Foreword

It is with great pleasure that we present “Sowing the Seeds of Change” An Environmental Teaching Pack for the Hospitality Industry. This is a joint initiative of the International Hotel and Restaurant Association (IH&RA), the United Nations Environment Programme, Division of Technology, Industry and Economics (UNEP DTIE) and the International Association of Hotel Schools (EUHOFA International).

The IH&RA and UNEP have an ongoing partnership to promote environmental awareness and good practice in the hospitality industry. A survey conducted by the two organisations identified a lack of information, expertise and practical teaching tools as the major concern when introducing environmental issues into the hospitality curricula. EUHOFA International endorsed these findings.

This Environmental Teaching Pack is designed to fill this gap. Both comprehensive and user-friendly, it includes detailed information for teachers and trainers, exercises and case studies for practical demonstration purposes, and identifies industry best practice. It is intended to help hospitality education centers develop and expand their environmental curricula, thereby introducing environmental issues into the education and training agendas of tomorrow’s hospitality and tourism professionals. Hospitality professionals wishing to develop in-house training programmes to support environmental initiatives in their hotels will find this pack an invaluable resource.

The IH&RA, UNEP DTIE and EUHOFA would like to thank all those people and organisations without whose support the publication of this manual would not have been possible.

John J. Bowen, President, EUHOFA
Ejnar Söder, President, IH&RA
Jacqueline Aloisi de Lardarel, Director, UNEP DTIE
About the Partners

The United Nations Environment Programme

The mission of the UNEP Division of Technology, Industry and Economics is to help decision-makers in government, local authorities, and industry develop and adopt policies and practices that:

- are cleaner and safer;
- make efficient use of natural resources;
- ensure adequate management of chemicals;
- incorporate environmental costs;
- reduce pollution and risks for humans and the environment.

UNEP TIE activities focus on raising awareness, improving the transfer of information, building capacity, fostering technology cooperation, partnerships and transfer, improving understanding of environmental impacts of trade issues, promoting integration of environmental considerations into economic policies, and catalysing global chemical safety.

The International Hotel & Restaurant Association

The International Hotel & Restaurant Association (IH&RA) is a global network representing over 750,000 hospitality operators, associations and suppliers in more than 150 countries. Its mission is to protect, promote and inform the hospitality industry, which it estimates to comprise over 300,000 hotels and 8 million restaurants world-wide, employ 60 million people and contribute US$950 billion to the global economy.

Previous joint environmental initiatives include:

- Launch of the IH&RA’s annual Environmental Award in 1990 to promote environmental awareness among hotels, to recognise the efforts being made to ‘green’ the industry from within, and to identify industry best practice. The award is judged by UNEP DTIE and IHEI, and sponsored by American Express.
- Joint publication of Environmental Good Practice in Hotels (1996) by the IH&RA and UNEP – a compilation of case studies of environmental good practice based on the entries of the IH&RA Environmental Award.

The International Association of Hotel Schools (EUHOFA International)

Founded in 1955, the International Association of Hotel Schools (EUHOFA International) is a non-profit, worldwide association of more than 140 renowned hotel schools, colleges and universities from thirty countries of the five continents. EUHOFA contributes to the exchange of ideas and experience in the field of professional training and education in the hotel and tourism industries, as well as the constant improvement and progress of hospitality training. It undertakes appropriate action to promote and improve professional education, and maintains regular contact with organisations connected to the industry.
About the Sponsors

Le Ministère de l’Aménagement du Territoire et de l’Environnement (French Ministry of Spatial Planning and Environment)

The French Ministry of Spatial Planning and Environment’s mission is to evaluate the problems affecting our environment, to implement research projects and develop concerted action at both the national and international levels.

Fondation Nestlé Pro Gastronomia

Nestlé has been a leading food manufacturer and major purchaser of agricultural raw materials for over 130 years. Food and agriculture are an integral part of the social, cultural, economic and political context of every community. Today, Nestlé is the world’s largest and most diversified food company, with nearly 500 factories around the globe, producing healthy, enjoyable food products for every stage of life.

The Company’s primary function is the transformation of perishable raw materials into finished products that meet consumers’ expectations for safety, quality, convenience and value. Nestlé has always recognised the need to protect the environment in its business activities, a commitment embodied in The Nestlé Policy on the Environment.

Nestlé carries out its global social responsibility, firstly, by taking a long term approach to strategic decision making which recognises the interests of its consumers, shareholders, business partners, and the worldwide economies in which it operates. Secondly, the Group’s responsibilities and values are reflected by the commitment of management and employees at all levels, to its Corporate Business Principles, which define standards of behaviour for all companies in the Nestlé Group, and are intended to complement applicable legislation and international recommendations.

P. Brabeck-Letmathe, Chief Executive Officer, Nestlé S.A.

Golden Tulip Hotels

Golden Tulip Hotels is a Dutch-owned international chain of hotels involved in the development, management and marketing of three, four and five star hotels. The chain’s portfolio now contains over sixty-five hotels, and more than 400 hotels in over 50 countries are associated with the licensing organisation, Golden Tulip Worldwide.

Recently Golden Tulip Hotels merged with the Spanish company NH Hoteles to create a leading European urban business hotel group.

Golden Tulip Hotels’ mission is to combine consistent international standards of quality with the individual character inherent in each hotel. Focusing on this refreshing approach, the chain treats its guests as individuals, all of whom are served by friendly, well-motivated and properly trained staff under the direction of highly-skilled management teams. The perception of hotel guests remains central to the company’s philosophy, and is the starting point for every activity. And that is just one reason why Golden Tulip Hotels strongly supports the implementation of a sound environmental policy in hotels.
Hotel Nikko, Hong Kong

The 461-room, deluxe Hotel Nikko Hong Kong is situated on the beautiful Victoria Harbour waterfront on the Kowloon Peninsula. Hotel facilities include the Nikko floors with private lounge for VIPs, business centre, swimming pool, health club, shopping arcade, banquet rooms, seven restaurants, bars and lounges, serving international cuisine. Hotel Nikko was the corporate winner of the IH&RA’s Environmental Award in 1995.

Hotel Nikko, Hong Kong, was also instrumental in developing the Hong Kong Polytechnic University’s Environmental Management Manual for Hotels in Hong Kong. This manual is a template for use by hotels in Hong Kong. It forms part of the output from the project ‘Keeping Hong Kong’s Hotel Industry Competitive – Environmental Management Systems for Hotels’, funded by the Services Support Fund administered by the Industry Department, the Government of the Hong Kong Special Administrative Region and supported by the Hong Kong Hotels Association.

Copies of the CD-ROM format of this publication are included in the pack. The Coordinators would like to thank Hotel Nikko Hong Kong for this generous addition to the Teaching Pack.

The Orchid, Mumbai, India

The Orchid Hotel, the Kamat Group’s eco-sensitive property, is the first five-star hotel in Asia to be accredited with ECOTEL certification from the world’s leading hospitality valuation organisation, HVS International. Designed from the outset with preservation of the environment in mind, the Orchid is committed to enhancing the guest experience while setting a new standard of corporate responsibility through the conservation of natural resources, education, motivation of staff and cultivation of community relationships. The Orchid was the corporate winner of the IH&RA Environmental Award in 1999.

PA Consulting Group, USA

PA Consulting Group is a leading management, systems and technology consulting firm, with a unique combination of capabilities. Established almost 60 years ago, and operating worldwide from over 40 offices in more than 20 countries, PA draws on the knowledge and experience of some 3,700 people, whose skills span the initial generation of ideas and insights all the way through to detailed implementation.

PA’s tourism group is considered a global leader in environmental sustainability and through its in-house staff and extensive network of consultants, offers a wide range of sustainable tourism services to local and national governments, international development agencies and private companies. The group’s sustainable tourism work spans the globe and involves creating public and private partnerships for successful execution and draws on their experience in environmental management programmes, environmental market analysis and policy and institutional development. PA has ongoing sustainable tourism projects in the Middle East, Africa, Europe, the Americas and Asia/Pacific.
**Bass Hotels & Resorts**

Bass Hotels & Resorts is the most widely distributed hotel business in the world. It owns, manages and franchises more than 3,200 hotels in over 90 countries worldwide. The group’s impressive portfolio of brands includes Inter-Continental Hotels and Resorts, Crowne Plaza, Holiday Inn, Express by Holiday Inn and Staybridge Suites, which offer a variety of services, amenities and lodging experiences catering to virtually every travel occasion and guest need.

**Ecole de Savignac, France**

Founded in 1988 by the Chamber of Commerce and Industry of Périgueux, France, the Ecole de Savignac prepares its students for careers in the fields of hospitality and tourism. The programme runs for two years, after which graduates are awarded the prestigious ‘Diploma of International Management Studies’. The partners are especially grateful to the school for translating the pack into French.
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# Table of Contents

**User's Guide**

**Unit 1: Where Do We Stand? The State of The Global Environment**

## Unit Outline

**Section 1:** The State of The Environment: An Overview
- 1.1 Global Warming and Climate Change
- 1.2 The Depletion of the Ozone Layer
- 1.3 Water Scarcities and Pollution
- 1.4 Biodiversity Loss
- 1.5 Land Degradation
- 1.6 Acid Deposition
- 1.7 Air Pollution

**Section 2:** Introducing Sustainable Development
- 2.1 An Outline of Agenda 21
- 2.2 Broad Implications for Sustainable Development
- 2.3 What Does Sustainable Development Mean for tourism and Hospitality?

**Exercises**

**Glossary**

**Illustrations**
- Gdp Per Capita
- Annual Average Growth of Per Capital Gdp (1975-95)
- Measures of Poverty
- Human Development Index
- Anthropogenic Sources of Greenhouse Gases
- Global Carbon Dioxide Emissions
- Carbon Dioxide Emissions Per Capita
- Natural Disasters, 1993-97
- Total and Per Capita Energy Consumption, 1995
- Numbers of Motor Vehicles
- Global CFC Production
- Current Ozone Losses and UVB Increases
- Known and Estimated Total Numbers of Species
- Threatened Animal Species
- Calorie Intake Per Capita
- Change on Forest Extent, 1990-1995
- Sources of Global Sulphur Emissions
- So2 Emissions from Fossil Fuel Burning
- Global Carbon Dioxide Emissions
- Carbon Dioxide Emissions Per Capita
- Environmental Factors Affecting Health
# Unit 2: Tourism, Hospitality and the Environment – Impacts and Solutions

## Unit Outline

<table>
<thead>
<tr>
<th>Section 1: The Impacts of tourism and Hospitality on the Environment</th>
<th>37</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.1 Impacts of Tourism on Air</td>
<td>38</td>
</tr>
<tr>
<td>1.2 Impacts of Tourism on Land</td>
<td>38</td>
</tr>
<tr>
<td>1.3 Impacts of Tourism on Water</td>
<td>41</td>
</tr>
<tr>
<td>1.4 Other Related Issues</td>
<td>42</td>
</tr>
</tbody>
</table>

| Section 2: An Introduction to the Social and Cultural Impacts of Tourism | 43 |

| Section 3: Tourism and the Environment – The Other Side of the Argument | 45 |

| Section 4: The Need for Environmentally-sound Tourism | 46 |
| 4.1 The Framework for Environmentally-sound Tourism | 46 |

| Exercises | 51 |

---

# Unit 3: Environment Law, Voluntary Initiatives and Principles For Sustainable Development

## Unit Outline

| Section 1: An Introduction to Environmental Law | 57 |

| Section 2: Voluntary Initiatives and Partnerships | 59 |

| Section 3: Principles for Sustainable Development | 64 |

| Exercises | 67 |

| Glossary | 68 |

**Illustrations**

Iso Guidelines | 60 |
Unit 4: Environment Management Systems

UNIT OUTLINE

Section 1: An Introduction to Environment Management Systems
1.1 What is an Environment Management System (EMS)
1.2 The Origins of EMS

Section 2: Developing and Implementing EMS
EMS Stage 1: Assign Responsibility and Conduct Environment Status Review
EMS Stage 2: Establish Environment Policy and Set Environment Objectives and Targets
EMS Stage 3: Implementing the Environment Management Programme
EMS Stage 4: Conducting The EMS Audit and Reporting on Environment Performance
4.1 Environment Management System (EMS) Audit
4.2 Reporting on Environment Performance

Section 3: Department Checklists on Environment Management

Section 4: Case Studies on EMS In Hospitality Businesses
1. Turtle Island, Yasawas, Fiji
2. The Orchid Hotel, Mumbai, India
3. Hotel Madhuban, Dehra Dun, India
4. Hotel Mocking Bird Hill, Port Antonio, Jamaica
5. Saunders Hotel Group, The Lennox and Copely Square Hotels, Boston USA
6. Hotel Kurrajong, Australia
7. The Severin Sea Lodge, Mombasa, Kenya
8. Bass Hotels & Resorts (BHR)
9. Golden Tulip Hotels

Section 5: Introducing the Core Concepts of Environment Management
5.1 Cleaner Production
5.2 Eco-efficiency
5.3 Industrial Ecology (Systems Thinking)
5.4 Life Cycle Assessment

Section 6: EMS in the Future

Exercises

Glossary

Illustrations
Four Stages of EMS
Estimates of Energy Intensity and Costs in the UK
Energy Conversion
Carbon Dioxide Estimates
Sound Intensity
Maximum Permissible Industrial Workday Noise Levels
Environmentally-preferable Alternatives to Toxic Products
Unit 5: The Sustainable Siting, Design and Construction of Tourism Facilities

UNIT OUTLINE

Section 1: An Introduction to Sustainable Design

Section 2: Sustainable Siting of Buildings
2.1 Site Selection
2.2 Carrying Capacity Considerations
2.3 Environment Impact Assessment (EIA)
2.4 Building Placement

Section 3: The Sustainable Design of Buildings
3.1 Architectural Features of Buildings
3.1.1 Passive Solar Design
3.1.2 Daylighting
3.1.3 Renewable Energy Use
3.1.4 Architectural Features to Reduce and Reuse Water
3.1.5 Landscaping
3.2 Environment Considerations for the ‘Building Shell’
3.3 The Use of Environment Management During Occupation

Section 4: Reuse of Existing Buildings

Section 5: The Sustainable Construction of Buildings

Section 6: Case Studies
1. Ing Bank, The Netherlands
2. Plymouth College for Further Education, UK

Exercises

Glossary

Illustrations
Active Solar Heating
The Main Components of the PV System
Geothermal Heat Pumps
Ecowatt Micro Hydro-electric System
Small-scale Hydro System
Wind Turbines
Composting Toilet
Coefficient of Embodied Energy of Building Materials
Floor Plans PCFE Environment-exemplary Building

Parting Thoughts

Resources
USER’S GUIDE

What can you Expect from this Pack?
This is a complete information pack for developing and expanding the environmental curriculum in hotel schools.

- The pack will enable education professionals to develop a tailor-made environmental curriculum to suit the needs and objectives of each school and education system;
- For students of hospitality management, this pack will serve as an environmental information and resource handbook;
- For hospitality professionals, this pack provides all the necessary information for raising environmental awareness and for developing and implementing Environment Management Systems.

The pack is most suitable for developing syllabuses at the degree and postgraduate level. Sections of the pack, especially unit 2 and unit 4, can be adapted for lower level studies.

- The pack covers a minimum of 45 hours of teaching time – a half-semester module;
- The pack can be used to develop an independent environmental curriculum, or to incorporate environment information into syllabuses such as Front Office and Rooms, Back Office and Administration, Food and Beverage, Kitchen and Tourism Management;
- The pack can also be used by hotel and tourism schools to develop:
  - Environment training programmes for hospitality professionals
  - Short courses on environment management
  - Distance learning programmes on environment management;
- Examples of good practice and case studies have been included to demonstrate theory in practice. It is strongly recommended that teaching be supplemented with additional information, and with examples relevant to the national and local context. Site visits and guest lectures by environment and hospitality professionals will also provide value input.

How is the Pack Organised?
- The pack is organised into 5 units;
- Each unit begins with a unit outline and teaching objectives, and ends with a glossary and exercises;
- Units 2, 4 and 5 include examples of good practice and case studies;
- A short list of resources is provided at the end of the publication.
WHERE DO WE STAND?
THE STATE OF THE GLOBAL ENVIRONMENT
UNIT 1
WHERE DO WE STAND? THE STATE OF THE GLOBAL ENVIRONMENT

Unit Outline
The objective of this unit is to provide an overview of the global environment field as it stands today. It is divided into 2 sections:

Section 1
The state of the environment – an overview
To give readers an impression of the seriousness of environmental threats facing the world today, this section outlines and discusses:

- Climate change;
- Depletion of the ozone layer;
- Water scarcities and pollution;
- Biodiversity loss;
- Land degradation;
- Acid deposition;
- Air pollution.

The discussion explains why these threats are important to tourism, and outlines international action being taken to combat them.

Section 2
Introducing sustainable development
If readers are to appreciate the importance of environment management in tourism and hospitality, they need to be first introduced to the concept and implications of sustainable development.

The framework and principles for sustainable tourism are covered in Unit 2.

Given the diversity and continuous evolvement of the environment field, it is recommended that the information in this unit be:

- Applied to national environment issues;
- Supplemented with news and views of topical environment issues at the time of teaching.

Learning Objectives
At the end of the lesson, students should be able to:

- Gain an overall appreciation of global environment issues;
- Link global environment threats to national environment issues and appreciate that global environment threats are caused by environment degradation, pollution and resource depletion at the national level;
- Define and discuss sustainable development.
Healthy economies and societies cannot continue to develop in a world with so much degradation of the environment and such large inequalities in the distribution of wealth and resources. Degradation of the environment is the biggest threat facing the world today. The excessive damage we are causing to the earth is threatening our very existence.

To understand this phenomenon better, let us draw a simple analogy between the human body and the earth. If a person continuously works too hard and too fast, he or she will have a physical and mental breakdown, as the body cannot maintain the level of activity demanded of it. Similarly, the rate at which human economic activity extracts resources and emits pollution and waste is growing to be intolerable: the earth can no longer sustain it.

The following tables highlight some of the major threats to the world environment today which are then discussed in further detail.

### GDP per capita

![Graph showing GDP per capita from 1975 to 1995 for different regions: North America, Europe and Central Asia, West Asia, Latin America and the Caribbean, Asia and the Pacific, Africa, and the World. The graph indicates a steady growth in global GDP/capita, with differences both between and within regions.](source)

**Source:** compiled by RIVM, the Netherlands, from World Bank and UN data/
Published in Global Environment Outlook 2000, UNEP

### Annual average growth of per capita GDP (1975-95)

<table>
<thead>
<tr>
<th>Region</th>
<th>Annual Average Growth</th>
</tr>
</thead>
<tbody>
<tr>
<td>Africa</td>
<td>-0.20%</td>
</tr>
<tr>
<td>Asia and the Pacific</td>
<td>3.09%</td>
</tr>
<tr>
<td>Europe and Central Asia</td>
<td>1.54%</td>
</tr>
<tr>
<td>Latin America and the Caribbean</td>
<td>0.66%</td>
</tr>
<tr>
<td>North America</td>
<td>1.53%</td>
</tr>
<tr>
<td>West Asia</td>
<td>-2.93%</td>
</tr>
<tr>
<td>WORLD</td>
<td>1.37%</td>
</tr>
</tbody>
</table>

**Source:** compiled by RIVM, the Netherlands, from World Bank and UN data/
Published in Global Environment Outlook 2000, UNEP
### Measures of poverty

<table>
<thead>
<tr>
<th>Measure</th>
<th>Millions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Malnourished children</td>
<td>2,000</td>
</tr>
<tr>
<td>People not expected to survive to age 40</td>
<td>800</td>
</tr>
<tr>
<td>People lacking health services</td>
<td>4,000</td>
</tr>
<tr>
<td>Illiterate adults</td>
<td>6,000</td>
</tr>
<tr>
<td>People lacking safe water</td>
<td>1,000</td>
</tr>
<tr>
<td>People who are income-poor</td>
<td>1,200</td>
</tr>
</tbody>
</table>

Source: UNDP 1997/Published in Global Environment Outlook 2000, UNEP

### Human development index

<table>
<thead>
<tr>
<th>Region</th>
<th>HDI Value 1994</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sub-Saharan Africa</td>
<td>0.38</td>
</tr>
<tr>
<td>East Asia</td>
<td>0.65</td>
</tr>
<tr>
<td>South Asia</td>
<td>0.46</td>
</tr>
<tr>
<td>South-east Asia and the Pacific</td>
<td>0.67</td>
</tr>
<tr>
<td>Arab States</td>
<td>0.64</td>
</tr>
<tr>
<td>Latin America and the Caribbean</td>
<td>0.83</td>
</tr>
<tr>
<td>Eastern Europe and CIS</td>
<td>0.76</td>
</tr>
<tr>
<td>Industrial Countries</td>
<td>0.91</td>
</tr>
<tr>
<td>World</td>
<td>0.76</td>
</tr>
</tbody>
</table>

Source: UNDP 1997/Published in Global Environment Outlook 2000, UNEP

#### 1.1 Global Warming and Climate Change

The earth’s atmosphere is getting warmer. The United Nations Environment Programme reports that the average global temperature, 15°C, has increased by 0.3° to 0.6° since the late 19th century, while thermal expansion of the oceans has caused sea levels to rise by 10 to 25cm in the same period. The 11 warmest years of this century have all occurred during the 1990’s, with 1997 being the warmest so far.

Global warming, or the ‘greenhouse effect’, is a natural atmospheric feature. The earth’s surface absorbs radiation from the sun and re-radiates it into the atmosphere. Radiatively active gases, or ‘greenhouse’ gases, absorb some of this thermal radiation. If this did not occur, the earth’s average temperature would be minus 18°C. Human industrial activities, however, are substantially increasing the atmospheric concentrations of greenhouse gases. This enhances the natural greenhouse effect, causing additional warming of the earth’s atmosphere. This is called ‘global warming’. The main gases that absorb thermal radiation and increase global warming are carbon dioxide (CO2), methane (CH4), nitrous oxide (N2O), the CFCs, ozone (O3) and water vapour.
Anthropogenic sources of greenhouse gases

<table>
<thead>
<tr>
<th>GASES</th>
<th>ANTHROPOGENIC SOURCES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carbon dioxide</td>
<td>Fossil fuel burning for industrial activity, energy generation and vehicles</td>
</tr>
<tr>
<td>Methane</td>
<td>Agriculture, biomass burning, gas drilling and transmission, landfill sites, coal mining</td>
</tr>
<tr>
<td>Nitrous oxide</td>
<td>Fossil fuel burning for industrial activity, energy generation and vehicles</td>
</tr>
<tr>
<td>CFCs</td>
<td>Used as refrigerants, propellants, and blowing and cleaning agents</td>
</tr>
</tbody>
</table>

* CFCs also cause depletion of the ozone layer

The Impacts of Global Warming

Global carbon dioxide emissions

1,000 million tonnes CO₂/year

Source: CDIAC 1999/Published in Global Environment Outlook 2000, UNEP

Carbon dioxide emissions per capita

Source: compiled by UNEP GRID Geneva from CDIAC 1998 and WRI, UNEP, UNDP and WB 1998/
Published in Global Environment Outlook 2000, UNEP
The greatest concern about global warming is that it is causing climate change. Computer models predict that the heating of the earth's atmosphere will alter atmospheric and oceanic temperatures as well as air circulation and weather patterns. This could result in:

- **ALTERED RAINFALL PATTERNS**
  
  Rainfall is expected to increase in the middle and high latitude continents and decrease in the lower latitudes. This will cause flooding and erosion in some regions, and drought in others. Boreal forests and permafrost areas are expected to undergo major changes. Coastline ecosystems, flatlands and small islands risk disappearing altogether. Changes in water availability will affect crop yields and increase the incidence of vector-borne diseases. For example there has already been a global resurgence of malaria, dengue fever and cholera.

- **SHIFT IN CLIMATE ZONES**
  
  Projected changes in rainfall and temperature for the next 50 years could result in a shift of climate zones by several hundred kilometres towards the poles. Flora and fauna will lag behind the climate shifts and find themselves in 'hostile' environments. As some species will not be able to adapt to such rapid changes in habitat, species will become extinct in greater numbers than before.

- **INCREASE IN THE FREQUENCY AND INTENSITY OF STORMS**
  
  A shift in large-scale weather patterns such as depression tracks could greatly alter the variability and the extremes of weather patterns. For example, intense storms usually only develop around oceans that are warmer than 26°C. Global warming means larger areas of ocean will reach such temperatures. This will cause more frequent and more intense storms all over the world. Already, the worldwide increase in natural disasters is causing extraordinary losses for property insurers. Annual insured losses have risen dramatically – from about US$1.8 billion a year in the 1980s to over US$10 billion a year in the 1990s.

- **RISING SEA LEVELS**
  
  The UN International Panel on Climate Change (IPCC) predicts that thermal expansion of the oceans and melting of the glaciers could cause average sea levels to rise by 6cm a decade. Increased flooding will displace millions, alter coastlines, contaminate freshwater supplies, and destroy agricultural land. Islands, lowlands and coastlines are particularly at risk from devastating flood and storm damage.
**Natural disasters, 1993-97**

<table>
<thead>
<tr>
<th>Region</th>
<th>Numbers of Disasters</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sub-Saharan Africa</td>
<td>160</td>
</tr>
<tr>
<td>South Asia</td>
<td>120</td>
</tr>
<tr>
<td>Southeast Asia</td>
<td>80</td>
</tr>
<tr>
<td>East Asia</td>
<td>40</td>
</tr>
<tr>
<td>South America</td>
<td>160</td>
</tr>
<tr>
<td>North America</td>
<td>120</td>
</tr>
<tr>
<td>Rest of Europe</td>
<td>80</td>
</tr>
<tr>
<td>Central America</td>
<td>40</td>
</tr>
<tr>
<td>European Union</td>
<td>160</td>
</tr>
<tr>
<td>Oceania</td>
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<td>Caribbean</td>
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<tr>
<td>North Africa</td>
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<tr>
<td>Central Asia</td>
<td>160</td>
</tr>
<tr>
<td>West Asia</td>
<td>120</td>
</tr>
</tbody>
</table>

Note: not all regions correspond to GEO-2000 regions

Source: CRED 1999/Published in Global Environment Outlook 2000, UNEP

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**Why Should the Tourism Industry be Concerned about Climate Change?**

**Total and per capita energy consumption, 1995**

<table>
<thead>
<tr>
<th>Region</th>
<th>Energy Consumption per Capita (GJ)</th>
<th>Total Energy Consumption (PJ)</th>
</tr>
</thead>
<tbody>
<tr>
<td>World</td>
<td>244.90</td>
<td>344.90</td>
</tr>
<tr>
<td>Africa</td>
<td>8.51</td>
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<tr>
<td>Asia and the Pacific</td>
<td>28.56</td>
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<tr>
<td>Europe and Central Asia</td>
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<td>Latin America and the Caribbean</td>
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<tr>
<td>North America</td>
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<tr>
<td>West Asia</td>
<td>99.89</td>
<td>99.89</td>
</tr>
</tbody>
</table>

In 1995, the high-income countries, home to 20 per cent of the world’s population, accounted for about 60 per cent of world commercial energy use.

Source: compiled by UNEP GRID Geneva from UNSTAT 1997/Published in Global Environment Outlook 2000, UNEP
The tourism and hospitality industries are important motivators of travel and transport and significant users of energy. Both transport and energy directly involve the burning of fossil fuels and the emission of greenhouse gases. Tourism is therefore an indirect, but significant, contributor to global warming and climate change.

The areas that are most at risk from climate change – small islands, coastal zones, flatlands and wetlands – are primary tourist attractions. The industry would suffer heavy losses if these areas were destroyed. A shift in climate zones and subsequent changes to flora and fauna could mean that many countries would lose their key tourist sites. Increased floods and storms would destroy basic infrastructure, and the resulting epidemics will reduce tourist arrivals to such areas. Consider the following examples:

- More frequent periods of extreme heat are causing discomfort in many eastern Mediterranean resorts, where the number of days above 40°C has increased;
- A decline in cloud cover in Australia will increase exposure to the sun's harmful rays;
- Malaria is likely to re-emerge in Spain;
- Cruise ships no longer visit islands where dengue fever is present; this is threatening the Caribbean's 12-billion-dollar, half-million-employee tourism industry;
- Skiing destinations, which are recording less snowfall and shorter skiing seasons;
- Hurricane George brought losses of US$ 2 million to the Caribbean tourism in 1998, and arrivals to Peru, Equador and Bolivia fell by 45% following flood damage from Hurricane Mitch the same year;
- The 1991 cholera epidemic cost Peru over one billion dollars in lost seafood exports and tourism;
- Coral bleaching, fading of the reef's rich colours, has until now been triggered by the rise of local seawater temperature over a critical threshold. Since 1997, there have been six excessively warm periods, which caused mass coral bleaching the world over. The most damage was caused in 1998, the hottest year of the century;

*Note: Data Source: Worldwide Fund for Nature (WWF)*
• International airline and hotel industries lost over two billion dollars because of the 1994 epidemic in India;
• The 1997 summer pfiesteria outbreak in the United States cost taxpayers, seafood industries and tourism tens of millions of dollars;
• The 2001 outbreak of foot-and-mouth disease in the UK (caused by unsustainable agricultural practices and the mass transport of animals over long distances) cost the British tourism industry £125 million a week. Revenue losses from overseas tourists are expected to reach £2.5 billion by the end of 2001.

COMMON QUESTION Many people, especially in the northern hemisphere, suggest that climate change will benefit them: warmer weather, increased agricultural possibilities, cheaper living etc. Is there any truth in such remarks?

These people do not appreciate the full consequences of climate change. Shifts in geographical zones, increased storms and floods, the extinction of important plant and animal species will not make life more pleasant, but will bring large-scale misery and suffering. In addition, as risks to business - including tourism - rise, it will become increasingly hard to obtain investment or favourable loans and insurance cover. This is already an issue for industries that are major greenhouse gas emitters.

International Action to Control Climate Change

Since the Earth Summit of 1992, the United Nations Framework Convention on Climate Change has been working towards stabilising greenhouse gas concentrations at levels that would prevent dangerous interference with the earth’s climate.

At COP-3, the Third Conference of Parties held in Kyoto, Japan, in December 1997, 54 countries signed the Kyoto Protocol. This set targets and timetables for reducing greenhouse gases from the year 2000 onwards. Industrialised countries (referred to in the Protocol as ‘Article One countries’) agreed to reduce overall carbon emissions to at least 5% below 1990 levels by 2008 and 2012; Japan and the USA agreed to cut greenhouse gas emissions by 6% and 7% respectively, the EU to reduce overall carbon emissions by 8%; Russia agreed to maintain its 1990 levels. Article 3.7 of the Kyoto Protocol (the ‘Australia Clause’) permits countries where land-use change and forestry areas are sources of greenhouse gas to include emissions from land-use change in their 1990 base year when calculating targets for the commitment period 2008-2010 (this concerns only Australia, which is allowed to increase greenhouse gas emissions by 8%).

These targets represent a 30% cut in greenhouse gas emissions, compared to what we could expect by 2010 with no such measures. The agreement also requires developed countries to demonstrate progress by 2005. The gases to be reduced are carbon dioxide, methane, nitrous oxide, hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulphurhexafluoride (SF6).

Countries are allowed flexibility in how they make and measure reductions in emissions. The Protocol makes provisions for:

• Using net changes in emissions by direct anthropogenic land use changes and forestry activities to meet commitments. These are, however, limited since 1990 to deforestation, aorestation and reforestation;
- An international, market-based emissions trading mechanism that will allow Article One countries to buy and sell excess emission credits. Rules and guidelines for trading are to be established in 2000;
- Joint implementation projects among Article One countries, allowing a country to take emissions credits for projects that reduce emissions or enhance emissions-absorbing sinks such as forests from other Article One countries;
- A Clean Development Mechanism (CDM) under which Article One countries can take credits for projects that reduce emissions in non-Article One countries. Any group of Article One countries may also set up a bubble or umbrella to meet their total commitments by allocating a share to each member. In an umbrella agreement, the total reduction of all member nations would be met collectively through the trading of emissions rights.

The Kyoto Protocol is an important signal to businesses that greenhouse gas-free products and services must be developed and used more. The use of ‘no regrets’ options – strategies that are economically and socially beneficial whether or not climate change occurs – is being widely implemented. ‘No regrets’ emissions strategies include:

- Supply-side measures such as the diversification of energy sources, the reform of transport sectors and the use of renewable energy;
- Demand-side measures such as promoting energy conservation in homes, offices and industries, limiting methane emissions from waste management and energy systems, protecting forests and increasing the energy efficiency of appliances.

Since 1998, governments have reconvened every year to work on the setting up of a framework for trading emissions credits, for an international enforcement mechanism and for financing clean air projects in developing countries.

1998-1999 saw record temperatures, increased natural disasters, reports of shrinking ice packs and disappearing or ‘moving’ species. These all underline the necessity for action.

### 1.2 The Depletion of the Ozone Layer

Nearly 90% of all ozone, a naturally occurring gas, is found in the stratosphere, 12-15km above the earth’s surface: this is called the ozone layer. The ozone layer is vital because it absorbs harmful ultraviolet radiation (UVR) from the sun and stops it reaching the earth’s surface.

Some man-made chemicals containing chlorine and bromine move across the troposphere and into the stratosphere. These chemicals are stable in the troposphere, but in the stratosphere they are broken down into extremely reactive forms by high levels of UVR. They then become part of a series of complex reactions that break down the ozone molecule (O3) into an oxygen (O2) molecule. This leads to the thinning of, or the ‘hole’ in, the ozone layer.

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1 Ultraviolet radiation is made up of UVA, UVB and UVC
Impacts of Ozone Layer Depletion

As the ozone layer thins, higher levels of UV-B radiation reach and damage life on earth. This can cause:

- Increases in the pace of global warming and climate change;
- More cases of sunburn and skin cancers in humans;
- More cases of cataract, snow blindness (actinic keratitis) and other chronic eye diseases;
- Damage to immune systems, reducing human and animal resistance to infections and diseases including cancers, allergies, and diseases such as malaria, leishmaniasis and herpes, where the body's major defence system is the skin;
- Damage to crops (smaller plants, lower yields and nutritional value) and to natural ecosystems in the form of altered plant structures and growth patterns, and changes in the competitive balance between plants and consequently the animals that consume them: such changes have already been recorded on detritus organisms, plant pathogens and pests;

Current ozone losses and UV-B increases

<table>
<thead>
<tr>
<th></th>
<th>Ozone loss (%)</th>
<th>UV-B increase (%)</th>
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<tbody>
<tr>
<td>Northern Hemisphere, mid-latitudes, winter/spring</td>
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<td>7</td>
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<tr>
<td>Northern Hemisphere, mid-latitudes, summer/autumn</td>
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<tr>
<td>Southern Hemisphere, mid-latitudes, year-round</td>
<td>5</td>
<td>6</td>
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<tr>
<td>Antarctic spring</td>
<td>50</td>
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<tr>
<td>Arctic Spring</td>
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<td>22</td>
</tr>
</tbody>
</table>

Note: figures are approximate and assume other factors, such as cloud cover, are constant

Source: WMO, UNEP, NOAA, NASA, and EC (1998)/ Published in Global Environment Outlook 2000, UNEP
• Damage to marine and aquatic life through reduced growth of plants and life forms at the bottom of the food chain (phytoplankton, zooplankton, juvenile fish, crabs, shrimps etc), which will subsequently affect the growth of all marine life and reduce fish harvests;
• Damage to man-made materials through the faster degradation of paint, plastics and other materials.

The major groups of ozone-depleting substances (ODs) are:

• CHLOROFLUOROCARBONS (CFCs)
  First synthesised in 1928, CFCs were widely used as refrigerants in refrigerators, freezers and air-conditioners, as propellants in aerosol spray cans, blowing agents in the manufacture of foams, and cleaning agents for electronic equipment and in dry cleaning.

• HYDROCHLOROFLUOROCARBONS (HCFCs)
  First developed to replace CFCs as refrigerants and blowing agents. Though less potentially ozone-destructive than CFCs, they are nonetheless too dangerous for long-term use.

• CARBON TETRACHLORIDE AND METHYL CHLOROFORM
  These are used as solvents in dry cleaning and many other processes.

• HALONS
  Halons contain bromine and are used in fire-extinguishing equipment. Some halons have an ozone-depleting potential ten times higher than that of CFCs.

• METHYL BROMIDE
  This is used as an agricultural pesticide and to fumigate agricultural products.

Experts have classified each individual ozone-depleting substance (ODS) according to its ozone-depleting potential (ODP), on the basis of its atmospheric lifetime, stability, and reactivity and ozone-depleting capacity, by counting the chlorine or bromine atoms it contains. All ODP values are expressed in relation to the baseline value of 1 for CFC-11.

**Why Should the Tourism Industry be Concerned about Ozone Layer Depletion?**

The tourism industry directly contributes towards ozone-layer depletion, because it is an important user of ODSs for refrigeration, air-conditioning and fire-extinguishing, as well as of foam insulation, upholstery, and aerosol spray cans. Tourists, especially those looking for sunshine and the ‘open air’, are among the first to feel the impact of high levels of UV B radiation, which is increasing skin cancers, cataracts, and immunity system diseases. Damage to crops and marine life also means that key tourist resources will be affected.

**International Action to Halt Ozone Layer Depletion**

When evidence of the Antarctic ozone hole was first published, nations concerned about this crisis began negotiations that led to the adoption, in September 1987, of the Montreal Protocol on Substances that Deplete the Ozone Layer. This identified...
major ODSs and set a timetable for their phasing-out through the development of substitutes, changes in manufacturing processes, and recycling, reclamation and recovery. The Protocol came into force in 1989.

The Montreal Protocol first established control measures for eight ODSs, known as ‘controlled substances’: five CFCs and three halons. At further meetings (London 1990 and Copenhagen 1992) these controls were extended to require developed countries to phase out fifteen CFCs, three halons, 34 HBFCs, carbon tetrachloride, and methyl chloroform. In 1995 a longer-term reduction schedule leading to the complete phasing-out of forty HCFCs was agreed, and methyl bromide was added to the control list. Recognising the need for economic development in developing countries, the Montreal Protocol gave them an extra 10 years to implement the reduction and phasing-out measures. These countries are known as ‘Article Five Countries’.

Despite these impressive international efforts the ozone layer continues to be depleted, with record losses observed in the Antarctic and the northern hemisphere in 1997-98. Spring 1998 also saw a sharp increase in UVB radiation in the northern hemisphere’s middle and high latitudes. This was mainly due to the long life of ODSs already present in the atmosphere – the average lifespan of a CFC molecule in the atmosphere is 50-100 years. The hole in the ozone layer will therefore continue to expand until all atmospheric concentrations of ODSs are eliminated.

1.3 Water Scarcities and Pollution

Water is a renewable but finite resource that is naturally recycled in the earth’s hydrological cycle. Despite being renewable, it is considered a finite resource because human patterns of water use rarely correspond with natural patterns of water availability. For example, in temperate regions, most rain falls in winter, while the greatest demand is in summer. Likewise, many regions of high population and intensive industry and agriculture are situated in low-rainfall areas. These demand patterns require water to be stored, treated and supplied for industrial, irrigation and domestic uses. Water is also required for such ‘in-stream’ uses as tourism and recreation, transport, and power generation.

Despite the fact that 70% of the earth’s surface is covered with water, only 3% of that is freshwater; most of it sealed in glaciers. In addition to surface freshwater, ground and marine water are also major sources of water supply. Over 1,500 million people currently depend on groundwater for their drinking water needs. Marine water is important both for direct use after desalination and for fisheries and geological resources.

Water Scarcity

Growing worldwide urbanisation and industrialisation are increasing the demand for water. Many issues are involved, including:

- Pollution of water sources through poor wastewater treatment;
- Interruptions to natural water flows by dams and barrages intended to facilitate water supplies and storage;
- Inefficiencies in the distribution of water from storage areas.

Countries that extract over 20% of their available water supply (both aquifer and surface waters) are referred to as ‘waterstressed’. Two thirds of the world’s population are expected to be waterstressed by 2025.
Water Pollution

A change in natural water quality implies water pollution. While natural events such as storms, cyclones and mudflows can cause temporary deterioration, the term ‘pollution’ implies the more serious and longer-term water quality problems that result from domestic, industrial and agricultural activity.

Water pollution is critical, especially given the increasing demand for high-quality water for drinking, recreation and industry, coupled with the increased use of water for sanitation and waste disposal – all the water being taken from the same source. Groundwater or aquifer pollution is a particular problem, as this water has a longer residence time in the natural hydrological cycle than surface water.

Some 1,500 substances have been listed as aquatic pollutants. The main sources of marine water pollution are:

- Organic waste from sewerage and other industrial and agricultural sources (the primary source);
- Oil spills or discharges from transport, offshore installations, terminal operations, coastal refineries and municipal and industrial activity;
- Heavy metals discharged through mining, smelting and refining;
- Organochlorines and PCBs discharged by industrial processes;
- Radioactivity (which can also occur naturally, mainly from potassium-40 and other decay products);
- Heat or thermal pollution.

The Impacts of Water Pollution

The impacts of water pollution depend on the quantity and type of pollutants and the ecological conditions in the environment that receives them. Some water pollution impacts are briefly discussed below.

- Organic pollutants such as sewage and agricultural waste break down in the presence of oxygen, through bacterial activity that reduces the oxygen concentration in the water. This can be naturally supplemented through the digestion of oxygen from the surrounding air. The digestion of oxygen is, however, a slow process and anaerobic bacteria begin to thrive as oxygen levels drop. The end products – hydrogen sulphide, methane and ammonia – are toxic.
- Water pollution causes cultural eutrophication. Cultural eutrophication is the human-induced enrichment of water by inorganic nutrients such as phosphates and nitrates, which are discharged into water bodies through urban sewage and agricultural effluent, especially animal waste. Cultural eutrophication first stimulates plant growth and in extreme cases can result in algae blooms. These plants are not simply anaesthetic in terms of smell, slime and flies; they also severely restrict the transparency of water to light. This results in a series of chain reactions leading to the widespread death of fish and aquatic invertebrates. The loss of these species affects other animals further up the food chain, including plants and fish-eating birds.
- Heavy metals in water bodies can concentrate in filter-feeding molluscs such as mussels. This may have adverse effects on other aquatic flora and fauna, and on human health when people eat contaminated shellfish.
• Thermal wastewater from cooling in industry processes and power stations can increase turbidity in water and lead to an increase in the oxygen demand of other waste effluents. Higher temperatures in water can also result in an unusual assembly of plants and animals that are not found under normal climatic conditions. For example, invertebrates of semi-tropical origin have been found growing in northern water bodies that become artificially warm.

• When fuel oil is spilt at sea it first spreads over the water surface as a slick. The lightest components, which are also the most toxic, either evaporate or dissolve in the water. The immobile elements then disperse in the water and emulsify to form a sticky brown mass that causes major problems when it comes ashore. The heaviest residues form lumps of tar. Oil spills can kill a range of marine life including fish, seals, otters and birds.

• Organic contaminants such as polychlorinated biphenyls (PCBs) and polyaromatic and heteroaromatic hydrocarbons (PAHs) are a great human health hazard. They are extremely persistent in the environment, remaining stable under temperatures at which most other organic compounds, natural or synthetic, decompose. PCBs and PAHs are soluble in fat, and therefore ‘bioaccumulate’ up the food chain. Studies of first- and second-order marine carnivores, including seals and birds in North America and Europe, have indicated high tissue concentrations of PCBs. This is thought to cause serious abnormalities in feeding and breeding.

Other Water Management Issues

Many of the world’s major rivers flow through several different countries. This can cause serious sharing and management problems. International conflicts over water resources have arisen in the Middle East, Asia and Africa.

There can also be management and distribution problems at the national level. In most countries there is little co-ordination between the different bodies responsible for water, which can result in confused supply, treatment, and discharge. In coastal areas, there may be additional problems involving fisheries, including fish farming, maritime transport and tourism. This has already been experienced in many destinations.

The availability of adequate safe drinking water is also critical, to limit risks of gastro-enteritis, hepatitis A and typhoid. There is also mounting concern on effects synthetic chemicals and the way they mimic natural hormones and cause radical disruption of the human reproductive system. Exposure (even to a foetus in the womb), to minute quantities of these chemicals, can cause sterility, lower sperm counts, malformed reproductive organs, and is even suspected to affect intelligence and temperament.

Why Should the Tourism Industry be Concerned about Water Scarcity and Pollution?

Water is perhaps the tourism industry’s most important resource. It is estimated that in most developing countries, a tourist uses ten times more water every day than a local inhabitant. Water quality is also important for in-stream tourism sites such as bathing beaches, rivers and lakes. Water pollution in these sites will automatically result in losses to tourism.
International Action to Reduce Water Pollution

The International Convention for the Prevention of Pollution of the Sea by Oil, commonly referred to as the ‘Law of the Sea’ and signed in 1954, was the first international convention to address water pollution. Several annexes and protocols followed. Other international agreements on water include:

- The Convention for the Protection of the Mediterranean Sea Against Pollution, Barcelona, 1976, and subsequent protocols;
- The Convention for the Protection of the Black Sea Against Pollution, Bucharest, 1992;

The United Nations Environment Programme (UNEP) has played an important role in catalysing and organising regional agreements on marine pollution. It launched the Regional Seas Programme, which has now grown to cover ten Action Plans involving 120 countries. The Action Plans of the Regional Seas Programme cover the Mediterranean, Kuwait, West and Central Africa, the Caribbean, East Asia, the Southeast Pacific, the Red Sea and the Gulf of Aden, the South Pacific, Eastern Africa, and South Asia.

Despite these efforts, it is worrying to report that the world’s water crisis continues, as there is little integrated, mutually supportive action on water management, either within or beyond national boundaries.

1.4 Biodiversity Loss

Biodiversity is the basic resource that acts as the earth’s life support system. Soil formation, nutrient recycling, energy absorption, water purification, waste degradation and the continuation of natural bio-chemical cycles all depend on animals and plants. Biological systems are the culmination of billions of years of evolution. They maintain essential natural processes at no additional cost to us.

Industrial and agricultural expansion, shifting and slash-and-burn cultivation, soil degradation, water and air pollution, poor land-use practices, the depletion of water sources, the conversion of natural habitats to other uses, the introduction of non-native species and climate change are collectively causing the loss, fragmentation and degradation of habitats and biodiversity. The 1995 UNEP Global Biodiversity Assessment reports that species extinction is proceeding 50-100 times faster than the average expected natural rate. The drive for increasing agricultural yields is further reducing the genetic diversity of crop plants.

Biodiversity protection is critical, as it is one of mankind’s most important resources. A few examples include:
• Food;
• Industrial and commercial products such as wood, cotton, jute, rubber and other resins, wool, hides, etc;
• Wild plants and animals are an important source of drugs, analgesics, antibiotics, anticoagulants, and antiparasitics. 50% of all prescription drugs contain natural products;
• The beauty and integrity of natural ecosystems such as mountains and forests are important tourism resources. In many countries ecosystems are more valuable as national parks or reserves than when turned into...
housing estates or farmland. For example, the economic yield from tourists visiting game reserves in Kenya to see the ‘big cats’ is equal to the income from 3,000 cows in Kenya. Revenue from big game hunting – tour, guides, accommodation, permits – is only 5% of that from big game watching. In the United States, 8 million bird watchers and 30 million anglers collectively spend several billion dollars on these activities every year.

The first step towards reducing biodiversity loss is to recognise 3 types of losses:

- **LOCAL OR GLOBAL SPECIES DESTRUCTION**
  Extinction is forever. When a species is lost, we lose not only all of the species, but also all potential adaptations that might have appeared in future offspring. Examples of extinct species include the American Messenger Pigeon and the Mauritius Dodo.

- **DEPLETION OF A ONCE COMMON SPECIES**
  This happens often – the American Bald Eagle, the Indian Tiger, for example. These animal populations can be restored provided small numbers of them survive and their original habitat has been maintained. But the reduction in numbers reduces the gene pool of the species, which can lead to the loss of key characteristics. The restored population can therefore suffer from a lower ability to survive in a changing environment.

- **ECOSYSTEM DESTRUCTION**
  This refers to human-induced habitat degradation or destruction, a cause of the rapid decline in the number and diversity of species.

It is also important to recognise that a certain level of biodiversity is essential for ecosystems to remain functional, self-sustaining, and life supporting. It is not enough just to conserve an arbitrary collection of species. In addition, conservation efforts must consider the ordered and integrated web of materials, cycles, and species, and the role of individual species in this complex system. Not all species are important: some are ‘key’, while others play more of a supporting role. Conservation strategies therefore need to consider:

- How many species must be protected?
- Which species must be protected?
- Where, geographically, must they be protected?

**The International Response to the Loss of Biodiversity**

An important first step came in 1992, with the establishment of the International Convention on Biological Diversity. This reinforced the importance of already existing international agreements such as the Ramsar Convention for the Protection of Wetlands, the Convention on International Trade in Endangered Species of Flora and Fauna (CITES) and the Convention on Migratory Species of Wild Animals (CMS).

On a national level, many countries are developing national biodiversity action plans. They include the establishment of protected areas, re-forestation, and the regeneration of degraded habitats.
Some facts on biodiversity losses:

- **AFRICA**
  Cultivation and slash-and-burn agriculture account for 70% of deforestation in Africa.

- **ASIA AND THE PACIFIC**
  India is expected to produce 75% of its rice from just 10 varieties in 2005, compared with the 30,000 varieties traditionally cultivated. In Indonesia, 1,500 varieties of rice disappeared from 1975 to 1990.

- **EUROPE**
  Species under threat include 42% of all mammals, 52% of all fish, 45% of all reptiles, 30% of all amphibians, and 15% of all birds.

- **LATIN AMERICA**
  The region includes five of the world’s mega-biodiversity countries – Brazil, Colombia, Ecuador, Mexico and Peru. The region lost over 7% of its tropical forests during the last decade.

- **NORTH AMERICA**
  728 species are listed as endangered or threatened.

- **CARIBBEAN**
  Coral reefs have declined by over 20% and species such as lobster, shrimp, grouper, conch and game fish are over-fished across the entire area.

- **WEST ASIA**
  11% of remaining natural forests was lost in the 1980s, and natural forests now cover less than 1% of the land area. The depletion of groundwater reserves in the western Gulf is leading to the loss of valuable ecosystems and freshwater springs.

- **THE POLES**
  These regions, with their fragile ecosystems and short food chains, represent the world’s largest remaining pristine environments. Fisheries, mining, and tourism development are bringing with them the threat of pollution and ecosystem destruction.

### 1.5 Land Degradation

Land degradation is affecting vast areas worldwide. This is especially distressing as it means productivity is declining at a time when rapidly rising populations are demanding vastly increased supplies of food, fibre and fuel. UNEP reports that land degradation affects 1,900 million hectares, i.e. about 16% of the world’s agricultural land, and that another 5 to 6 million are lost each year. This implies that several million acres of ‘new’ land have to be used for agriculture to offset the unusable degraded areas.

There are many ways in which land can be degraded. Soil erosion and salination are the most widespread. Erosion is the deterioration of the soil by the physical movement of soil particles from a given site. It is vegetation that keeps the soil (in its natural state) from eroding. Undisturbed by man, soil is usually covered by shrubs, trees, grass and dead or decaying leaves, all of which protect it from rain and wind, and prevent moisture, nutrient loss and leakage. Root systems also help to consolidate the soil. Even in drought the roots of native grasses, which can extend several metres into the ground, help tie down the soil and
prevent it blowing away. But if this vegetation cover is stripped away, the soil becomes vulnerable. Erosion induced by human activities like agriculture, grazing, deforestation, burning or bulldozing is the most serious form of soil degradation. In extreme cases the surface soil can be blown or washed away right down to the bedrock.

Salination is the result of water logging due to over-irrigation or flooding. When the water runs off again, it leaves salt deposits in the soil. This significantly reduces yield and can, in the long run, make the land unsuitable for cultivation.

There are several causes of land degradation:

- Both modern and traditional agricultural methods – intensive farming, overgrazing, and shifting cultivation, extensive cultivation of marginal lands, poor land management, the use of inappropriate technology – are without doubt the most significant;
- Deforestation is another. UNEP estimates that over 20 acres of forests are destroyed every day for timber and fuel;
- Long and continuous droughts, water scarcity and subsequent desertification have destroyed vast areas of land, especially in Africa and Asia;
- Forest fires are important causes of land degradation in Asia, the Pacific and the Mediterranean;
- Significant areas have been degraded through industrial practices. Land contamination in and around former industrial sites worldwide – gas works and metal smelters, for example – are giving rise to high-profile environment liability legal actions.

Calorie intake per capita

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<td>2,400</td>
</tr>
</tbody>
</table>

Source: compiled by UNEP GRID Geneva from FAOSTAT 1997 and WRI, UNEP, UNDP and WB 1998
Facts and Figures on Land Degradation

- One third of the world’s land area is dry land;
- 18% of all land in Southeast Asia is affected by desertification. About 25% of soil degradation is directly caused by farming;
- In China, over 10% of desertified land has been rehabilitated and a further 12% is being reforested;
- More than three-quarters of West Asia is desert, with new land continuously coming into production by reclamation. But the productivity of reclaimed lands is only a fraction of the old;
- In Africa, over 500 million hectares have been degraded, i.e. one third of the continent’s cropland and permanent pasture;
- About 80 million hectares of European dry lands suffer from some degree of desertification;
- The priority concerns in North America are land pollution and water contamination. Additional programmes are in place to improve agricultural practices, in order to reduce erosion and losses in land productivity;
- In South America, 73% of dry land used for agriculture suffers from moderate to extreme degradation, while 47% of permanent pastures have lost much of their original fertility;
- Owing to the degradation of vast areas of land, at least 63 countries can grow food for only half their people;
- The area of rain-fed cropland across the world could shrink by as much as 544 million hectares by 2005. This is more than the entire potential cropland of Southeast Asia. 30% of Central America’s rain-fed cropland, and 36% of Southeast Asia’s, could be lost;
- The entire potentially cultivable land of the 117 developing countries would be sufficient to support only 1.6 times the expected population of 2000, even if it were used only for food crops or as grassland supporting livestock. This potential area is at least three times greater than the present cultivated area.
Why Should the Tourism Industry be Concerned about Land Degradation?

Land degradation directly or indirectly hinders the development of all industries. For tourism, land degradation directly implies the loss of tourist sites, and food and water shortages. What is more, increasing poverty implies lack of skilled labour and expertise, with a consequent fall in service quality, and destination image.

International Action on Land Degradation

The United Nations Convention to Combat Desertification works towards halting land degradation through site-specific soil remediation programmes and by setting up partnerships to allow for the exchange of expertise and indigenous technologies across countries. But so far these efforts have had limited success. In most developing countries, populations continue to rise faster than food production.

When it comes to land degradation and future food security, there are two schools of thought. The optimistic view is that improvements in technology and agricultural practices will enable the world’s food demands to be met without exceeding biological production capacity. The pessimistic view is that technology will not necessarily lead to environmentally-sound agricultural practices and land will go on being degraded, that the best technology will remain out of reach for developing nations, and that they will have to continue spending heavily on importing food. As a result, over two-thirds of the world’s population will suffer from malnutrition.

1.6 Acid Deposition

Acid deposition and acid rain occur when emissions of sulphur dioxide (SO2) and nitrogen oxides (NOx) react in the atmosphere with oxygen, water and other oxidants to form acidic compounds. These acidic compounds fall on the earth as ‘wet deposition’ (rain, snow, fog), and as ‘dry deposition’ (particulate matter and gas).

Sulphur dioxide is a product of burning fossil fuels. Coal and oil contain significant quantities of sulphur, which is released into the atmosphere as sulphur dioxide and sulphur trioxide during combustion. Oxides of nitrogen are also produced during the burning of fossil fuels – either as ‘fuel oxides of nitrogen’ or as ‘thermal oxides of nitrogen’.

<table>
<thead>
<tr>
<th>Sources of global sulphur emissions</th>
<th>% of total sulphur emissions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power generation using coal and oil</td>
<td>66%</td>
</tr>
<tr>
<td>Industry processes powered by fossil fuel and the burning of wastes</td>
<td>25%</td>
</tr>
<tr>
<td>Oil refineries</td>
<td>7%</td>
</tr>
<tr>
<td>Transport</td>
<td>3%</td>
</tr>
</tbody>
</table>
Impacts of Acid Deposition

- Acid deposition affects human health. Sulphur dioxide interacts in the atmosphere to form sulphate aerosols, which can be transported long distances through the air. Most sulphate aerosols can be inhaled: high concentrations are associated with respiratory and lung disorders such as bronchitis and asthma.

- Acid rain increases the acidity and lowers the pH of surface water bodies such as lakes and streams that have a limited ‘buffering capacity’, or ability to neutralise acid compounds. An increase in the acidity of lakes in Scandinavia and Canada has led to the complete eradication of some species of fish. Acidity also affects acid-tolerant aquatic invertebrates by changing them from high-calcium-bearing prey to low-calcium-bearing. Furthermore, high acidity increases the amounts of toxic heavy metals in invertebrates that are prey to numerous species of water-breeding birds. The combination of these two effects can lead to serious disruptions further along the food chain and affects the reproduction and survival of many species of aquatic fauna.

- Acid rain is also linked to impaired tree growth and therefore causes forest degradation. For example, acidic cloud water at high elevations is reported to increase the susceptibility of red spruce trees to winter injury. This is significantly impairing the health of high-elevation spruce forests in Northern America and Northern Europe.

- There are also concerns about the impacts of acid rain on forest soil. As it passes through soil, it can strip away vital plant nutrients: this poses further threats to forest growth and productivity.

- Acid rain and dry deposition contribute to increased corrosion of materials and the deterioration of stone and paintwork on buildings, structures and vehicles. US car manufacturers use acid-resistant paints at a cost of five dollars per vehicle (a total of $61m a year) to reduce acid deposition damage to paintwork. Dry deposition also increases the dirt on buildings and structures, resulting in increased maintenance costs.

The major emitters of acidic gases today are India, China, the USA and the east European economies in transition.

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<thead>
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<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Europe</td>
<td>59</td>
<td>42</td>
<td>31</td>
<td>26</td>
<td>18</td>
</tr>
<tr>
<td>United States</td>
<td>24</td>
<td>20</td>
<td>16</td>
<td>15</td>
<td>14</td>
</tr>
<tr>
<td>Asia</td>
<td>15</td>
<td>34</td>
<td>40</td>
<td>53</td>
<td>79</td>
</tr>
</tbody>
</table>

Note: per capita emissions in Asia are still many times lower than those in Europe or the United States

Source: Worldwatch Institute 1998

Forest damage and the loss of species due to acidification mean the degradation of some of the tourism industry’s primary resources.
Why Should the Tourism Industry be Concerned about Acidification?

Forest damage and the loss of species due to acidification mean the degradation of some of the tourism industry’s primary resources. Dry deposition on historic buildings and other monuments increases the frequency and cost of maintenance and repair. High sulphur emissions can impair the health of tourists and local people, increasing respiratory and lung disorders such as asthma.

International Response to Combat Acid Deposition

Sulphur dioxide emissions from domestic sources were primarily responsible for the infamous 1952 London smog, which was at least partly responsible for the deaths of over 4,000 people. This incident was the catalyst for the introduction of clean air laws in Western Europe and North America in the mid-1950s. Their enforcement has resulted in a significant reduction of sulphur dioxide emissions, mainly through the elimination of domestic coal fires and significant improvements in flue cleaning techniques (dry and wet scrubbers, filters, and electronic precipitators).

Additional impetus was provided in 1983 by the adoption of the Geneva Convention on Long-Range Transboundary Air Pollution, the first international agreement to address acidification and photochemical pollution in a transboundary context. The convention has since been extended by five protocols, including:

- The 1985 Protocol on the Reduction of Sulphur Emissions of their Transboundary Fluxes by at least 30%, which gave signatories eight years to reduce 1980 sulphur emissions by 52%;
- The 1994 Oslo Protocol on the Convention of the Long-Range Transboundary Air Pollution, which made further provisions for ‘joint implementation’ but has not been implemented so far;
- The 1998 Sofia Protocol on the Control of Emission of Nitrogen Oxides of their Transboundary Fluxes, which prompted several countries to reduce nitrogen oxide emissions by 25% (though lack of data limits the possibility of evaluating the results).

Sulphur Dioxide Allowance Trading – The US Experience

In the US, a sulphur dioxide allowance-trading programme was begun in 1995 as a market-based strategy for reducing acid gas emissions.

Under this programme, each legally concerned utility can decide on the most cost-effective way to reduce acid emissions, be it through energy conservation measures, increasing reliance on renewable energy sources, switching to low-sulphur coal or oil, or using flue gas desulphurisation technology. Utilities that reduce emissions below the number of allowances they hold may:

- Trade allowances with other units in their system;
- Sell them to other utilities in the open market or through US Environment Protection Agency auctions;
- Bank them to cover future emissions.

The advantage with such market-based initiatives is that they provide incentives for energy conservation, technological improvement, and the development of cost-effective pollution abatement strategies.
1.7 **Air Pollution**

Deterioration in air quality is considered to have occurred when substances (gases and particles) in the atmosphere exist at higher concentrations than the normal background or ‘ambient’ levels and cause measurable effects on humans, plants, animals and materials.

**Global carbon dioxide emissions**

1,000 million tonnes CO$_2$/year

<table>
<thead>
<tr>
<th>Year</th>
<th>Global Emissions (1,000 million tonnes CO$_2$/year)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1950</td>
<td>1.00</td>
</tr>
<tr>
<td>1955</td>
<td>1.10</td>
</tr>
<tr>
<td>1960</td>
<td>1.20</td>
</tr>
<tr>
<td>1965</td>
<td>1.30</td>
</tr>
<tr>
<td>1970</td>
<td>1.40</td>
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<tr>
<td>1975</td>
<td>1.50</td>
</tr>
<tr>
<td>1980</td>
<td>1.60</td>
</tr>
<tr>
<td>1985</td>
<td>1.70</td>
</tr>
<tr>
<td>1990</td>
<td>1.80</td>
</tr>
<tr>
<td>1995</td>
<td>1.90</td>
</tr>
</tbody>
</table>

Source: CDIAC 1999/Published in Global Environment Outlook 2000, UNEP

**Carbon dioxide emissions per capita**

<table>
<thead>
<tr>
<th>Region</th>
<th>1975</th>
<th>1995</th>
</tr>
</thead>
<tbody>
<tr>
<td>North America</td>
<td>19.93</td>
<td>19.93</td>
</tr>
<tr>
<td>Europe and Central Asia</td>
<td>19.11</td>
<td>19.11</td>
</tr>
<tr>
<td>West Asia</td>
<td>8.78</td>
<td>8.78</td>
</tr>
<tr>
<td>Latin America and the Caribbean</td>
<td>2.03</td>
<td>2.03</td>
</tr>
<tr>
<td>Asia and the Pacific</td>
<td>7.93</td>
<td>7.93</td>
</tr>
<tr>
<td>Africa</td>
<td>4.88</td>
<td>4.88</td>
</tr>
</tbody>
</table>

Source: compiled by UNEP GRID Geneva from CDIAC 1998 and WRI, UNEP, UNDP and WB 1998/ Published in Global Environment Outlook 2000, UNEP

Air pollutants can be classified as primary pollutants and secondary pollutants. A primary pollutant is one emitted by an identifiable source. The most significant primary pollutants today are:

- Carbon monoxide (CO);
- Nitrogen oxides;
- Sulphur dioxide;
- Sulphur oxide;
Secondary pollutants are formed in the atmosphere through complex chemical reactions. The most widely known is tropospheric or 'ground-level' ozone, which is associated with urban smog. Nitrogen oxides and various hydrocarbons in the presence of sunlight set off a process of reactions that produce photochemical oxidants of which ground-level ozone is the most abundant.

\[ \text{Hydrocarbons} + \text{NO} + \text{sunlight} = \text{O}_3 \text{ and photochemical smog} \]

Air pollution is a major issue in all large urban areas worldwide. Apart from major pollution incidents in many industrialised cities, Beijing, Manila, Bangkok, Mexico City, Jakarta, Cairo, Buenos Aires, and Rio de Janeiro are joining the list of the most polluted urban centres in the world.

Air pollutants likely to be found in all major urban areas are known as 'criteria pollutants'. The concentration of these varies with the level of industrial activity, traffic density, climatic conditions, and the use of pollution-control technology. The World Health Organisation, the European Union and the United States Environment Protection Agency classify the following as criteria pollutants:

- Carbon monoxide;
- Nitrous oxide;
- Sulphur dioxide;
- Ground-level ozone;
- PM-10 (particulate matter of diameter < 10 micrometres, or black smoke);
- Lead.

**Why Should the Tourism Industry be Concerned about Air Pollution?**

Ironically, the world's most polluted cities are also important tourist attractions or 'hubs'. Cities are also the key product of the 'weekend break' and 'short-stay' holiday markets. More and more tourists are also becoming concerned about urban air pollution. A 1997 EU 'Eurobarometer' survey showed that CLEAN AIE was a key criterion in choice of holiday destination.

**Reducing Air Pollution**

A major focus of national air quality improvement strategies is the establishment of air quality standards. There are two categories of air quality standards: standards for ambient air quality, and standards for industrial air emissions.

Broadly speaking, the minimum limit for criteria pollutants would be 30 times the ambient air standard. This limit accounts for the potential of an emission to be diluted in the atmosphere. The ability of the surrounding air to dilute the emission depends on such factors as prevalent air quality, emission density and temperature, its flow rate, its source (including if it is stationary or mobile), weather conditions, etc. Clearly, the more polluted the surrounding air, the lower its capacity to dilute an emission.
National air quality standards are periodically reviewed and modified. For example, black smoke (PM-10) used to be an air quality problem in winter, mainly because of the domestic coal fire. With the introduction of electric and gas-fired heating in homes and the use of clean coal technology in industrial power generation, PM-10 may well soon be dropped from the list of criteria pollutants in the EC. It however continues to be an issue in urban areas in Eastern Europe and other parts of the world.

Environmental factors affecting health

<table>
<thead>
<tr>
<th>Environmental Factor</th>
<th>Polluted air</th>
<th>Poor sanitation and waste disposal</th>
<th>Polluted water or poor water management</th>
<th>Polluted food</th>
<th>Unhealthy housing</th>
<th>Global environmental change</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acute respiratory infections</td>
<td>*</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Diarrhoeal diseases</td>
<td></td>
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<td></td>
<td></td>
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<tr>
<td>Other infections</td>
<td></td>
<td>*</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Malaria and other vector-borne diseases</td>
<td></td>
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<tr>
<td>Injuries and poisonings</td>
<td></td>
<td>*</td>
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<td></td>
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<tr>
<td>Mental health conditions</td>
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<tr>
<td>Cardiovascular diseases</td>
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<tr>
<td>Cancer</td>
<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chronic respiratory diseases</td>
<td></td>
<td></td>
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</tbody>
</table>

Source: WHO 1997a/ Published in Global Environment Outlook 2000, UNEP
International recognition that environment degradation was threatening not simply economic and social well-being, but life on earth, came about in 1972, when 133 nations gathered for the Stockholm Conference on the Environment and Development – the first global meeting on the environment. One important result was the establishment of UNEP, with the mandate to catalyse environmental protection and improvement across the world.

United Nations created the World Commission on the Environment and Development (WCED), often referred to as the ‘Brutland Commission’ after its leader, the then Norwegian Prime Minister, Gro Harlem Brutland. The Commission’s landmark report *Our Common Future* was published in 1987. It stated that while global economies had to meet human needs and aspirations, economic growth had to fit within the earth’s finite physical limits. It called for ‘a new era of environmentally-sound economic development’ and declared, ‘Humankind has the ability to make development sustainable – to ensure that it meets the needs of the present generation, without compromising the ability of future generations to meet their own needs’ – hence the introduction and definition of sustainable development.

In 1989, the United Nations began planning a conference on the environment and development to develop a methodology for sustainable development. Over the next two years, international negotiations commenced as never before. Thousands of experts from industry, business, government, non-government organisations, citizens’ groups and academic disciplines developed policies and action plans. These discussions culminated in the United Nations Conference on Environment and Development (UNCED), the Earth Summit, held in Rio de Janeiro in June 1992.

The Earth Summit was unprecedented, not just because it was the biggest ever gathering of heads of state, United Nations agencies, industry, non-government organisations and citizens’ groups, but also because it made it clear that economic development, social well-being and the environment could not continue to be considered as three separate areas. Focusing on achieving sustainable development, the Earth Summit produced:

- **THE RIO DECLARATION OF ENVIRONMENT AND DEVELOPMENT**
  27 principles that define the rights and responsibilities of nations as they pursue sustainable development;

- **AGENDA 21**
  A Global Plan of Action for Sustainable Development.

Five years later, in 1997 and in compliance with Agenda 21, the UN Conference on Sustainable Development (commonly referred to as ‘Rio Plus 5’) met to report on progress in implementing Agenda 21. The conference stressed that added momentum was needed in working towards sustainable development, especially in relation to climate change, biodiversity loss, desertification, and deforestation.

### 2.1 An Outline of Agenda 21

Agenda 21 is an important document. It is the blueprint for worldwide action on environmental improvement. The original document is 700 pages long and the outline presented below is based on *Agenda for Change, A Plain-Language Version of Agenda 21 and other Rio Agreements* by Michael Keating, published by the Centre for our Common Future, Geneva.
Section one of Agenda 21 presents the social and economic dimensions for achieving sustainable development. It outlines broad strategies on:

- International co-operation for trade liberalisation, harmonising environment policies and legislation, and providing financial and technical assistance to developing countries;
- Combating poverty;
- Consumption that promotes economic growth while reducing energy and material use and waste output;
- Population strategies;
- Improving human health;
- Improving urban housing and transport, and controlling migration to urban areas.

Section two, which covers the conservation and management of resources, outlines strategies for:

- Protection of the atmosphere: control of greenhouse gases, ozone-depleting substances and other pollutants;
- Land management;
- Combating deforestation;
- Combating desertification and drought;
- Sustainable mountain development;
- Sustainable agriculture and rural development;
- Biodiversity conservation;
- Biotechnology management;
- Ocean protection and management;
- Freshwater protection and management;
- Safer use of toxic chemicals;
- Hazardous waste management;
- Solid waste and sewage management;
- Radioactive waste management.

Section three of Agenda 21 outlines strategies for ensuring that all social groups participate in and benefit from sustainable development. The major groups identified are women, children and youth, indigenous people, non-government organisations, local authorities, workers and trade unions, business and industry, scientists and technologists, and farmers.

Section 4 covers the implementation of sustainable development and includes strategies for:

- Financing sustainable development;
- Technology transfer;
- Increased scientific research into impacts and solutions;
- Environment education, training and public awareness;
- More effective international environment law;
- Speeding up technological improvements;
- Improving data collection and assessment, to provide accurate information for sustainable development.
2.2 Broad Implications for Sustainable Development

Sustainable development, as defined by the Bruntland Commission, is ‘development that meets the needs of the present generation, without compromising the ability of future generations to meet their own’.

This does not mean that business and industrial activity must be halted, for the needs of the present generation have to be met. Business must continue to prosper and to be profitable. Rather, sustainable development calls for business and industrial activity that makes more efficient use of resources and materials, and reduces the output of pollution – solid waste, liquid effluents, noise and emissions. This will help future generations to continue to develop sustainably, rather than inherit an earth stripped of resources and burdened with pollution and waste.

Sustainable development cannot be achieved by action in industrialised countries alone. Admittedly, a large share of the world’s resources is consumed, and a major proportion of global waste generated, through business expansion and consumption in industrialised countries. But reducing use of resources and pollution in these countries alone will not be sufficient if resource intensity and pollution increase in industrialising countries: environment problems are not contained within geographical boundaries. Climate change and biodiversity loss threaten life on the whole planet, while acidification and air and water pollution are causing impacts in areas far away from the points of discharge. Sustainable development strategies have therefore to be country-specific, based on economic and industrial activity, social setting, natural resource base, and levels of environment degradation and population growth.

2.3 What does Sustainable Development mean for Tourism and Hospitality?

Sustainable development is about responsible entrepreneurship, product stewardship, long-term planning and ‘doing more with less’. The environment is the tourism industry’s key resource – eliminate a clean and healthy environment and you eliminate tourism.

To be sustainable, tourism businesses need to reduce the use of resources and the output of waste and emissions through, and together with, a range of environment management and monitoring activities. The framework for such activities is discussed in Unit 2.
UNIT 1: EXERCISES

1. GROUP DISCUSSION, GROUP PROJECT OR WRITTEN ASSIGNMENT
Outline the major environment threats facing the world today. How are these issues impacting your country or region? Critically examine how the resulting environment changes are affecting the tourism and hospitality industry in your country or region.

2. GROUP DISCUSSION OR GROUP PROJECT
What are the major environment threats facing your country or region? What control measures are in place to combat these threats? Do you feel that these control measures are resulting in environment improvement? Make a 10-15 minute presentation of your findings.

3. GROUP PROJECT
Review the environment-related issues that have caught the attention of your local and national media over the past month and in the next two weeks. How have these issues affected tourism in your city or region? Make a 10-15 minute presentation of your findings.

4. GROUP PROJECT OR WRITTEN ASSIGNMENT
What is the biggest environment issue facing the tourism industry in your country? How does it impact the tourism and hospitality business? To what extent does tourism contribute towards maintaining and increasing this issue? Develop a feature article for a local newspaper responding to these questions.

5. GROUP PROJECT
Develop an outline for a television or radio programme that will raise public awareness of environment issues and related control actions in your country.

6. WRITTEN (AND RESEARCH) ASSIGNMENT
How does tourism and hospitality contribute towards climate change, depletion of the ozone layer, biodiversity loss, land degradation, acid deposition and air pollution?
### Glossary

<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
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</thead>
<tbody>
<tr>
<td>anthropogenic</td>
<td>directly due to the activities of humans</td>
</tr>
<tr>
<td>bioaccumulate</td>
<td>(chemicals that) accumulate and increase in the fatty tissues of animals</td>
</tr>
<tr>
<td>biodiversity</td>
<td>the diversity of plants, animals and other living things</td>
</tr>
<tr>
<td>CFCs</td>
<td>chlorofluorocarbons</td>
</tr>
<tr>
<td>El Niño/Southern Oscillation</td>
<td>a major warming of the ocean waters across the eastern and central tropical Pacific Ocean</td>
</tr>
<tr>
<td>endangered species</td>
<td>species facing the risks of drastic population reduction or extinction</td>
</tr>
<tr>
<td>endemic</td>
<td>(a species) found naturally in only a specific region or country</td>
</tr>
<tr>
<td>extinction</td>
<td>the death or destruction of all remaining members of a plant or animal species so that the species no longer exists</td>
</tr>
<tr>
<td>greenhouse gases</td>
<td>gases that cause global warming and climate change</td>
</tr>
<tr>
<td>joint implementation</td>
<td>a mutually beneficial bilateral agreement between a developed and a developing country that results in environment improvement on a global level</td>
</tr>
<tr>
<td>market-based instruments</td>
<td>instruments that help to integrate environment and economic policies; they include user fees, impact levies, pollution taxes, payments for environment services, tradable pollution permits etc.</td>
</tr>
<tr>
<td>ODP</td>
<td>ozone depleting potential</td>
</tr>
<tr>
<td>ODS</td>
<td>ozone-depleting substance</td>
</tr>
<tr>
<td>UVB</td>
<td>ultraviolet radiation between the wavelengths of 315 and 280 nms</td>
</tr>
<tr>
<td>UVR</td>
<td>ultraviolet radiation (from the sun) made up of UVA, UVB and UVC</td>
</tr>
</tbody>
</table>
TOURISM, HOSPITALITY AND THE ENVIRONMENT – IMPACTS AND SOLUTIONS
UNIT 2

TOURISM, HOSPITALITY AND THE ENVIRONMENT – IMPACTS AND SOLUTIONS

Unit Outline
This unit brings the environment agenda closer to home and examines the impacts of tourism and hospitality on the environment. It has 4 sections.

Section 1
The impacts of tourism and hospitality on the environment
If readers are to appreciate the importance of environment management and sustainable development, they must learn about the impacts of tourism on the environment. This section discusses the impacts of tourism on air, land and water.

Section 2
An introduction to the social and cultural impacts of tourism
The social and cultural impacts of tourism fall outside the scope of this pack. The discussion is therefore limited to introducing key impacts that are causing concern in many destinations.

Section 3
Tourism and the environment – The other side of the argument
Despite its environment impacts, tourism can boast of significant contributions to the protection and conservation of the environment. These contributions are outlined in this section.

Section 4
The need for environmentally-sound tourism
Environmentally-sound or sustainable tourism is defined and discussed, including a framework for achieving environmentally-sound tourism together with short case studies.

Learning Objectives
At the end of this chapter, students should be able to:

- Recognise that tourism can have significant environment impacts;
- Understand the importance of developing and managing tourism in an environmentally-sound manner;
- Have an overall impression of the actions needed for environmentally-sound tourism;
- Begin to appreciate the benefits of managing tourism and hospitality with minimum environment impact.
Like all industries, tourism has an impact on the environment. It is a large consumer of natural and other resources such as land, water, fuel, electricity, and food, and generates significant quantities of waste and emissions. The World Tourism Organisation (WTO) reported for 1999: 663 million international tourists (a 4% increase from 1998), 10 times that many domestic travellers and a colossal US$453 billion spending on international tourism (a 3% increase from 1998). The industry’s environment impact is obviously of huge significance.

Tourism has a vested interest in maintaining environment quality, as the environment is its key resource. A clean and healthy environment is critical for successful tourism. All over the world, from coastlines in Asia, the Caribbean and the Mediterranean to national parks in Africa, and to mountain resorts in North America and Europe, environment degradation caused by tourism has and continues to bring business losses. Nobody wants to go to the beach where the water is polluted, to visit countryside lined with ribbon developments or walk in parks littered with packaging and disposable waste. As visitor numbers fall, so do prices, then profits. Prices are slashed as tourism operators struggle to stay in business. There being little or no cash for maintenance, repair, or waste management, prevailing environment impacts are worsened. Shabby facilities and poor service further reduces destination quality, and demand continues to drop. To short-circuit this vicious cycle, environment improvements are vital.

**COMMON QUESTION What is an environment impact?**

An environment impact is the change in an environment parameter (or medium) resulting from a given activity, compared with the natural rate of environment change that would have occurred had the activity not taken place. For example, the environment impacts of a marina are changes in the lagoon’s ecosystem due to anchoring, the movement of boats, oil, sewage and other chemical discharges, etc. These changes include water pollution, the death of some species of marine life, and increased noise levels. These effects are then compared to those that would have naturally taken place in the same lagoon had the marina not been built. This could be the gradual sedimentation and build-up of vegetation and marine life towards that of a wetland, or strong tidal movements that would remove and renew nutrients to maintain the existing lagoon ecosystem. As this example shows, environment impacts have to be considered over a specific area and within a specific period of time.

Environment impacts can be direct or indirect. Direct impacts are those caused directly by a given activity, while an indirect impact occurs as a follow-on or snowball effect.

The impacts of tourism and hospitality on land, air and water, as well as several other related issues will be discussed in what follows. The discussion will include impacts that occur during the construction of infrastructure and facilities, as well as those that occur during their use and occupation.

The following discussion will help improve appreciation of how the impacts of tourism contribute towards the global environment issues discussed in Unit 1.
1.1 Impacts of Tourism on Air

With over 650 million people travelling internationally and ten times that number travelling domestically, road, rail and air transport are major contributors to global warming, climate change, photochemical smog and poor air quality. Road traffic also causes noise, dust, congestion and particulate emissions that are worsened in many cities by badly maintained exhaust systems. It is worth noting that many of the world’s major tourism city destinations – Bangkok, Paris, Rome, Los Angeles, Mexico City, New York, Athens, and Manila are also on the global list of urban areas with very poor ambient air quality.

Transport is also an important activity when tourism facilities are being designed and built. Building materials, machinery, furniture and fittings have to be transported to the site and construction waste has to be disposed of. Once buildings are occupied, businesses directly contribute towards air pollution through the use of fossil fuels and ozone-depleting substances1, as well as the purchase of goods and services that need to be transported long distances.

In many countries electricity is generated by burning fossil fuels and as hospitality businesses in these countries are big electricity consumers, they contribute to air emissions that way too.

Emissions from aircraft, especially nitrous oxides, have greater impact when released at high altitudes. Air traffic control delays, airport congestion and fuel jettisoning (even though rare) all contribute to air pollution.

1.2 Impacts of Tourism on Land

- LAND USE ISSUES

  The hospitality industry is often held responsible for the expansion of urban sprawl and the use of hitherto untouched natural areas, especially mangroves, mountains and forests, for further development. While this can bring much-needed water, power and transport infrastructure, it also creates competition with traditional land uses such as agriculture, fisheries and forestry.

  Mangroves, forests and mountains are constantly under pressure for resort development. Coral reefs and forests are further exploited as sources of building materials which leads directly to land degradation and biodiversity loss.

  Land use conflicts can be observed in many coastal regions, where the local fishing industry has vehemently opposed tourism development. The fishermen argue that tourism not only destroys the coastal environment and near-shore fishing grounds, but brings them only very meagre revenues.

- RESOURCE CONSUMPTION

  Hospitality businesses and tourists themselves consume large proportions of basic resources, which are often in short supply. It is usual practice in many resort areas for local people to live through cuts in power, water, fuel and food supplies during peak seasons, to meet the needs of tourists. Consider the following facts:

  - Several species of shellfish are on the brink of extinction in the Caribbean because of over-fishing. The main demand for shellfish comes from tourists;
- In the Mediterranean, one tourist uses the same amount of water as 8 local people;
- A 5-star hotel in Cairo consumes the same amount of electricity as 3,600 middle-income households;
- In Nepal, a country plagued with deforestation and desperate for fuel, a trekking tourist can use four to five kilograms of wood a day.

**LAND DEGRADATION**
Poor land-use planning coupled with unsustainable siting, engineering and construction of tourism facilities can cause erosion, landslides and flooding. For example, in many low-lying and coastal areas, tourist facilities constructed on the waterfront may increase these risks if natural protective features such as dunes and vegetation cover have been destroyed. Walls and dams are often constructed in an effort to halt erosion, but these structures have been shown to exacerbate issues by increasing erosion, flooding, sedimentation and deposition further upstream or downstream.

**‘ARCHITECTURAL POLLUTION’ AND SPRAWL**
Tourism often fails to integrate its structures with the natural architectural features of the surrounding area. Large dominant resort buildings of varying design are out of place in any natural environment and may clash heavily with the indigenous architecture. Many tourism experts refer to this as ‘architectural pollution’ (Pearce 1978). Moreover in the absence of building and planning regulations, tourism developments tend to expand in sprawling ribbons along coastlines, valleys and scenic routes. They bring with them problems of litter, waste and effluent disposal, and traffic congestion, which contribute to increased pollution of air, water and land.

Tourism, building and planning professionals have recently begun to realise that building design and ambience have a dollars-and-cents value. In many countries a new development is often preceded by the definition of visual envelopes, and by presenting graphic and other illustrations of it as seen from different angles. Environment-compatible design is discussed in Unit 5.

**LOSS OF VEGETATION**
Building and construction often involves soil removal, land reclamation, filling, dredging and levelling, which can involve the removal and sometimes total destruction of the site’s vegetation. This causes serious interruptions in the natural cycles of the surrounding ecosystem. Indirect impacts include erosion, species loss, waterway pollution, fire risks, and the introduction of non-native species to the area. Litter and waste dumping can also affect vegetation by changing the nutrient balance of soils and by blocking out air and light.

Vegetation can also be damaged by the activities of tourists:
- Camping, trampling, and the construction of pathways can lead to the loss of cover vegetation, which increases erosion and linear soil blowouts. The extent of damage depends on intensity of use and the ecosystem’s vulnerability. In flat areas with compact soils and a large number of resilient plant species, the effects may be minimal; but on hills and dunes, the vegetation is much more vulnerable. Trampling is also reported to have a negative effect on the root base of certain species, the sequoia redwood, for example.
- Constant picking of flowers, plants and fungi can change species composition.
- The deliberate chopping down of young trees to be used as walking sticks, tent poles or firewood can be disastrous to the ecosystem. The removal of young trees alters the age structure of the plant community and leaves fewer trees to mature.

**Facts about Vegetation Damage**

- The greatest damage to vegetation occurs during the initial use of the area, when the rare and fragile species are destroyed and recovery is dominated by the more resilient species.
- With continued use, only the more tolerant species survive and some non-native species may be introduced. This reduces species diversity.
- There is a strong relationship between soils and vegetation. Soil compaction (caused by erosion, water and nutrient loss) affects plant growth and the age structure of vegetation.

As tourism and hospitality businesses continue to expand to remote natural areas, it is absolutely vital to achieve better management of their impacts on the surrounding vegetation for they contribute to biodiversity loss on the global level.

**EFFECTS ON WILDLIFE**

Viewing, photographing and in some cases hunting wildlife are all important tourist activities. But over the last 30 years the evidence has been mounting to suggest that tourism is again becoming a victim of its own success. As early as 1975, travel writers reported that much of the attraction of game viewing lay not simply in the presence of animals, but in the absence of tourists and minibuses. The ever-increasing number of tourist lodges, campsites and safari vehicles, coupled with the increasing reliance of expanding local populations on natural parks and reserves for agricultural land, food and fuel, are frequently exceeding the natural carrying capacities of these areas.

The impacts of tourism on wildlife include:

- Interruptions to feeding and breeding habits and predator-prey relationships of animals. Especially at fault are tourist vehicles that chase and track down animals in order to get a good photograph. Wildlife writers have also recorded numerous occasions when young animals get fatally separated from their mothers by the illegal off-road driving of safari vehicles, as well as many instances when noisy tourists have interrupted the hunting of predators.
- The creation of game reserves has helped some species to proliferate unnaturally. This can stimulate fighting and lead to habitat destruction. For example, in recent years the elephant population in the game reserves of Central and Southern Africa has increased dramatically. These large populations have uprooted trees and stripped away vegetation cover, reducing the food available for many browsing species such as the giraffe.
- Littering and waste dumps by tourists and hospitality lodges attract rodents, birds and species such as bears. This affects these animals’ traditional feeding patterns and raises safety issues for tourists and
local inhabitants. The use of animals for souvenir manufacturing is internationally banned, but poaching still thrives everywhere. This will continue as long as skins, furs, horns, shells, tails, hoofs, tusks, claws and stuffed animals fetch high prices, and as long as adequate revenues from tourism do not filter down to the local population.

All these impacts collectively affect the further growth and survival of animal species and, as with vegetation loss, contribute directly to global biodiversity loss.

### 1.3 Impacts of Tourism on Water

Tourism is clearly not the only major source of water pollution; a host of other industries and authorities are, too. But tourism is different: clean rivers, coastlines and lakes, where people can bathe, swim, sail and fish are essential for good business.

#### The Effects of Water Pollution

- Poorly treated or untreated sewage released into water introduces pathogens, which are a human health hazard. Sewage in seawater is especially critical, since the salinity of the water inhibits the natural bacterial breakdown of the waste.
- Cholera, typhoid, dysentery, hepatitis, and a variety of skin and eye diseases can be transmitted through contaminated water, fish and all other seafood.
- Solid wastes and effluents dumped in deeper water are often washed up on the shore. This is not only unsightly and unhealthy: damage to aquatic life is inevitable.
- Sewage and waste in water increase its nutrient levels, which can speed up eutrophication. Excessive plant growth affects the volume of dissolved oxygen, which in turn will reduce the growth and diversity of aquatic invertebrates and fish.
- Oil spills from pleasure boats and ships can kill birds and all forms of aquatic life.
- Heavy metal and chemical run-offs from tourist boats, marinas and other such facilities are toxic to aquatic life. Some of these chemicals are surprisingly stable in the environment; they can accumulate in the fatty tissues of aquatic animals and birds further up the food chain.
- Erosion increases silting, which reduces the dissolved oxygen supply for animals and plants, and the amount of sunlight penetrating the water.
- The removal of coral, live shells and other life forms from reefs for the making of tourist souvenirs causes the reef and a large section of the coastal ecology to die.
1.4 Other Related Issues

Apart from the impacts on air, land and water, some important environment issues arise directly as a result of tourism:

- Congestion and noise due to overcrowding, be it in urban areas, natural parks, visitor attractions or recreational waterways, can cause considerable stress both to the local environment and to its population. Traffic jams, long queues, delays in service delivery, noise, shortages of power, water and foods all increase environment impacts.
- The seasonal characteristic of tourist arrivals leaves many facilities vacant for large portions of the year. This has serious consequences for businesses in terms of cash flow and facility maintenance. Poorly maintained facilities mean increased environment impacts.
Tourism can have significant impacts on the cultural and social lifestyles of the host populations. Often referred to as ‘people’ impacts, these dynamic and varied effects give rise to changes in lifestyles, value systems, traditional practices, family and community relationships, moral conduct, and health and safety concerns in holiday destinations. Tourism’s social and cultural impacts have received significant attention from planners and academics and are well documented. In fact, we now recognise it as an entire academic discipline of its own, with application not only to tourism, but to geography, modern history, anthropology and a number of other areas.

These social and cultural impacts are beyond the scope of this pack and their discussion is therefore limited to a few selected issues that are of concern to many destinations. It does not, however, reduce their importance for sustainable tourism, which calls for tourism that is managed (to a large extent) by local people, respects local tradition and culture, and equitably and tangibly enhances the living conditions in tourist destinations.

Some of the key social and cultural impacts of tourism and hospitality are listed below.

- Land tenure and ownership issues have arisen, especially surrounding national parks and reserves established on land that has traditionally belonged to indigenous communities.
- The roles and rights of local people (including indigenous communities) living in and around protected areas has given rise to conflict between these communities and area management bodies.
- The overcrowding and concentration of tourist infrastructure can create ‘tourist ghettos’ where basic infrastructure and resources have to be shared between tourist facilities, local industry and households. When shortages arise during the high season, tourist facilities are given priority, which can cause animosity and tension in local communities.
- Some tourist attractions being also sites of local cultural and religious significance, conflict can arise between local communities and the tourism industry.
- The apparent wealth of tourists may cause antagonism and encourage the ‘demonstration effect’. Tourists are seen to possess such ‘attractive’ material goods as cameras, electrical devices, trendy clothes, etc. They also appear to have a carefree lifestyle, an impression enhanced by the fact that people on holiday may behave far less responsibly than they do at home. This can lead to the development of an inferiority complex amongst local people, especially the local youth, encouraging them to change their values and lifestyles by imitating the behaviour and consumption patterns of tourists. This is called the ‘demonstration effect’.
- Tourism has been accused of introducing and increasing alcoholism, gambling, prostitution and drug abuse among local people, leading directly to increased crime rates and health concerns.
• While tourism provides a market for the continuation of traditional arts and crafts, it is often accused of encouraging the development of pseudo-art forms which degrade and devalue traditional practice and culture. It is also argued that traditional practices of interest to tourists are often those that are the most unimportant and least valuable to local cultures. Tourism is further accused of commercialising traditional ceremonies and art forms.

Certainly, these changes cannot be attributed to tourism alone; in fact, it is debatable if tourism is still an influence at all. Worldwide economic and trade expansion, coupled with the increasing influence of western ‘material’ economies, also play a large part.
The objective of this unit is not to blacken the tourism and hospitality industry by labelling it a degrader and polluter, for tourism can boast of remarkable environment-related achievements.

- Tourism has been responsible for the conservation of large areas of natural habitat. Wildlife, forest reserves and scenic landscapes have been preserved primarily for their ability to attract visitors. For example, over 207,200 square kilometres have been set aside as national parks in Eastern and Southern Africa.

- Tourism is a vital stimulus for the conservation of historic monuments, archaeological sites, ancient buildings and structures of religious and cultural significance. Europe, with its rich heritage and diversity of monuments, churches, cities and villages, is perhaps the best example in the world of tourism-oriented heritage conservation.

- Not only does tourism initiate conservation, it also provides revenues and incentives for its continuation. A large proportion of revenues earned by cultural sites and natural parks is re-injected into ongoing environment improvement. Tourism revenues can also be used for the rehabilitation of old buildings, which could be later used as tourism and hospitality facilities. Large structures can be converted into hotels, museums and conference centres while smaller houses, cellars and warehouses can be used as guesthouses, bed-and-breakfast facilities and bars and restaurants. Former industrial sites (mills and factories, for example) and historic buildings such as well-known houses, prisons or castles can serve as visitor attractions in their own right.

- In many parts of the world, tourism has been responsible for the introduction of administrative and planning controls to ensure that environment quality is maintained and visitors have a satisfactory experience. Examples of such controls include building restrictions and permits, mandatory environment-related criteria for infrastructure development, traffic management plans, zoning of natural areas to provide extra protection for fragile ecosystems, training and licensing of tourism professionals, limiting visitor numbers, etc. Unfortunately, in most cases, these controls are enforced only after environment damage has occurred as a result of uncontrolled expansion, waste dumping and excessive use of the site.

- Tourism can also play an important role in promoting local industries and providing a market for local arts, crafts and culinary specialities. Many traditional art forms and industries would certainly be under a heavier threat of disappearance if it were not for tourism.
If tourism is to continue to expand and be profitable, it must develop and operate in an environmentally-sound manner. Environment stewardship is the key concept here. Just as product manufacturers work continually to improve the quality of their goods, so the tourism industry must put back what it takes from the primary product, which it receives practically free of charge: the environment.

**What is Environmentally-Sound Tourism?**

Environmentally-sound or sustainable tourism can be defined as ‘tourism development and management that meets the needs of today’s tourists and tourism businesses without compromising the ability of future tourists and tourism businesses to enjoy and profit from the same destinations’. In other words, environmentally-sound tourism is tourism that meets the needs of the present generation while maintaining and enhancing the beauty and integrity of destinations for future generations.

In theory, tourist destinations go through a cycle of evolution: exploration, followed by evolvement, development and consolidation, leading to stagnation and, eventually, either rejuvenation or decline. Environment impacts begin to occur right at the very beginning during the exploration stage, and if no planning and control measures are put in place, they increase during evolvement and development, their full consequences becoming apparent during the consolidation stage. Environment degradation is a key factor in a destination’s stagnation and eventual decline, while environment improvement is vital for its regeneration. Environmentally-sound tourism will ensure that a destination’s stagnation period is reduced to a minimum and that it passes from consolidation to continuous rejuvenation.

**4.1 The Framework for Environmentally-Sound Tourism**

Environmentally-sound, sustainable tourism, requires an all-round effort in the planning, delivery, monitoring and end disposal of all goods and services involved:

1) A sustainable tourism master plan is critical to ensure overall environment improvement in the destination. This master plan must be developed and implemented in collaboration with other businesses linked to tourism: regulators, local government, educational establishments, non-government bodies and citizens’ groups.

2) Environment criteria must be incorporated into all legislation relevant to tourism – land use, planning, building and construction, facility operation, emissions standards, waste disposal, demolition, protected-area management, visitor management, etc. Legislation should aim to:

   - Facilitate environment management;
   - Reward those who improve their environment performance;
   - Prevent waste and pollution in the first place, and not simply deal with them once they have been created;
   - Ensure that environment improvement in one area does not result in increased resource use or waste output in others;
   - Ensure that cleaner and safer technology is available and affordable.
3) Legislation must be not only enacted but also enforced. Governments must ensure that adequate controls and incentives are in place to regulate and stimulate environmentally-sound infrastructure development and management. Other necessities include procedures and guidelines for the opening of ‘new’ natural areas for tourism, conducting environment impact assessments, allowing for public participation, and the licensing of tourism professionals.

Examples of Good Practice

In Bermuda, a country that benefits greatly from tourism, legislation restricts residents to the ownership of one car, prohibits rental cars and neon signs, provides for the protection of whales, dolphins, turtles and coral, imposes heavy fines for reef damage, limits the number of ships that dock in the harbour, compels visitors to stay on designated trails in national parks, and requires that new developments follow traditional architectural designs and are no higher than two floors.

4) The tourism industry must take environmental responsibility and integrate environment management into its daily operations and business practices. All tourism and hospitality businesses, irrespective of their size and location, must reduce resource intensity and waste and emissions.

5) Environment management must be incorporated into the management of tourist attractions – centres, museums and galleries, etc.

6) The savings in costs, and revenues earned through environment management – be it at the state, corporate, small business or individual level – should be injected back into continued environment improvement.

7) New tourism facilities should be sited, designed and built with environment improvement at the core

8) Both the government and the tourist industry must be active in raising the industry’s environment awareness and expertise. Environment training and information are especially important for small and medium-sized businesses.

9) Incentives for environmentally-sound tourism are needed. These can range from voluntary self-regulation initiatives such as environment certification schemes and eco-labels, to tax rebates on environment investments and low-interest financing schemes on clean and resource-efficient technology.

10) Partnerships should be developed between national tourism authorities, the tourist trade, non-government organisations and citizens’ groups, to facilitate conflict resolution, to harmonise plans, and to bring about action for environment improvement.

Examples of Good Practice

A national environment and tourism programme is being developed in Botswana with the collaboration of Conservation International. Work is underway to establish local tour operator partnerships and to develop an Okavango Wilderness Fund supported by travel companies working in the region.
11) Industry networks within and between the service sectors of tourism (transport, tour operators, hospitality, travel agents and the leisure sectors) are critical, as they will provide for the sharing of experience and expertise and the establishment of mutually beneficial environment projects.

**Examples of Good Practice**

*The Tour Operators’ Initiative for Sustainable Tourism Development was launched in March 2000. Supported by UNEP, UNESCO and the World Tourism Organisation (WTO), the Initiative comprises 20 members who have committed themselves to adopting good environmental, social and economic practices in the management of their internal operations and in working with their suppliers and at destinations. Through the Initiative, members are able to share information on best practices and explore new ways of addressing environmental, cultural and socio-economic issues.*

*The Tourism Council of the South Pacific compares the tourism experience of member countries and produces guidelines for environmentally-sound tourism.*

12) Tourism revenues must be visible and equitably spread. All stakeholders – the international and local tour operator and travel agent, the accommodation provider, the natural park tour guide and the small-scale farmer whose produce the tourist consumes – must receive a fair income in return for their goods and services. The tourism industry must make a positive difference to the lives of its employees and service providers.

**Examples of Good Practice**

*The Campfire Project in Zimbabwe helps rural villages to develop tourism and benefit from the revenues.*

*Ruins of a Mayan city were discovered during the restoration of Tekax, a group of villages in Yucatan, Mexico, after a hurricane in 1998. With assistance from government authorities and the tourist board, the local people excavated the site, designated zones of archaeological significance that needed extra protection, developed a local education programme on the importance of preserving the site, improved water availability, and set up a small hotel designed on traditional architectural principles. Tourists began arriving and the revenues generated remained with the people of Tekax.*

13) Tourists must be informed of the natural and cultural values, as well as the impacts they cause during their stay. They must also be told what they can do to ensure these destinations can still be visited and enjoyed by their children and grandchildren.

14) Regular environment monitoring of tourist sites and business operations is essential. Monitoring provides the data to anticipate future impacts and plan the mitigation measures to avoid them.

15) Realistic indicators for environment improvement and sustainable development need to be established, from which overall progress can be monitored and assessed.
Examples of Good Practice

The Dutch Government has developed and tested environment indicators that function as a barometer of the health of travel and tourism. These indicators were defined at the national, destination and consumer level using a number of criteria, including tourism demand and supply, social and demographic information, landscape and the physical environment, water, air, waste, and noise.

COMMON QUESTION Does environmentally-sound tourism mean limiting visitor numbers and the number of tourism businesses in a destination?

Environmentally-sound tourism does not imply limits, but rather the anticipation, management and monitoring of the environment impacts caused by visitors and the businesses needed to service them.

For a start, if all tourism businesses and attractions reduced resource use and lowered waste output, if local authorities ensured adequate supporting municipal services (especially at peak season), if tourism sites worked on visitor management to prevent environment damage and over-crowding, and if visitors were told how they can enjoy a low-impact holiday, environment damage could be greatly reduced.

COMMON QUESTION Is it more environmentally-sound to target a smaller number of high-spending tourists, rather than larger numbers of backpackers, campers and package-holidaymakers?

It is important to stress the effectiveness of good environment management, rather than merely concentrating on visitor numbers. A small number of ill-informed, poorly supervised tourists tramping around in fragile areas can cause considerable damage, while a larger number of well-organised groups can end up having relatively fewer impacts.

It must not be forgotten that high-spending tourists demand luxury facilities and services, and that providing these facilities and services (especially in remote locations) generally causes serious and irreversible damage.

An argument in favour of package tourism is that most package tourists move around in groups and generally spend their vacation concentrated around the resort area. Since their impacts are limited to a specific geographical zone, impact monitoring and management are greatly facilitated.
**COMMON QUESTION** What is meant by ‘ecotourism’? Does it just mean environmentally-sound tourism?

Much ambiguity surrounds the term ‘ecotourism’, which may or may not refer to environmentally-sound tourism. In the first instance, it was used to imply tourism to natural areas that:

- Was monitored and managed to keep environment impacts to a minimum;
- Educated the visitor about the destination’s environment and culture and therefore provided incentives to participate in reducing impacts;
- Was developed in close collaboration with local communities who received their fair share of tourism revenues.

Today, however, ‘ecotourism’ is used to refer to all forms of nature tourism, including sports, adventure and rural holidays, irrespective of the environment attributes of the tourism products and services.

**COMMON QUESTION** Can tourism be developed and managed completely free from environment impacts?

The answer is no, as all human activity impacts the environment, including tourism. The challenge is to manage and reduce these impacts to an absolute minimum, bringing them well within the carrying capacity of the destination. In this way we can ensure that tourism and hospitality remain profitable, with the beauty and quality of destinations maintained in the long term.

Given the power and diversity of the tourism and hospitality industry, it can serve as an excellent example of environment stewardship. As an important consumer of a variety of goods and services, the industry can induce environment management practices in suppliers and contractors all along the supply chain. Similarly, since they are significant producers of recyclable waste, the collective efforts of tourism and hospitality businesses can increase recycling volumes, help drive down recycling costs, and increase the profitability of local recycling markets.

Tourism and hospitality service people at leisure. Such people are usually a captive audience for environment communication. Most tourists feel good to know that they have spent a low-impact holiday and used the services of environment-conscious operators. Given the opportunity to learn about reducing impacts, some tourists may even feel inclined to carry out good environment stewardship when they return home.

This feel-good factor is not limited to tourists but extends to employees. The high rates of employee turnover, so characteristic of the tourism industry, mean that environment stewardship can help to retain and motivate employees, and influence them to be good environment-conscious citizens.

How can tourism and hospitality businesses reduce their impact on the environment? The answer lies in environment management, which is discussed in Unit 4.
UNIT 2: EXERCISES

1. GROUP DISCUSSION OR WRITTEN ASSIGNMENT
Consider an urban or rural tourist location where environment degradation is, or will soon be, causing concern.
To what extent is the tourism industry contributing to this degradation?
What efforts are in place to curb this degradation?
What additional efforts could be made towards environmentally-sound tourism?

2. GROUP DISCUSSION, GROUP PROJECT OR WRITTEN ASSIGNMENT
You have been invited by your local authority to develop an environmentally-sound tourism strategy for your town/province. What are the principles that will guide you in the development of this strategy? Make a 10-15 minute presentation outlining this strategy.

3. GROUP DISCUSSION OR GROUP PROJECT
Consider your daily lifestyle over the past week and list all the goods and services you have purchased and consumed, including water and electricity, food and drink, transport, entertainment and leisure activities, communications, toiletries, clothes, books, stationery, etc. This will now give you an idea of the material intensity of daily lifestyles. Discuss and begin to assess the environment impacts that have taken place in order to provide you with these goods and services. With little or no inconvenience to your present lifestyle and comfort, what could you do to lower the environment impacts of your daily life?

4. GROUP DISCUSSION, GROUP PROJECT OR WRITTEN ASSIGNMENT
Outline the environment impacts caused by tourism in your region or country.
What measures have been taken to manage these impacts?
Critically assess the effectiveness of these measures and how they could be improved.

5. GROUP DISCUSSION OR WRITTEN ASSIGNMENT
Discuss the following statements:
- There are environmental limits to the development of tourism.
- Tourism is a victim of its own success.

6. WRITTEN ASSIGNMENT
Develop an action checklist for environmentally-sound tourism.

7. WRITTEN ASSIGNMENT
Read the following article and write a 1,500-word report on how sustainable tourism could be developed in the Maldives.
Letter from the Maldives - Not Sinking but Drowning

From THE ECONOMIST, 13 May 2000

How do you keep paradise afloat? The Maldivians urgently want to know. Their ocean country is made up of more than a thousand coral islands strewn across the turquoise waters of the equatorial Indian ocean. Buoyed by good weather, good location and lots of tourism, the country’s 250,000 or so citizens lead comfortable lives. Yet for how much longer, nobody knows. The sea around them is rising.

The problem of greenhouse gases may sound nebulous in Maidstone or Miami. But to the people of the Maldives it is a clear and present danger. The noisy tea shops of Male, the capital, are full of men (no women: this is an Islamic country) who can tell you all about the early signs of impending disaster. Fishermen hawking their catch at the market complain of the decline in live bait. Hotel owners lament that the warming of the sea has bleached the life, and pretty colours, out of much of the famous coral.

And in case anyone should gaze at the clear sky or sparkling water and wonder if life wasn’t so bad after all, Abdul Gayoom, the president of the Maldives and Asia’s longest-serving ruler, is never silent for long on the threat that global warming poses to his fellow citizens and to the island’s tourism. He uses his grip on the local press to keep the dangers close to the front of everyone’s mind. Nor do his anxieties stop at his own country’s coral. He is world spokesman for low-lying islanders everywhere.

Engineering is one answer, for the Maldives at least. To combat the surge in storms and waves, the government has built what locals call the ‘Great Wall of Male’: a concrete barrier 1.8-metre (6 ft) high that partly rings the capital. Set just off shore, it was designed to absorb wave energy and spare Male further damage. More ambitious is Hulhumale, an artificial island, higher than Male, that officials say they are building nearby. Sceptics mock. But the plan is to house perhaps half the country’s present population there, eventually.

Most of the Maldives’ coral is less than a metre above sea level. So a sea-level rise of three-quarters of a metre this century, which many who study climate think it reasonable to expect, would wipe the country out. Even a less fearsome 20-centimetre rise, combined with bigger waves, could wreak havoc.

William Allison, a scientist who lives in Male, explains it as follows. Global warming threatens coral in several ways. Rising seas are not bad in themselves. They give coral more upward growing room. But coral flourishes in water of around 22°C. A warmer atmosphere threatens to heat the local ocean to more than that, killing the coral. Another danger is carbon dioxide. When too much of this gas dissolves in seawater, corals build skeletons only with the greatest difficulty. A final worry is that hotter temperatures will increase the scale and frequency of storms.

It sounds grim. But Robert Mendelsohn of Yale University has a cheery, get-in-your-boat solution. Not that he thinks low-lying islanders are exaggerating. Their reefs and beaches could well be submerged, in his view. But burning less oil to keep air cool so ice stays ice and the seas don’t warm is too expensive and roundabout a way to meet the danger, Mr Mendelsohn thinks. Wouldn’t it be cheaper, he asks, for Maldivians, and those like them, to move?
On cost, he may be right. But people like their homes. Particularly Maldives homes. There was a time when the Maldivians were more nomadic. Life was not always so idyllic. In the past, when storms destroyed one island habitat, they would move to another. Nowadays, they would rather stay if they can. Even so, one government idea is to gather the people of the smaller islands on to three bigger ones, and defend these behind sea walls.

This is not without regret. The country’s environment minister talks fondly of small-island life, particularly its sense of community, which he feels is missing in the bustle of Male. Yet the outliers may not have a choice: “We simply cannot have 200 inhabited islands, one with 60,000 people and others with 200, vying for the same expensive defences and services! In consequence, the government wants to consolidate services into three regional hubs”, he explains.

Mural defences have drawbacks of their own. The coral that forms the islands is porous, making them in effect giant sponges. If the ocean continues to rise, before long the salt water will begin to seep through from under the walls. Quite apart from that, the cost can be astonishing. Someone has calculated that the Great Wall of Male cost $13,000 per linear metre to build.

It is interesting to know how the Maldives could afford this. As an official explains, the Japanese government was generous enough to pay for it. He hesitates. Yes? He goes on: the aid was linked to a contract award for a Japanese firm, which used patented technology. To extend or repair the wall, the official complains, they must buy from the firm at outrageous prices. “These rich countries pollute the atmosphere,” he says as a flash of anger displaces his jovial smile, “and then they profit from it.”

Making and Unmaking Paradise

It sounds wrenching: peaceful denizens of a simple land in harmony with their environment, paying for the wastefulness of others. Is it so simple? Oil-guzzlers in rich countries do have something to answer for. But not all Maldives’ troubles can be laid at their door. Like most paradises, Maldives is to a large extent artificial. Development made the harsh coral habitable. Development brought the hotels (over 80 at last count). And development is bringing problems, familiar and less familiar.

Jetties and harbour breakwalls have weakened natural sea defences. They channel sand to deep water while landfills extend the coastline to the vulnerable deepwater verge. The Great Wall of Male was probably needed only because the island’s natural wave buffer, its wide, flat reef, was filled in to house a booming population.

People take their toll in other ways. Male’s residents have made such a call on the underlying aquifer that the ground water is now laced with salt. They get fresh water (and soft drinks) to reach them by way of desalination plants. Even fresh air is getting scarce. The city of Male has terrible traffic jams and people idle their engines even when standing still just to run the air conditioning. How do you keep paradise afloat? How do you keep paradise paradise?
ENVIRONMENTAL LAW, VOLUNTARY INITIATIVES AND PRINCIPLES FOR SUSTAINABLE DEVELOPMENT
UNIT 3
ENVIRONMENT LAW, VOLUNTARY INITIATIVES AND PRINCIPLES FOR SUSTAINABLE DEVELOPMENT

Unit Outline
This unit is organised as follows:

Section 1
Environment law

Section 2
Voluntary initiatives and partnerships

Section 3
Principles for sustainable development

Learning Objectives
At the end of the unit, students should be able to:

- Explain the scope of environment law;
- Outline methods for the enforcement of national environment law in tourism and hospitality;
- Outline the role of voluntary initiatives in tourism and hospitality;
- Discuss the principles for sustainable development.
AN INTRODUCTION TO ENVIRONMENTAL LAW

Section 1:

International Environment Law

International environment law is developed in the form of international conventions, agreements and protocols. Those that directly concern tourism and hospitality are introduced in Unit 1.

The drawback with international law is that it is difficult to enforce. Countries are required by honour to implement and meet the objectives and targets of the protocols they have ratified and it is difficult if not impossible to enforce penalties for non-compliance.

National Environment Law

Since the mid 1970s, national environment law has been continuously evolving to cover ever-wider areas of activity.

National environment law is generally developed in the form of codes, acts and quality standards.

Examples of environment law that concern tourism and hospitality include:

- Drinking water quality standards;
- Legislation on the treatment and discharge of sewage;
- Indoor air quality standards;
- Emissions standards;
- Legislation on the separation and disposal of recyclable waste;
- Disposal of food waste and other organic waste;
- Vehicle emission standards;
- Occupational health and safety legislation;
- Bathing water quality standards;
- Legislation on environment impact assessment;
- Legislation on air-borne asbestos;
- Standards on sulphur content in coal, fuel oil and diesel;
- Legislation on noise;
- Building, construction and plumbing codes;
- Legislation on the use of ozone-depleting substances;
- End-of-life disposal of electronic appliances and vehicles;
- Legislation on the protection and conservation of habitats and species;
- Environment impact assessment.

As the scope of environment law is particular to each country, readers are advised to consult their national environment legislation for additional information.

National hygiene, sanitation and food safety legislation is also important, since it complements environment legislation.

Enforcement and Compliance

If not enforced, environment law remains merely words on paper. Compliance can be ensured through several mechanisms – the most important (especially for tourism and hospitality) being the permit system. Permit systems are generally developed in consultation with industry and should promote economically and
environmentally beneficial improvements in operations and procedures to reduce waste and pollution. Most legal systems also provide for the verification of compliance through stipulations for the physical monitoring and inspection of sites and premises by expert inspectors.

**The Multi-Medium Approach to Environment Law**

In the past, environment legislation was designed to address environment problems concerning a single environment medium (water, air or land), or a single environment issue such as solid waste or effluent discharge. The drawback with this approach is that it fails to recognise that pollutants released into one environment medium can move and impact other mediums. For example, untreated sewage released into water not only contaminates the water, but can also contaminate land (if the water is used for agriculture), and creates unpleasant odours. If the water is directly used for drinking, health impacts are inevitable. Similarly, sulphur dioxide emitted into the air can end up on land as dry deposit, which damages forests and buildings, or on water as wet deposit, which increases the acidity of the water body.

Single medium legislation also creates difficulties of enforcement and compliance. Both legislators and environment managers have often been frustrated to find that even after careful and costly enforcement policies and compliance strategies, overall environment improvement may not be achieved, as meeting standards on one environment medium has led to violations in others.

These drawbacks are now being addressed through legislation and enforcement that take a multi-medium approach. This means adopting a more holistic view, which recognises that outputs to all environment mediums (air, land and water) be considered in an integrated manner. In addition, enforcement is carried out through a single permit which covers all releases – emissions, effluents, solid waste, noise, indoor air quality, etc.

The added benefits of considering all mediums holistically is that it enables environment managers to consider the environmental burden of the entire business, and consider a wide range of environment improvement options and abatement techniques before choosing the most environmentally and economically favourable option.

The multi-medium approach also demonstrates the cost-effectiveness of prevention-at-source initiatives that avoid the generation of waste in the first place, rather than dealing with it once it has been created.
Experience shows that traditional command-and-control legislation is not sufficient to bring about environment improvement. Environmentally-sound development calls for a wider range of incentives, and voluntary self-regulation is now a popular force for environment-related improvement in several industries, including hospitality and tourism.

Voluntary initiatives are voluntary agreements and voluntary standards, which promote product stewardship and environmentally responsible entrepreneurship.1

- Voluntary agreements include environment-related principles, charters and codes of conduct, which set out guidelines to environmentally-sound operations and procedures;
- Voluntary standards not only provide guidelines, but also indicate specific levels of environment-related performance that need to be achieved.

Voluntary initiatives are popular because they:

- Do not compel a business to join or comply;
- Provide a framework for implementing environment management systems in businesses of diverse sectors and sizes;
- Provide formal recognition to businesses implementing environment management systems and improving environment performance. This recognition is provided through certification, accreditation or eco-labels, which allows consumers, investors, legislators, local communities and the entire market at large, to recognise and reward environmentally-responsible businesses. Current practice shows that environment certification is increasing sales, enhancing brand and corporate reputation, and improving dialogue with stakeholders. In the case of tourism and hospitality, eco-labels are proving to be very successful in promoting widespread environment improvement. Over 30 eco-labelling schemes, operating on the international, national and regional levels, are discussed in the United Nations Environment Programme’s publication, *Eco-Labels for the Tourism Industry*.
- Promote networking and the sharing of good environment practice and expertise;
- Create opportunities for similar businesses to learn from one another;
- Encourage environment improvement in areas that are not within the scope of environment legislation.

Voluntary initiatives are being launched, managed and monitored by industry and the government in a joint effort, or by a third party such as a non-government organisation, an entity specially set up for the purpose.

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1 In a global context, the terms ‘voluntary agreement’ and ‘voluntary standards’ may not be used consistently. For example, in the Netherlands a voluntary agreement refers to a formal, negotiated, legally binding contract between industry and the government. In the USA a voluntary agreement implies a non-binding agreement and companies can decide if they wish to participate.
ISO 14000

The major international voluntary environment management standard in operation today is ISO 14000. A short discussion on ISO 14000 follows. There are also several regional and national environment management standards such as the European Union’s Eco-Management and Audit Scheme (EMAS), and the US Environment Protection Agencies Industry Partnerships Program.

The ISO 14000 is a series of environment management standards and guidelines developed and promoted by the International Organisation for Standardization (ISO). The idea was conceived during the run-up to the United Nations Conference on Environment and Development in 1992, after which a new ISO Technical Committee – ISO/TC207 on environment management – was created, with the objective of developing standards on environment-related performance. The complete list of the ISO 14000 series is given below.

The series of most interest to tourism and hospitality is ISO 14001, which provides standards and certification of corporate environment management systems.

<table>
<thead>
<tr>
<th>ISO NUMBER</th>
<th>GUIDELINES / STANDARD TITLE</th>
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<tbody>
<tr>
<td>ISO 14010</td>
<td>Guidelines for Environment Auditing – General Principles</td>
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<td>ISO 14011</td>
<td>Guidelines for Environment Auditing – Audit Procedures – Auditing of Environment Management Systems</td>
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<td>ISO 14012</td>
<td>Guidelines for Environment Auditing – Qualification Criteria for Environment Auditors</td>
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<td>ISO 14020</td>
<td>Environment Labelling – General Principles</td>
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<tr>
<td>ISO 14021</td>
<td>Environment Labelling – Self Declaration – Environment Claims/ Terms and Definitions</td>
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<td>ISO 14022</td>
<td>Environment Labelling – Symbols</td>
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<tr>
<td>ISO 14023</td>
<td>Environment Labelling – Testing – Verification – Methodologies for Application in Environment Labelling</td>
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<tr>
<td>ISO 14024</td>
<td>Environment Labelling – Practitioner Programmes – Guiding Principles, Practices and Certification procedures of Multiple Criteria Programmes</td>
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<td>ISO 14031</td>
<td>Environment Management – Environment Performance Evaluation</td>
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<td>ISO 14040</td>
<td>Life Cycle Assessment – General Principles and Practices</td>
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<td>ISO 14041</td>
<td>Life Cycle Assessment – Life Cycle Inventory Analyses</td>
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<td>ISO 14042</td>
<td>Life Cycle Assessment – Life Cycle Impact Assessment</td>
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<td>ISO 14043</td>
<td>Life Cycle Assessment - Life Cycle Improvement Assessment</td>
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<tr>
<td>ISO 14050</td>
<td>Environment Management – Terms and Definitions</td>
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<tr>
<td>ISO 1460</td>
<td>Guide for the Inclusion of Environment Aspects in Production Standards</td>
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</table>
The International Organisation for Standardization has appointed national certification bodies in all member states. These national certification bodies are responsible for adapting all the global standards to suit the national context, and for managing, monitoring and certifying companies that meet the required level of performance.

Companies seeking certification under ISO 14001 are required, as a minimum, to have developed and implemented an environment management system and conducted an environment management system audit. The certification of companies, including service providers such as tourism and hospitality, is based on ‘production or service processes’ rather than on the end product or service itself. In other words, ISO 14000 is concerned with how companies manage the processes through which goods and services are produced, rather than the environment attributes of the final product or service itself. The rationale is that environmentally-sound processes automatically deliver environmentally-sound products and services.

Many tourism and hospitality businesses all over the world have already applied and received certification under ISO 14001. Readers are invited to contact their national ISO certification bodies for information on ISO 14001 certification procedures and standards applicable to tourism and hospitality businesses in their countries.

**COMMON QUESTION** How is the ISO 14000 series different from the well-known ISO 9000 series?

Both ISO 14000 and ISO 9000 are series of standards and guidelines on management systems. ISO 9000 applies to quality management and ISO 14000 applies to environment quality management. Both ISO 14000 and 9000 are concerned with processes and not products.

**HACCP**

An international food safety and hygiene programme that facilitates and complements environment management, the Hazard Analysis and Critical Control Points (HACCP) is a systematic method using seven principles for analysing a food process and determining the possible chemical, physical, and biological hazards within it. The HACCP-9000 programme integrates HACCP, ISO 9000, and food hygiene practices into one management system to ensure food safety and quality for a food/beverage plant, or a food-service establishment, anywhere in the world. Efforts to integrate ISO 14000 are underway.

HACCP-9000 registration is achieved through a five part process:

- Application for registration;
- HACCP Plan Validation and on-site HACCP Plan Audit;
- HACCP-9000 Quality Manual and on-site Readiness Review;
- HACCP-9000 Registration Audit;
- Actual HACCP-9000 registration.

After registration, the process continues with semi-annual surveillance audits to confirm continued conformity and continuous improvement by the company.
Examples of Good Practice

Created in 1992, the International Hotels Environment Initiative (IHEI) is a non-profit, charity programme developed by the international hotel industry for the benefit of hotels and the environment. The IHEI aims to promote the advantages of environment management as a fundamental part of running a successful and efficient hotel operation.

Representing more than 8,000 hotels around the world, the IHEI’s key objectives are to:

- Raise environment awareness in the hotel industry and to promote good practice internationally, working with governments, non-governmental organisations, hotel associations, tourism bodies and hotels;
- Facilitate access to environmental information to help all hotels implement their environment programmes;
- Position the hotel sector as a leader on the environment within the tourism sector;
- Work with partners who can help to multiply the reach and impact of the Initiative.

In a joint initiative, the IH&RA, UNEP and IHEI published an Environment Action Pack for Hotels in 1995 (updated 1998). This user-friendly guide is intended for use by all hotel employees and helps them to develop a practical and effective environment programme. (For further information, please visit the IHEI website, www.ihei.org, or the IH&RA website, www.ih-ra.com). This pack has been adapted and translated by a number of IH&RA member associations worldwide.

The IH&RA’s annual Green Hotelier and Restaurateur Environmental Award serves a triple purpose: to promote what the industry is doing internationally, to raise industry standards through identification of best practice, and to promote awareness of what still remains to be done. This award has been sponsored by American Express since its launch in 1991.

Judged by IHEI and UNEP DTIE, applicants must show evidence of:

- A comprehensive environment management system;
- Continuous environmental improvement and the revision of environmental targets and objectives;
- Measuring and monitoring of environmental performance;
- Internal environment communication and staff engagement;
- Communication of environmental performance and raising the environmental awareness of guests;
- Improving the quality of the local environment;
- Commitment to sharing the benefits of tourism with the local community.

The IH&RA uses illustrations of applications to highlight industry efforts in achieving the UNEP’s goal of sustainable development in tourism, and to produce best practice publications. Examples from the submissions have also been used in this manual.
Voluntary Initiatives in Tourism and Hospitality

As tourism and hospitality is largely made up of small and medium-sized businesses, legislative enforcement and compliance verification is difficult. Therefore, it is not surprising that voluntary initiatives such as eco-labels, environment awards and environment codes of conduct are proving to be an effective method of realising environment improvement across a large number of businesses.

Eco-labels are of particular interest to small and medium-sized tourism and hospitality businesses as they:

- Provide businesses with environment management information and expertise, which may not be available in-house;
- Allow tourists – the consumers – to identify directly and select environmentally responsible operators;
- Enable each business to develop an environment management system to suit its individual circumstances.

As mentioned earlier, a significant number of international and national tourism eco-labelling schemes are currently in operation, with many more in the pipeline. These schemes are analysed and discussed in the 1998 UNEP DTIE publication *Eco-labels in the Tourism Industry*.

**Example of Good Practice**

*The Green Globe Americas Programme is a joint venture between Green Globe and the Caribbean Alliance for Sustainable Tourism (CAST). This environmental management and awareness programme promotes the membership and certification of travel and tourism companies and destinations.*

*Both organisations work towards the implementation of Agenda 21 Towards Environmentally Sustainable Tourism, and seek to establish tools and programmes at local, national and regional levels. Together, they strive to establish methodology for measuring the environmental performance of hotels. Four certificates have been issued to date, all to hotels in Jamaica.*

Many tourism organisations have also developed environment codes of conduct. Amongst the first were the World Travel and Tourism Council’s (WTTC) Environment Guidelines, inspired by the Business and Environment Charter of the International Chamber of Commerce.
This section outlines key principles and approaches that lie at the core of environment improvement. They provide the reader with some insight into the logic of environment improvement, environment management and sustainable development. They are also the foundation on which environment policies and strategies are based.

**The Precautionary Principle**

It is more efficient and cheaper to do things properly the first time, than to go back and rectify the damage. The precautionary principle advocates a better-safe-than-sorry, no-regrets approach to environment management. It calls for industries to anticipate the environment impacts of their present and future activities and take action to minimise impacts before they happen – hence ‘precautionary’.

**Environment Integration**

Environment integration focuses on the interdependence between economic growth and environment quality. In the case of the tourism industry, this principle is particularly significant because industry growth and expansion will not be possible if its key resource – the environment – is destroyed.

Environment integration is multi-faceted in its application. With reference to environment management systems, it reminds us that pollution control in one medium (air, land or water), or in one activity, should not result in pollution increases in other mediums or activities. Let us consider some examples.

- Recycling post-consumer waste requires that waste is cleaned and sorted in homes/businesses, that collection points are set up, and that it is transported to handling facilities where it is again sorted, cleaned and crushed. The crushed product is then transported to manufacturers where it is transformed into new products. The process can be very energy and material-intensive. If recycling is to be environmentally and economically viable, the resources and energy saved and the waste avoided by recycling should not be offset by the resources and energy used and the new waste created in collecting, preparing and transporting waste for recycling.

- Photovoltaics (PVs) are an alternative emissions-free energy source. But to get the full benefit of PVs, the system’s capacity and feasibility must be well calculated to minimise use of the back-up diesel generator: if the generator has to be used for long periods, the PV application is both economically and environmentally-unsustainable.

Environment integration also calls for limiting human and financial resources in seeking environment solutions. Take the example of a coastal area with a large concentration of beach resorts. Sewage from the hotels must be treated before discharge, to maintain the quality of the shallow bathing waters. This will be more environmentally and economically feasible if local authorities set up a collective wastewater treatment plant, rather than requiring each facility to construct its own on-site unit. Construction-related impacts will be reduced, and pre-discharge wastewater-level monitoring will be made easier. Maintenance costs of such a plant could be financed through discharge levies.
Prevention at Source

‘Prevention is better than cure.’ Environment improvement practices should be applied at the very outset, to prevent the generation of waste and pollution in the first place. The objective is to move away from end-of-pipe, clean-up approaches that deal with pollution after it has been created, by avoiding the generation of waste at source. Prevention at source also paves the way for reducing the material and energy intensity of processes and products/services.

For example, if a hotel or restaurant starts using less water by installing flow-reducers in taps and water-saving flushers in toilets, it will also significantly reduce wastewater. This means less wastewater to treat, reducing risk to nearby waterways. Using less water also results in lower bills, while reduced wastewater output lowers effluent discharge costs.

The ‘Polluter Pays’ Principle

This principle says that the costs of pollution abatement should be borne by the polluter. It has been widely accepted and applied in the development of environment policies on the use of ‘economic instruments’ for environment improvement, such as pollution taxes, user fees, and levies.

An important question that arises from this is: Who is the polluter? People often suppose the polluters are manufacturers of goods and services, often forgetting that consumers are also polluters, since they demand and consume the products and services that generate the pollution. Governments are also polluters, either directly as producers and consumers, or indirectly by subsidising polluting activities.

The ‘polluter pays’ principle provides the framework for the development of economically viable pollution control strategies. In dealing with pollution costs and how they should be allocated among polluters, the principle further suggests that:

- Pollution within a given area and medium (air, land or water) be controlled up to the point where marginal control cost equals marginal benefit;2
- The cost of abatement be paid for by polluters in proportion to the type and volume of their emissions and discharges;
- Those who have the lowest abatement costs carry out the abatement activity until abatement costs are equalised across all polluters.

Public Participation

The principle of public participation is concerned with the decision-making processes that involve all those most likely to be affected by a decision. It dictates that:

- All groups of society should be able to have their say on matters of concern;
- Interest groups should be able to participate in discussions that precede decision-making;
- Relevant groups should be informed about the potential environment impacts of developments and the measures proposed to reduce them.
One of the best examples of the application of public participation is in the formal Environment Impact Assessment (EIA) process (discussed in Unit 5). Most countries require an EIA before major development projects are finalised and approved. The formal EIA process requires that EIA findings be compiled into a formal ‘environment impact statement’ and made available for public consultation, allowing interested groups to be informed about the proposed development and to voice their concerns, suggest alternatives and consider impact mitigation methods before the plans are finalised.

Experience with EIA shows that public participation is invaluable in providing an opportunity for the input of indigenous knowledge on impact reduction, which has often been more valuable than the findings of scientific assessments. Public participation also improves dialogue between developers and local groups, and prevents wasteful and costly conflicts from occurring later.
UNIT 3: EXERCISES

1. GROUP PROJECT
What are the broad areas of environment-related compliance required by a small or medium-sized hotel in your country?

- Conduct a short investigation and develop a short environment-related compliance checklist.
- What is the relationship between national environment legislation for tourism and the framework for environmentally-sound tourism discussed in Unit 2?

Write a short report and make a 5-10 minute presentation of your findings.

2. GROUP PROJECT
- Have any voluntary initiatives been launched targeting the hotel and tourism industry in your country or region?
- How are these initiatives managed and monitored?
- Do you feel that these initiatives have been successful in promoting environment improvement?

Write a short report and make a 5-10 minute presentation of your findings.

3. GROUP DISCUSSION OR WRITTEN ASSIGNMENT
Critically discuss the following statements:

- Voluntary initiatives are a good way to get businesses started on environment management. But for real progress in environment improvement, voluntary initiatives will not be enough. Legislation and enforcement are absolutely essential.
- Voluntary initiatives can be much more effective than legislation in promoting environment action in companies. It is human nature to prefer to do something of our own free will, rather than be forced to.
### GLOSSARY

<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
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<tbody>
<tr>
<td>accreditation</td>
<td>official recognition and approval</td>
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<tr>
<td>certification</td>
<td>a formal declaration or a certificate of confirmation</td>
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<tr>
<td>charter</td>
<td>a list of aims and principles of an organisation</td>
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<tr>
<td>code of conduct</td>
<td>a set of written rules which explain how people of a certain group, industry or profession should function</td>
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<tr>
<td>eco-label</td>
<td>a label certifying that special efforts have been made to reduce the environment impacts of a given product or service</td>
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<tr>
<td>EIA</td>
<td>Environment Impact Assessment; the procedure to forecast and assess the environment impacts of proposed developments</td>
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<td>environment burden</td>
<td>the resources and materials used, and all waste, effluents and emissions generated by a given activity or business</td>
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<td>environment management system</td>
<td>a system that helps businesses to evaluate, manage and reduce their environment impacts by providing a methodology to integrate environment management into business operations in a systematic manner</td>
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<td>food hygiene practices</td>
<td>the fundamental sanitation precepts by which all food processing and handling establishments must operate, the foundation for food safety involving good sanitation</td>
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<tr>
<td>HACCP</td>
<td>Hazard Analysis and Critical Control Points</td>
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<tr>
<td>ISO</td>
<td>International Organisation for standardization</td>
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<tr>
<td>ISO 9000</td>
<td>a series of standards and guidelines for quality management systems developed and implemented by ISO</td>
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<tr>
<td>ISO 14000</td>
<td>a series of standards and guidelines for environment-quality management systems developed and implemented by ISO</td>
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<tr>
<td>UNEP DTIE</td>
<td>United Nations Environment Programme, Division of Technology, Industry and Economics</td>
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<tr>
<td>voluntary initiatives</td>
<td>voluntary agreements and voluntary standards that promote product stewardship and environmentally responsible entrepreneurship</td>
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ENVIRONMENT
MANAGEMENT SYSTEMS
**UNIT 4
ENVIRONMENT MANAGEMENT SYSTEMS**

**Unit Outline**
Environment management systems enable businesses to minimise and avoid environment damage, whilst maintaining and increasing profitability.

This unit contains four sections:

**Section 1
An introduction to environment management systems (EMS)**
This section will define EMS, outline its origins and discuss the benefits of implementing it.

**Section 2
Environment management systems**
Developing and implementing EMS.

The approach is based on the EMS specifications of ISO 14001. Examples of good practice are included to demonstrate theory in practice.

EMS is discussed in four stages:

**EMS Stage 1:** Assign environmental responsibility
- Conduct the environment status review

**EMS Stage 2:** Develop the environment policy
- Establish environment objectives and targets

**EMS Stage 3:** Implement the environment management programme
- This involves:
  - Reducing water use;
  - Reducing energy use;
  - Reducing waste output;
  - Purchasing environmentally-preferable products;
  - Lowering emissions;
  - Improving indoor air quality;
  - Reusing waste water;
  - Reducing noise;
  - Internal communication, delegation and training;
  - Communicating environment performance to guests;
  - Monitoring and documenting environment performance.

**EMS Stage 4:** Conduct the EMS audit
- Report on environment performance
Section 3
Environment management checklists

- Rooms, housekeeping, front office;
- Administration, purchasing, back office;
- Food and beverage, kitchens;
- Pools;
- Gardens;
- Engineering and maintenance.

Section 4
EMS case studies in hospitality businesses

Section 5
An introduction to environment management tools and concepts

Cleaner Production, Eco-Efficiency, Industrial Ecology (Systems Thinking) and Life Cycle Assessment.

Section 6
EMS in the future

Learning Objectives

At the end of this unit, students should be able to:

- Define and outline EMS;
- Identify opportunities for EMS in the school, the workplace and the home;
- Appreciate that EMS approaches and priorities will vary according to the type and size of the business, local environmental problems and climate characteristics;
- Develop an EMS for a hospitality business;
- Discuss EMS options with engineers and environment specialists and participate in selecting the most cost-effective and environmentally-suitable improvements for a given situation.
“All this talk about jumping on the green bandwagon has died down. Being ‘green’ is no longer fashionable or glamorous, it is a fact of life. Now considered by all industries to have a direct impact on profitability, it has been absorbed in business practice. Having left the glamour and excitement, we are now at stage two – the detail of implementation.”

David Henderson, Former Marketing Manager of Plysu Containers, UK

1.1 What is an Environment Management System (EMS)?

An environment management system (EMS) helps businesses to evaluate, manage and reduce their environment impacts by providing a methodology to integrate environment management into business operations in a systematic manner.

A typical EMS consists of the following actions:

- Conduct a preliminary environment review to identify all resource inputs and waste outputs;
- Establish an environment policy;
- Establish environment objectives/targets;
- Implement EMS through an environment management programme;
- Establish EMS procedures in all departments and divisions;
- Establish environment performance monitoring and data collection procedures;
- Internal environment communication, delegation and training;
- Environment-related communication to visitors;
- Conduct an EMS audit;
- Compare actual performance against objectives/targets;
- Review objectives/targets for continual improvement;
- Report on environment performance to employees, customers, stakeholders and the wider public.

1.2 The Origins of EMS

EMS was developed on the following bases:

- COMPLIANCE AND DUE DILIGENCE AUDITING
  Compliance audits were developed in the 1970’s in response to the costly fines companies were incurring due to non-compliance with environment legislation. Due diligence or pre-acquisition audits are conducted to identify the environment issues of sites and businesses before they can be considered for investment or takeover.
- TOTAL QUALITY MANAGEMENT
  EMS is based on the TQM process:
THE BENEFITS OF EMS

- EMS enables tourism businesses to comply with, and even exceed, environment legislation.
- EMS lowers costs by reducing resource use, improving operating efficiency, lowering waste output and avoiding non-compliance fines.
- EMS makes a property a safer and healthier environment for employees and visitors. Work related accidents, occupational illnesses and related absenteeism can therefore be reduced.
- Along with the growth of public environment awareness, tourists are demanding ‘greener’ services. EMS enables businesses to meet this demand. The growth of tourism eco-labels and environment awards is a strong indication of the growing response of tourists to environmentally responsible services.
- Banks and insurance companies now require information on environment performance when making lending and coverage decisions. In 1997, UNEP brokered the Statement by Financial Institutions on Environment and Sustainable Development, a commitment by 104 signatories to improve environment management and adopt industry best practice in credit risk management, reduction of energy and materials use and waste management. The signatories include a range of financial institutions: commercial and investment banks, venture capitalists, asset managers and multilateral development banks. As a spin-off from this initiative, over 70 insurance companies from 25 countries have come together under UNEP to form UNEP Insurance Industry Initiative for the Environment.
- Corporate social responsibility is a growing agenda. Companies are no longer judged by their profit alone and face mounting pressure to participate in improving the quality of life of their customers, employees and the wider society within which they operate. EMS is the first critical step in this direction.
EMS STAGE 1: ASSIGN RESPONSIBILITY AND CONDUCT ENVIRONMENT STATUS REVIEW

Assign Environment Responsibility

In any business, responsibility for a task must be assigned to someone to ensure that it is performed and completed. Responsibility for EMS can be assigned to one employee or to a group. Most tourism businesses appoint an 'environment champion', supported by an environment management team. The environment management team should include representatives from top management and from all departments: this will ensure that the environment burdens of the entire business are identified and included in the EMS.

The environment champion and management team should have the skills to:

- Appreciate the importance of EMS;
- Understand legislative requirements and the implications of non-compliance;
- Appreciate the technicalities of EMS so that priority actions can be identified;
- Implement EMS, which includes gathering information, conducting interviews, data analysis and report writing.
**COMMON QUESTION** Are the services of external consultants required to set up EMS?

There is always the choice of using external consultants, especially at the early stages when adequate expertise may not be available in-house. While external consultants may facilitate the identification and implementation of cost-effective improvements, their services can be quite expensive, especially for a small business. External consultants must work closely with employees to provide training and build in-house expertise.

**Conducting the Environment Status Review**

An environment status review is similar to a SWOT analysis. It identifies the environment-related strengths, weakness, opportunities and threats of a business by assessing:

- How and where resources are used;
- How and where waste is generated;
- Which codes and standards are being violated in daily business practices.

The Environment Status Review involves data collection, interviews, inspection, observation, and review of existing documents and records on resource/materials use and waste output. The objective is to gather baseline data to:

- Establish environment management objectives and targets;
- Identify the best areas to start EMS that will bring both business and environment benefits.

It is best to begin with the documentary evidence and supplement this information with data gathered through interviews, observation and inspection.

EMS in a hospitality business is based on nine action areas:

- Reduce water use;
- Reduce waste water output;
- Reduce energy use;
- Reduce waste;
- Purchase environmentally-preferable products;
- Lower emissions, including ozone-depleting substances;
- Improve indoor air quality;
- Reduce noise;

A series of fact sheets and environment status review checklists for each of the above areas are given below. (The fact sheets contain important background information for an environment review). Neither the fact sheets nor the review checklists are fully comprehensive; they have been developed to demonstrate the type of background data and issues that should be considered in an environment status review.
**Environment Status Review on Water and Wastewater**

**WATER FACTSHEET**

- Water can account for a significant part of purchasing costs in hospitality businesses.
- Most businesses are supplied with water by utility companies who purify the water before distribution. Some businesses (especially in rural areas) may draw supplies directly from surface waters (rivers, streams etc.) or aquifers. In this case, water purification may need to be conducted on-site.
- The various uses of water in hospitality businesses are:
  - Hot and cold water for bathrooms, kitchen and laundry;
  - Hot and cold water for toilets;
  - Cold and hot water for HVAC;
  - Cold water for drinking;
  - Cold water for fire fighting.
- In most businesses, drinking water is drawn from the mains, whilst non-drinking water is drawn from storage tanks.
- Over 50% of water is used in guestrooms and kitchens. Other major users are laundries and public toilets.
- Hot water is held in, and distributed from, hot-water storage tanks. In larger facilities, separate boilers and storage tanks may be used to heat and hold water supplies at different temperatures. An alternative is to use location-specific water heaters to increase temperatures as required.
- Much energy is needed to heat and store hot water, and lowering hot water consumption will reduce water-heating costs.
- Different degrees of hot water are required for different purposes. Typical water heating thresholds for hospitality businesses are:
  - Guest rooms 50°C
  - Laundry 40-80°C
  - Kitchens 60°C
- Wastewater should be directed to sewage treatment plants for treatment before discharge. Yet large volumes of wastewater are discharged without treatment in both industrialised and non-industrialised countries.
- Water treatment is expensive, and is usually charged by volume discharged.
- Biological treatment ponds could be set up if no municipal sewer is available.
<table>
<thead>
<tr>
<th>Question</th>
<th>Answer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Is water use being monitored? How much hot and cold water is used on the main property, in the swimming pool and in the garden every month/year?</td>
<td>✔</td>
</tr>
<tr>
<td>Have efforts been made to save water?</td>
<td>✔</td>
</tr>
<tr>
<td>What are the sources of water supply?</td>
<td>✔</td>
</tr>
<tr>
<td>Are water quality standards being met?</td>
<td>✔</td>
</tr>
<tr>
<td>Are there signs of corrosion, high levels of scale or other deposits, or pH increase, indicating that water quality needs to be improved?</td>
<td>✔</td>
</tr>
<tr>
<td>What is water consumption cost as a proportion of operating costs?</td>
<td>✔</td>
</tr>
<tr>
<td>Are employees encouraged to save water during daily work routines?</td>
<td>✔</td>
</tr>
<tr>
<td>Are guests invited to save water?</td>
<td>✔</td>
</tr>
<tr>
<td>How often is the water distribution system checked for leaks, pressure control malfunctions and other inefficiencies?</td>
<td>✔</td>
</tr>
<tr>
<td>Have separate departments been sub-metered to monitor the water consumption of each?</td>
<td>✔</td>
</tr>
<tr>
<td>Is there adequate turnover in water storage tanks to prevent the forming of bacteria?</td>
<td>✔</td>
</tr>
<tr>
<td>Is wastewater treated before discharge?</td>
<td>✔</td>
</tr>
<tr>
<td>Have water purchasing and waste water discharge costs risen over the last 3 years?</td>
<td>✔</td>
</tr>
</tbody>
</table>
Environment Status Review on Energy

ENERGY FACTSHEET

- Energy accounts for the largest share of operating costs in tourism facilities.
- Energy is used for lighting, heating and cooling, ventilation, and powering appliances.
- Most tourism businesses draw their electric energy from the national grid, whose power is generated from various sources: fossil fuels such as fuel oil and coal, hydropower, nuclear power, natural gas; and renewable sources such as solar, wind, bio-fuels and geothermal energy.
- Apart from grid electricity, hospitality businesses use a range of other fuel and energy sources for water and space heating and cooking. These include fuel oil, natural gas or propane, solar and wind power, bio-fuels and geothermal energy.
- What area of a hospitality business is the most energy-intensive? The answer depends on building configurations, climate conditions, heating and cooling requirements, levels of occupancy and activity, the energy sources used, and the energy-efficiency of appliances.
- While some activities may require high amounts of energy, associated costs may be relatively low. Apart from pricing distortions, this could be due to the high energy-efficiency of equipment or the high calorific value of the fuel used. The UK Department of the Environment, Transport and the Region’s Energy Efficiency Best Practice Programme, provided the following estimates on energy intensity and costs based on energy consumption data from hospitality facilities in the UK:

<table>
<thead>
<tr>
<th></th>
<th>% OF TOTAL ENERGY VOLUME</th>
<th>% OF TOTAL ENERGY COSTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Space heating/cooling</td>
<td>48%</td>
<td>29%</td>
</tr>
<tr>
<td>Kitchen and F&amp;B outlets</td>
<td>15%</td>
<td>15%</td>
</tr>
<tr>
<td>Water Heating</td>
<td>20%</td>
<td>12%</td>
</tr>
<tr>
<td>Lighting</td>
<td>9%</td>
<td>11%</td>
</tr>
<tr>
<td>Others</td>
<td>8%</td>
<td>23%</td>
</tr>
</tbody>
</table>

- Energy management considerations differ in hot and cold climates. In hot climates air-conditioning is used to reduce temperatures and humidity, while in cold climates, heating systems are required to increase temperature and control ventilation and humidity.
- Degree-day thresholds provide guidance to property managers on heating and cooling levels. They differ from country to country. Comparing outside temperatures with the degree-day threshold will indicate the levels to which buildings have to be heated or cooled. Degree-day thresholds are published ahead of time in energy and property management literature.
- When carrying out energy audits it may be necessary to convert quantities of fuel into units of energy. The ‘input values’ for energy conversion of commonly used fuels are given in the table below. ‘Input value’ means the energy being converted in the power/heat generation process. These input values must therefore be multiplied by the energy efficiency of the appliance to obtain the actual output of energy. Accurate data of the exact calorific values of fuels and the efficiency of equipment can be obtained from suppliers.
It will also be necessary to convert values from watt-hours to joules or vice versa. The calculation is:

1 kilo watt-hour (kWh) = 3,600 kilojoules (kJ) or 3.6 megajoules (MJ)

Emissions from different fuels should be taken into account. The UK Department of the Environment, Transport and the Regions provides the following estimates:

- The potential savings linked to energy efficiency are significant. Repair and good housekeeping measures will reduce energy costs by 10%. Retrofit and refurbishment options bring savings of 30% or more.

### Energy conversion

**ENERGY CONVERSION DATA – INPUT VALUES**

- Coal kWh = Kg x 8.05
- Liquid petroleum gas kWh = m³ x 25
- Natural gas kWh = m³ x 10.6
- Heavy fuel oil kWh = litres x 13.3
- Light fuel oil kWh = litres x 12.9

### Carbon dioxide estimates

**CARBON DIOXIDE EMISSIONS PER UNIT OF DELIVERED ENERGY**

- Coal 0.32
- Oil 0.28
- Gas 0.19
- Electricity generated from an oil-fired power station 0.63
# ENERGY CHECKLIST

- How much power and fuel is used on the property every month/year?
- What fuel source is used to generate the electricity used?
- Have efforts been made to save power and energy?
- Is power supply shut down in areas that are not in use?
- Are temperature settings adjusted to ensure comfort levels and minimum energy use?
- Is the cheapest and most efficient fuel being used for each requirement?
- Is the energy plant and equipment over ten years old?
- Are energy-saving lightbulbs being used?
- Are employees encouraged to save energy in daily routines?
- Are visitors invited to save energy?
- Are appliances thermostatically controlled?
- What are fuel and power costs in proportion to total operating costs?
- Have fuel and power costs increased over the last three years?
Environment Status Review for Waste

WASTE FACTSHEET

Waste disposal is a major economic and environment challenge facing all societies.

- Waste generated by hospitality businesses include:
  - Paper and cardboard items such as stationery, disposable items and packaging;
  - Aluminium products such as beverage cans and tins;
  - Plastic items such as packaging, containers and disposable items;
  - Organic waste such as food waste and garden trimmings;
  - Hazardous waste such as batteries, solvents, paints and anti-fouling agents;
  - Building materials and furniture;
  - Oils and fat;
  - End-of-life appliances and furniture.
- Municipal waste (which includes the above) is recycled, incinerated or land filled. In most countries, most waste goes for landfill.
- Landfill sites have significant environment impacts. In an effort to reduce landfill volumes, many countries are enforcing landfill taxes and legislation to discourage new sites. Simultaneously, efforts are being made to increase the recycling of paper, plastic and aluminium wastes. The incineration of waste with heat recovery is also being promoted, though to lesser extent.
- For tourism businesses, the revenue gains through the sale of reusable and recyclable wastes can greatly offset the costs of waste separation, bailing and compacting.
- The waste management hierarchy is:
  - Avoid;
  - Reduce;
  - Reuse;
  - Recycle;
  - Recover.

See page 105 for details on each aspect of the hierarchy.

- Based on material use and recycling statistics from the US:
  - Recycling one aluminium can saves enough energy to run a TV for 3 hours;
  - Recycling one glass bottle saves enough energy to light a 100-watt bulb for 4 hours;
  - Every 3 weeks, Americans dispose of an amount of used motor oil equivalent to the Exxon Valdez oil spill;
  - Recycling one tonne of paper saves 1,400-kilowatt hours of energy, enough to heat an average American home for 6 months.
The first step in preparation for a preliminary waste status review is to compile an inventory of all materials disposed of by the business. The following should then be considered:

- How much waste is generated under the main waste categories: paper, plastic, aluminium, organic (kitchen and garden) and hazardous, every month/year?
- Which departments generate high volumes of waste?
- How much is known about waste disposal methods?
- Have initiatives been taken to separate waste?
- Is organic waste separated from other waste?
- Have initiatives been taken to reduce waste?
- What are waste disposal charges as a proportion of operating costs?
- Have waste disposal charges increased over the last 3 years?
- Are there items in the waste stream that have never been used?
- Has a waste audit been conducted?
Environment Status Review on Purchasing Environmentally-preferable Products and Services

PURCHASING FACTSHEET

- The hospitality industry is a large buyer of consumer goods and services and can, therefore, have a significant influence on suppliers and contractors. On average, 26 five-star hotels purchase the same volume of goods as 1,200 families.
- Environmentally-preferable products include:
  - Products made entirely or partly with recycled materials;
  - Materials with reduced toxicity – e.g. water-based paints and non-solvent cleaners;
  - Products manufactured through cleaner production processes – e.g. unbleached paper;
  - Products that are more durable and last longer;
  - Products that require less energy during manufacture and use;
  - Reusable or recyclable products;
  - Products with reduced packaging - most packaging ends up in the waste stream less than 9 months after manufacture;
  - Environmentally certified products;
  - Products manufactured locally not requiring long-distance transportation.
- The use of environmentally-preferable products can be a valuable showcase for corporate environment commitment.
- Environment-conscious purchasing practices avoid and reduce waste. For example, buying items with less packaging reduces packaging waste.
- Changing purchasing practices should be undertaken in close collaboration with suppliers to ensure that the most cost-effective and environmentally-preferable alternative is selected.
Purchasing Checklist

The first step is to compile an inventory of all materials purchased by the business. This inventory can be used to assess:

- Which items can be replaced by a more environmentally-preferable alternative?
- Which can be reused for the same or another purpose?
- Are items being purchased that never get used?
- Have suppliers been asked for environmentally-preferable alternatives?
- Have contractors been able to provide a more environmentally-preferable service?
- Which suppliers and contractors have an environment policy?
- Are efforts being made to reduce packaging?
- Is a conscious effort being made to buy environmentally-preferable products whenever possible?
Environment Status Review on Emissions and the Indoor Environment

EMISSIONS AND INDOOR ENVIRONMENT FACTSHEET

- Emissions from tourism facilities include:
  - Combustion gases (carbon dioxide, nitrous oxide, hydrocarbons) from fossil fuel and gas-operated boilers, stoves and generators;
  - CFCs from refrigeration and air-conditioning equipment;
  - Halons in fire-extinguishing equipment;
  - Vapours from dry cleaning solvents;
  - Vehicle emissions.

- Indoor environment quality is of great importance to the comfort and well-being of occupants. Most people living and working in cities spend 90% of their time indoors.

- Indoor air quality depends on the activities and emissions within the building and the pollutants brought into it from the air outside. Common sources of indoor air quality contamination include:
  - Combustion gases from stoves, boilers and other combustion equipment;
  - Tobacco smoke;
  - VOC vapours from cleaning solvents, paints, varnishes, photocopy emissions and pesticides;
  - Asbestos fibres;
  - Ozone brought in from the outside;
  - Dust and particles;
  - CFCs from refrigeration and air-conditioning equipment;
  - Radon released from building materials.

- Poor indoor air quality can induce adverse health effects, from headaches and nausea to respiratory irritations and allergic reactions. Long-term exposure (in the case of hospitality employees) can induce more serious illnesses.

- The best-known indoor environment-related health issue is ‘sick building syndrome’, associated with continual exposure to fumes from paints, adhesives, varnishes, and chemical emissions from photocopiers, furnishings and fabrics. The World Health Organisation (WHO) estimates that 30% of new and refurbished buildings have registered complaints of sick building syndrome symptoms: headaches, dizziness, rashes, asthma, and allergies.

- Adequate ventilation is critical in improving indoor air quality. Fresh air is needed to renew oxygen, remove micro-organisms, vapours and odours, as well as excess heat and moisture.

- Most small hotels are likely to use mechanical ventilation systems, while the use of integrated heat, light and ventilation systems is both more efficient and more feasible for larger properties.
The first step is to compile an inventory of all sources of emissions inside and outside the building. Then consider the following:

- Are emissions from boilers and stoves monitored?
- Is indoor air quality monitored?
- Are appliances and equipment serviced regularly?
- Are appliances over 10 years old being used?
- Have complaints about poor indoor air quality been received from guests or employees?
- Is the property free from asbestos?
- Have alternatives to CFCs been considered?
- Have efforts been made to reduce emissions?
- Are vehicles equipped with catalytic converters?
- Are there local initiatives to monitor prevailing (exterior) air quality, especially in urban areas?
- Is the air quality of the local environment considered to be good or bad?
Environment Status Review on Reducing Noise

NOISE FACTSHEET

- Noise pollution can be defined as undesirable sound that is disturbing, annoying and which may be detrimental to human health.
- Undesirable noise can include music, traffic, crowds, and workplace-related noise from machines and appliances.
- Noise is measured in decibels (dB), which follow a logarithmic scale. Therefore even a small increase in decibels means a large increase in the magnitude of the sound. For example, a sound of 30dB is ten times greater in intensity than 20dB, and a hundred times greater than 10dB.
- The frequency of noise is measured in Hertz (Hz).
- Vibration is a major source of noise transmission.

<table>
<thead>
<tr>
<th>Sound intensity</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>A home environment in an urban area</td>
<td>40dB</td>
</tr>
<tr>
<td>Office</td>
<td>50-60dB</td>
</tr>
<tr>
<td>City centre</td>
<td>70dB</td>
</tr>
<tr>
<td>A moving road transport container at a distance of 15 metres</td>
<td>90dB</td>
</tr>
</tbody>
</table>

- Continuous exposure to intensities of noise can have adverse health effects:
  - Noise levels between 70dB-12dB can induce migraines, circulatory disturbances, high blood pressure and ulcers;
  - Noise levels between 10dB and 120dB can cause loss of hearing;
  - Noise levels above 130dB can cause direct damage to the ear;
- High levels of noise in hospitality businesses can reduce the value of the property and lead to the loss of business. It also affects employee productivity and causes conflicts with neighbouring businesses and homes.
- Areas that generate the most noise in hospitality businesses are mechanical rooms with fans, compressors, boilers and generators, kitchens, laundries, delivery and waste output areas including compactors, garages, discotheques and function rooms, lobby areas and bars.
- The most noise-sensitive areas in hospitality properties are guestrooms, meeting and conference rooms, and offices.
- The US Occupational Safety and Health Act specifies the following:

<table>
<thead>
<tr>
<th>Maximum permissible industrial workday noise levels</th>
</tr>
</thead>
<tbody>
<tr>
<td>SOUND LEVEL (dB)</td>
</tr>
<tr>
<td>-------------------</td>
</tr>
<tr>
<td>90</td>
</tr>
<tr>
<td>92</td>
</tr>
<tr>
<td>95</td>
</tr>
<tr>
<td>100</td>
</tr>
<tr>
<td>105</td>
</tr>
<tr>
<td>110</td>
</tr>
<tr>
<td>115</td>
</tr>
</tbody>
</table>
Identify all possible sources of noise from within and outside the property:

- Verify national legislation for the maximum limit for noise in the workplace. Noise limits are usually included in occupational health and safety laws. In most countries the maximum noise level during an 8-hour working day is 85-90dB.

- Do guests complain regularly about noise? Does it come from inside or outside the property?

- Do employees complain about noise, especially those based in and around kitchens, laundries and maintenance areas?

- Have employees reported health problems that could be linked to high noise intensities?

- Are equipment and appliances regularly serviced to maintain low noise levels?

- Have steps been taken to reduce noise?

- Is it possible to identify days and times of the year that are particularly noisy?
Environment Status Review on the Potential Response of Visitors to the Impending Environment Effort

It is useful for a hospitality business to gain an insight into potential guest response to the impending environment effort:

- Have any guests inquired about the business’s environment policy?
- Have tour operators and travel agents inquired about the businesses’ environmental policy?
- Do competitors have an environment policy?

As part of the environment status review, a short guest survey could be conducted to evaluate visitor interest in environment issues and environmentally responsible service providers. For example:

**Example of Good Practice**

Treetops Hotel is committed to improving the environment and is working towards reducing environment impacts while providing you with a high-quality service. We would be pleased to have your comments on the following:

- Are you interested in environment issues?
- Would you consider giving preference to an environmentally responsible business?
- Would you agree to having your towel and linen changed every other day to save water and energy and to reduce wastewater?
- Would you agree to separating your glass, paper and metal waste if separate containers were provided in your room?
- Are you interested in receiving information on local environment initiatives and conservation programmes?

Further comments and suggestions: ..............................................................

Thank you very much for your time and participation.
EMS STAGE 2:
ESTABLISH ENVIRONMENT POLICY AND SET ENVIRONMENT OBJECTIVES AND TARGETS

Compile the Environment Status Report
To fully analyse and appreciate the data gathered through the environment status review, it should be compiled into an environment status report. This report should include:

- Volume of costs of water and energy used;
- Volumes and charges of waste disposal;
- Inventory of all materials purchased;
- Levels of compliance;
- Environment improvement activities already in place;
- Management and operation procedures that could facilitate/obstruct EMS implementation;
- Local initiatives that could facilitate EMS implementation – for example voluntary industry partnerships on the environment, eco-labelling schemes, loans or grants for environment improvement, environment help-lines, EMS literature produced by the national environment agency or local authorities, etc;
- Employee interest in the impending EMS;
- Potential visitor response to the impending EMS;
- Time spent on the review;
- Sources of information, including interviews and observations;
- Recommendations on EMS objectives and targets.

Verify Compliance with Current and Imminent Environment Legislation
A full review of relevant environment legislation needs to be undertaken at the same time as the environment status review. The environment status report will identify areas where legislation is being violated. It also helps to be aware of impending legislation, since the EMS can then be planned to meet and exceed the new requirements.

Set EMS Objectives and Targets
The environment status report should provide the information needed for establishing EMS objectives and targets. The objectives should specify environment goals, and the targets should indicate the level of improvement to be attained. For example:

Objective: Reduce carbon dioxide output
Target: Reduce carbon dioxide output by 12% of 1998 levels by 2001

Activities that are highly resource-intensive, generate large quantities of waste and emissions, violate legislation, are poor environment practice, and pose health hazards to employees and guests, should be given priority.
Objectives and targets should be established with input from all departments and approved by top management.

**Good Practice Tip**

Objectives and targets must be realistic and achievable from a business and environment perspective. An over-ambitious target can discourage action, reduce enthusiasm and interest, while an under-ambitious one will not provide a sense of achievement and impetus for continuous improvement.

**Establish the Environment Policy**

The environment policy is a public statement of a company’s environmental commitment and responsibility. It declares how the business is responding to environment challenges, and establishes the overall framework for achieving objectives and targets. It also validates the EMS.

The policy should be developed on the basis of the findings of the environment status review and the objectives and targets established. It must have top management support. The policy statements of five businesses are reproduced below.

**Bass Group’s Environment Policy**

With major hotel and leisure retailing activities around the world, Bass Recognises that it faces a wide range of environmental responsibilities.

Bass is committed to a policy of seeking continual improvement in environmental matters. Group companies have introduced environmental management programmes, which will deliver regulatory compliance in each country, commercial efficiency and good environment citizenship programmes. These programmes are an integral part of the proper management of group business and will help provide a safe and healthy environment for employees, contractors, customers and neighbours.

Bass will ensure that group companies:

- Undertake a thorough risk and hazard analysis;
- Are sensitive to environment issues and consider their potential impact on all new projects and developments;
- Implement their company environment policies;
- Have management accountability and responsibility for environment matters;
- Develop management programmes and set quantified targets where appropriate;
- Monitor and report on performance on a regular basis;
- Communicate with those affected by their actions, and train and involve employees at appropriate levels and function within the organisation.

You can visit the website at www.bass.com/environment
Golden Tulip Hotel’s Environment Policy

Golden Tulip and Tulip Inn Management Hotels focus on offering a high standard of services and products. Part of our policy is to promote the well-being of all parties concerned, as well as reduce health risks to our staff, guests and society at large, both now and in the future.

We conduct a proactive environment policy, called ‘Golden Tulip Goes Greener’, to reduce our environment load as much as possible. We do this without loss of comfort for our guests. We also maintain optimum safety for our staff, guests and other parties concerned without losing sight of sound business management.

Golden Tulip and Tulip Inn Management Hotels oblige themselves to:

- Conduct a proactive environment policy in all hotel departments and offices;
- Meet environment requirements, rules and regulations;
- Optimise use of energy, water and materials;
- Limit waste, and recycle when possible;
- Limit the use of harmful materials;
- Stimulate suppliers and guests to contribute to reducing the environment load;
- Share knowledge and experience with other companies in the hospitality industry;
- Provide hotel staff with the information and means to reach the Green Objectives;
- Measure the level of implementation on a regular basis;
- Evaluate and adjust the measures taken that should lead to an acceptable environment load;
- Unceasingly introduce improvements to the Green Programme.

Nestlé’s Commitment to Environmentally-preferable Business Practices

Nestlé respects the environment, supports sustainable development and is committed to environmentally sound business practices throughout the world. To fulfil this commitment, Nestlé:

- Integrates environmental principles, programmes and practices into each business;
- Strives for the continuous improvement of its environmental performance through application of the Nestlé Environmental Management System (NEMS);
- Complies with applicable environmental legislation. Where none exist, Nestlé’s own internal rules are applied;
- Provides appropriate information, communication and training to build internal and external understanding concerning the Company’s environmental commitment.

If you would like to know more about Nestlé’s policy on the environment, please visit the Nestlé Website: www.nestle.com.
Hotel Nikko’s Environment Policy

Hotel Nikko, Hongkong, is an environmentally-conscious hotel which not only aims to provide quality services for its guests, but is also committed to taking appropriate measures for pollution prevention and resources conservation. To fulfil the requirements of ISO14001 Standard, the environmental policy statement for Hotel Nikko Hongkong is as follows:

- The hotel is committed to complying with all local environmental legislation and continuously seeks to improve its environmental performance;
- The hotel’s management and staff understand and support the Environment Policy and are committed to continuous improvement of environmental performance by identifying ways to minimise both wastage of natural resources and pollution to the environment;
- The ‘Green Innovator Award’ will be presented to employees who devise the most innovative and practical environment improvement initiatives. These initiatives will be reviewed and included in the environment management programme;
- The hotel will continuously identify ways to minimise waste arriving at source and develop and implement resource and waste management strategies that conform to its 6R policy – Reduce, Reuse, Replace, Repair, Refill and Recycle. The hotel will also adopt best environmental practices to control and minimise all wastewater discharges;
- The hotel will identify and implement practices to optimise energy and water usage without affecting the quality of services provided to guests;
- The hotel will take appropriate measures to eliminate environmental, occupational and health risks and is prepared to respond to emergencies at all times;
- The hotel will support purchasing initiatives that are committed to sustainable environmental development, and continuously seek environmentally-friendly products and services that represent genuine value for money. The hotel will encourage and influence its suppliers to take part in the environment protection initiatives, to understand its purchasing policy, and to provide products and services that have the minimum adverse impact on the environment;
- The hotel will carry out regular internal programmes of education and training to enhance environment awareness amongst staff. The hotel will also actively participate in external environmental activities, as well as various training and development programmes, to broaden its horizon;
- The hotel will share its environment experience with other organisations in the community, raise the interests of its stakeholders by explaining the hotel’s environment philosophy, and seek their co-operation in improving their own attitude towards environment concerns.

April 1999
The Orchid Mumbai, India Hotel’s Environment Policy

We at The Orchid, Asia’s first five star, certified Ecotel hotel, commit ourselves towards continually improving our Environmental Management in the hospitality industry, so as to remain leaders by:

- Optimising the use of resources such as energy, perishable food products, water, paint and paper;
- Striving to go beyond the applicable environmental laws and other requirements;
- Enhancing the practice of waste management, which is to reduce, reuse and recycle;
- Implementing environmental awareness of our suppliers, team members, guests and the local community;
- Providing a hygienic and safe working environment in the hotel;
- Increasing and maintaining the green cover.

September, 2000

Example of Good Practice

The Plymouth College of Further Education, Plymouth, UK, undertook a preliminary environment review in 1999, with the objectives of implementing a comprehensive EMS. Manadon Associates of Plymouth carried out the review.

The review covered 4 areas:

1. An examination of existing environment practices and procedures:
   This was done through a 78-point questionnaire/checklist covering corporate issues, management structure, staff awareness, training processes, public relations, investment, office/classroom/workshop-based activities, energy use and sources, water use and effluent discharge, waste minimisation and disposal, travel and transport, estate maintenance, major and minor works, and monitoring performance targets.

2. A review of relevant environment legislation and regulatory requirements:
   Activities already regulated by the local authorities’ planning and development system and already enforced health and safety regulations were not included. The legislative areas reviewed were transport, airborne emissions, energy use, waste disposal and water use.

3. An evaluation and registration of significant environment effects:
   Although only sparse information was available, a register of effects (which records data on environment effects – resource inputs and waste outputs) was begun for atmospheric emissions, effluent discharge, waste and energy use.

4. Observed regulatory non-compliance.
   On the basis of this review, PCFE was able to set realistic environment objectives and targets, establish a formal environment policy and develop a 90-activity environment management programme.

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Paul Barton, Manadon Associates Fax: +44 807 7061066 or +44 1752 769090
EMS STAGE 3: IMPLEMENTING THE ENVIRONMENT MANAGEMENT PROGRAMME

An environment management programme is needed to implement the EMS. It is the mechanism through which environment objectives and targets are achieved and the environment policy realised.

An environment management programme works to integrate environment action – reducing resource use and waste output – into business activity through identifying the specific procedures and technological improvements that need to be incorporated into existing practices and operations. (An environment management programme is referred to as an ‘environment action plan’ in some sources.)

It helps to start by drawing up an activity plan, so that a complete overview of the environment management programme can be seen at a glance, perhaps in the form of a table. For example:

<table>
<thead>
<tr>
<th>Objective/Target</th>
<th>Action</th>
<th>Budget</th>
<th>Deadline</th>
<th>Department Concerned</th>
</tr>
</thead>
</table>

An environment management programme for hospitality facilities typically consists of the following action areas:

- Reducing water use and wastewater output;
- Lowering energy consumption;
- Reducing waste output;
- Purchasing environment-preferable products;
- Lowering emissions, including of ozone-depleting substances;
- Improving the indoor environment;
- Lowering noise;
- Internal communication, delegation and training;
- Environment communication to guests;
- Monitoring and documenting progress.

A range of environment management options for each of the above action areas will now be discussed. It will help to bear in mind these considerations:

- What procedural or process changes might be needed for environment improvement?
- What technology could be used to facilitate environment management?
- What changes will increase efficiency?
- What improvements will require substantial capital investment?
- Will better training help address some of the issues?
ENVIRONMENT MANAGEMENT PROGRAMME FOR WATER AND WASTE WATER

Water management in hospitality facilities includes:

- Maintaining water quality;
- Managing water storage and distribution works;
- Reducing water use;
- Reducing wastewater output;
- Purifying water for swimming-pools;
- Monitoring water consumption;
- Reusing treated wastewater;
- Maintaining water supply quality.

Most countries have water quality standards, and ensuring compliance with them is important. The WHO and the EU have their own standards, which can be referred to for additional guidance.

The most common indicators of poor water quality are: suspended solids, discoloring due to corrosion, rising pH levels, excessive hardness, high mineral content and bacterial contamination, especially legionella pneumophilia. Any change in water quality should be brought to the attention of the water supply company/authority. A quick review of the on-site water storage and distribution works should then be conducted to find out if the source of the contamination is on or off the property.

Managing Water Storage and Distribution Works

**WATER STORAGE**

- Ensure a frequent turnover of water to avoid the build-up of bacteria such as legionella pneumophilia;
- Storage tank openings should be covered and protected from dust, pests, and other sources of contamination;
- Inlet and outlet valves should be placed to avoid the build-up of stagnant water;
- Tanks should be cleaned every six months, and exterior and interior scale build-up removed;
- Tanks should be regularly checked for leaks.

**WATER DISTRIBUTION**

- Ensure regular maintenance to avoid leaks, spills and back siphonage between drinking and non-drinking supplies;
- Vacuum breakers and calibrated systems can be used to control flow, reduce pressure and optimise cost savings;
- Maintain and upgrade insulation on hot water tanks and pipes.

Reducing Water Use

**GOOD HOUSEKEEPING AND MAINTENANCE OPTIONS FOR REDUCING WATER USE**

- Repair leaks and dripping pipes;
- Run washing machines and dishwashers only when fully loaded;
• When watering gardens, direct flow to the roots of plants;
• Place plastic containers filled with water in toilet cisterns to reduce flush water volume;
• Encourage employees to save water;
• Collect rainwater for watering gardens and other non-drinking uses;
• Avoid rinsing under running taps: use buckets or bowls instead;
• Place tent cards in bathrooms inviting guests to save water;
• Invite guests to reuse their towels and linen.

REPAIR AND RETROFIT OPTIONS FOR REDUCING WATER USE
• Place volume reducers in toilet cisterns;
• Install hot and cold water mixers in all outlets;
• Install pressure flush valves on toilets and urinals. This can reduce flush water by 30-50%;
• Retrofit taps and showers with aerators. This can reduce water volume by 35%;
• Install photoelectric cells in public washstands;
• Install chemically purified urinals that do not use water.

REFURBISHMENT OPTIONS FOR WATER
• Replace baths with showers;
• Fit low-flow showerheads and toilets.

COMMON QUESTIONS
How much water can be saved through low-flow showerheads?
A conventional showerhead uses 15-30 litres per minute. A low-flow fitting gives a flow of 7-10 litres per minute. Thus, flow volume reduced by at least half.

How much water does a low-flush toilet save?
A low-flush toilet uses six litres of water per flush. A conventional system uses up to twelve.

Purification of Water in Swimming Pools
There are several environment-preferable techniques used to purify swimming pool water that do not use chlorine or other chemicals.

One such technique is ionisation, the release of metallic ions (usually copper and silver) into the water. Before release, low-voltage electricity is passed through electrodes to generate positive and negative ions. They kill algae, bacteria, and other micro-organisms. A small amount of chlorine (or other oxidiser such as bromine) is however needed to eliminate water-clouding elements such as suntan oil and dust, which are not affected by ions. Ionisation reduces chlorine use by almost 80%, and eliminates eye-sting and beaching effects.

Another technique involves ozone, which has been used for many years in industrial water purification and wastewater treatment plants throughout the world. Ozone is a very reactive form of oxygen which can destroy a variety of liquid waste materials, toxins, micro-organisms such as viruses, bacteria, spores, and
some chemical impurities. Ozone can be created through:

- The UV, or photochemical method, which passes air through UV lamps, the UV rays turning the oxygen molecules into ozone, just as in the stratosphere;
- High-voltage electricity being passed through dry air in a vacuum.

The ozone obtained is then introduced into the water via a compressor or similar device.

Also gaining ground is pool water purification by UVC radiation lamps, which radiate UV energy at 240-280 nanometres per second. The light is absorbed by the DNA of bacteria, moulds, viruses and yeast, which then leads to a change in the genetic material so that they are no longer able to multiply. Some chlorine (about 10% of conventional quantities) is then needed to provide residual bacterial control. A second benefit of this method is that UVC light has a photochemical effect, which can destroy chloramines and other by-products of chlorine. ‘Free’ chlorine is then released back into the water to perform its intended task of disinfection. Not only are water quality and atmospheric conditions considerably improved, but also much less chlorine has to be added to provide the residual bacterial control.

**Monitoring Water Consumption**

Since water is directly linked to the level of occupancy/activity, it is best to monitor and benchmark water use on the basis of guest nights or visitor numbers.

Water meters are essential for the monitoring of water use. Different areas of the business could be sub-metered for the collection of more specific data. Comparing water use over the years and benchmarking with other facilities of similar size and standing can provide valuable information for improved water management and increased savings on water and energy costs. When benchmarking with other properties it must be remembered that water use will vary greatly depending on the size of the property, services offered, level of activity and climatic conditions.

**Reuse of Treated Wastewater**

It is good environment and business practice to collect and reuse rainwater for irrigation and other non-drinking uses. Water collection tanks can be installed on the roof or at ground level. If the water is to be used in-house it may require a minimum level of treatment. The collection and use of rainwater is discussed in more detail in Unit 5.

It is possible to supplement non-drinking water needs by treating and reusing wastewater. The first consideration in wastewater reuse is to distinguish between ‘grey’ and ‘black’ water. Grey water is wastewater from bathrooms, laundries and kitchens; black water is wastewater from toilets. Black water contains pathogens and almost ten times more nitrogen than grey water, and therefore needs to go through a two- or three-stage biological treatment process before it can be reused. Grey water treatment is less intensive and can be safely conducted on-site. The treated water can be used for irrigation, toilet flushing and other non-drinking uses.

Over the last ten years, many national water supply and plumbing regulations have been modified to accommodate the reuse of grey water. They are most easily incorporated in the initial design process of a building, as separate drains and septic tanks have to be built. In the case of existing buildings, retrofitting drainage

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*When chlorine and ammonia are both present in water, they react to form ‘combined chlorine’ products called chloramines. They are less effective disinfectants than ‘free’ chlorine.*
systems may be expensive, and a cost-benefit analysis must be conducted to determine if the effort is worthwhile.

The level to which grey water needs to be treated depends on the level of biological oxygen demand, or BOD, of the wastewater and the purpose for which it will be reused. The BOD level is the level of oxygen extracted from the water by bacteria when pollutants decompose. The more organic materials there are in wastewater, the more oxygen is needed for pollutant decomposition.

In most hospitality businesses, grey water can be reused for irrigation or flushing toilets, and in this case it may be enough to pass the wastewater through a sand filter. To maximise sand filter efficiency, it is important to minimise the suspended solids in the wastewater. Bathroom, laundry and kitchen outlets should therefore be fitted with filters, and additional grease traps should be added to kitchen outlets.

But if grey water is to be used for drinking, it must go through a complete biological treatment process:

- Preliminary filtration process to remove grit and large suspended solids;
- Preliminary sedimentation process during which 55% of suspended solids are allowed to settle and are subsequently removed from the wastewater;
- Biological treatment process, either activated sludge or a percolating filter to oxidise the effluent, and reduce BOD;
- Secondary sedimentation process to remove all suspended matter and render the effluent suitable for reuse.

**Good Practice Tip**

The treatment of wastewater should not be undertaken without the services of wastewater treatment specialists. Plumbing codes and discharge regulations should also be consulted.

**Examples of Good Practice**

At the Cama Rajputna Club Resort, Rajasthan, India, ten to twenty thousand litres of grey water are first passed through a gravel and sand filter bed and then used for watering the garden. Water use and water bills have further decreased by changing towels and bed linen every three days.

At the Steigenberger Kurhaus Hotel, Amsterdam, Netherlands, a calibrated water pressure control system together with water-saving pressure nozzles on washbasins, sinks, and toilet cisterns is bringing substantial water savings. The new dishwasher unit is programmed to reuse water from the previous wash.

A wastewater treatment works has been installed at the Taj Residency, Indore, India, through which 40,000 litres of wastewater are treated and reused every day. The treated water is used to water the garden. Further water conservation was made possible by changing watering times from during the day to dawn and dusk. Losses from evaporation, which used to account for 8,000 litres per day, are thus reduced.
The Hong Kong Hotel, Hong Kong has reduced water consumption by 20% by installing aerators in bathroom outlets and eliminating the use of running water for cleaning.

In Canadian Pacific Hotel and Resorts hotels, water outlets and distribution pipes are regularly checked for leaks, aerators are installed in taps, low-flow showerheads and low-volume cisterns are used in bathrooms, and photoelectric-cell-operated toilets and washbasins are used in public facilities. At one of the chain’s hotels, the Hotel Vancouver, a solution based on baking soda and salt is used to purify swimming-pool water. This has reduced chemical use and associated costs, and made handling and disposal easier.

ENVIRONMENT MANAGEMENT PROGRAMME FOR ENERGY

Energy efficiency not only reduces fuel and electricity bills, it also increases the overall comfort of the property. Energy management may be divided into two main areas:

- Maintenance or good housekeeping options;
- Repair, retrofit and refurbishment options.

Maintenance or ‘Good Housekeeping’ Options

- Loft insulation can help prevent condensation and mould, and can reduce heating bills by almost 20%. Insulation materials include mineral wool and brown cellulose fibres. A thickness of 15 to 20 cm should be ensured for maximum energy efficiency. As insulation makes the loft area colder, hot water tanks and pipes in this area must also be insulated.
- Shut down power in sections of the building that are not in use. This can be done through the use of Building Management Systems (BEMS), discussed later in this section.
- Insulate all hot water tanks, pipes and boilers.
- Seal gaps in walls, windows, doors, roofs and floor to control heating/cooling loss and penetrating damp.
- Make visitors aware of the importance of energy conservation. Invite them to switch off equipment and lights when not required.
- Match the size of the appliances to demand requirements. Oversized or undersized equipment wastes energy.
- Train staff to use less hot water and to save energy by switching off equipment when not needed.
- In the kitchen, match pan size to hot plate/burner size. Defrost food at room temperature and not in hot water.
- Maintain hot water in taps at 50°C.
- Use translucent lampshades to optimise light output.
- Open and close curtains to maximise and minimise heat gain as required.
- Ensure timers and controllers are set according to the degree-day thresholds and levels of activity inside the property.
- Ensure boilers and chillers are regularly serviced to maximise efficiency.
• Do not place furniture in front of heating or cooling units.
• Radiators and air-conditioning units should be placed below windows to prevent down-draughts; curtains should therefore not be allowed to drape over them.
• Select the most energy-efficient cycles and fully load washing machines and dishwashers before use.

Repair, Retrofit and Refurbishment Options
A number of repair, retrofit and refurbishment options are presented below:
• Automatic load-shedding control systems;
• Controls for heating and hot water;
• Double-glazing;
• Sealing and stripping;
• Controlled ventilation;
• Low energy lighting;
• Covering and coatings;
• Heat recovery;
• Building Energy Management Systems (BEMS);
• Combined heat and power;
• Replacing old equipment;
• Renewable energy options;
• Wall, roof, and floor insulation.

Automatic Load-Shedding Control Systems
Most electricity suppliers require that hospitality businesses pay a maximum demand tariff based on peak demand loads. This is designed to discourage users from having large peaks and falls in their energy demand patterns. To reduce peak demand loads and tariffs, it is first necessary to investigate the causes of loading and to check if the use of some appliances can be avoided during peak periods. Automatic load-control systems continuously monitor electricity use. When demand rises to the maximum threshold, they automatically switch off the appliances programmed into the system. They also allow the user to choose which appliances get switched off first. Large hospitality businesses have found that automatic load-shedding control systems can greatly reduce peak demand loads and bring significant cost savings.

Controls for Heating and Hot Water
The right controls are crucial for the efficient operation of hot water and heating/cooling systems. These include:
• Room thermostats, which switch-off boilers when rooms are heated to a set temperature;
• Programmer and timer switches, which switch off space and water heating at required times;
• Zone controls, allowing one or more zones to be controlled separately
• Hot water cylinder thermostats to switch off boilers when water is heated to a given temperature;
• A thermostatic radio valve fitted onto a radiator and used in conjunction with the room thermostat system or boiler energy control system; it works by reducing water flow into the radiator when the thermostat reaches the set temperature;

• Storage water controls, used for storage or combination heaters: they include such features as automatic thermostats (to control heat storage and output according to peak demand loads and tariffs windows), convector-control room temperature thermostats, and external timers.

**Good Practice Tip**

A complete heating and cooling control package can usually be installed at any time, but installation costs can be substantially reduced if it is done during refurbishment.

**Double-Glazing**

Based on energy savings alone, the pay-back time for double-glazing replacement windows is 4 to 7 years. The most important feature in reducing heat loss is not the thickness of the glass, but the space between the layers of glass, which should be around 20mm. Low-emissivity glass will further reduce heat loss.

**Good Practice Tips**

In the case of windows already installed, secondary glazing usually made of glass in plastic or aluminium frames is a cost-effective option. Wood and PVC frames are better insulators than aluminium.

Trickle vents to ensure adequate ventilation should accompany replacement windows.

**Sealing and Stripping**

Badly fitted doors and windows are a major source of heating and cooling loss, but are cheap and easy to repair. Sealing and stripping materials include silicon strips, blade seals, brush piles and fillers, and rubber, PVC and aluminium seals.

**Good Practice Tip**

It is especially important to maintain adequate ventilation where flued (fuel and gas) appliances are in use, since adequate air must keep entering the area to allow fires to burn safely. If trickle vents are not fitted, the upper part of windows should not be sealed.

**Controlled Ventilation**

While sealing and stripping is important, so too is controlled ventilation. Adequate ventilation is important to reduce condensation and the resulting damp, and to ensure that odours, carbon dioxide and stale air are removed and good indoor air quality is maintained. There are several types of controlled ventilation suitable for hospitality buildings:
• Background ventilation systems such as trickle vents;
• Rapid ventilation systems such as extractor fans;
• Ducted systems including heat recovery.

Low-Energy Lighting

Low-energy lighting is easy to install and can reduce energy costs by 10-15%. Low-energy lamps include compact fluorescent (CLFs), fluorescent tubes, and tungsten halogens.

CLFs last about 8 times longer than tungsten halogen lamps and use about 25% less energy for the same light output. Tungsten halogen lamps are about 50% more efficient than standard lamps and last twice as long. All energy-efficient lighting offers the advantage of dimmer switches, which allow control of light output.

Coverings and Coatings

In warmer climates, weatherproof coverings should be finished off with sun-reflecting paints to reduce solar heat gain. Similarly, pale shades used for decorating exteriors and interiors reduce heat gain and increase light reflection.

Heat Recovery

Hospitality properties can achieve substantial savings by recovering sensible and latent heat from kitchen, laundry and swimming-pool exhaust systems, boiler flues, and condensed heat recovery. This heat can be channelled back for space or water heating. Heat recovery requires the installation of heat exchangers to separate the heat from its source (water, gas or combustion products) and transfer it to where it can be reused – the water or space heating system. The most cost-effective heat-recovery systems for hospitality businesses are usually sensible heat exchangers such as run-around coils and thermal wheels.

The feasibility of heat recovery depends on:

• The temperature of the waste heat in the air or water;
• Where the waste heat is to be used, which should be closely connected to the source of the waste heat;
• Purchasing and operating costs of the heat-exchange unit: the cost of the heat recovered should be higher than the purchasing and operation of the heat-exchange unit.

COMMON QUESTION What is the difference between sensible heat and latent heat?

Sensible heat is the heat associated with a change in temperature. Latent heat is associated with a change in state such as from liquid to gas.

Building Energy Management Systems (BEMS)

BEMS are computer-based energy-management systems which provide for the integrated control of thermostats, boilers, and zone controllers, each zone having its own heating, cooling and lighting units. They therefore enable different areas of a property to be controlled separately and even shut down when not in use.
BEMS allow for the use of occupancy-linked control systems, which are very useful for hospitality businesses. These include:

- **LINK PANELS AND KEY FOB PANELS**
  These allow for power in rooms to be activated to set temperatures only when occupied. The link panel is activated when the key is removed from the key holder at reception or the control area, while the fob panel is activated when the key is placed in the key holder inside each room. Both systems require the installation of TRVs.

- **INFRA-RED OCCUPANCY DETECTORS**
  These systems turn on units when motion is detected and allow for individual temperature control by the occupant. If no motion is detected, the system holds the set temperature for a preset time (5-50 minutes) before switching back all units to background levels.

**Combined Heat and Power (CHP)**

CHP systems generate electricity and channel the heat generated in the process (normally regarded as waste) to use for water or space heating. As both electricity and heat are generated at the same time, the efficiency of CHP systems can be as high as 80-90%.

CHP is most suited to properties that require water and space heating for longer periods of the year. The UK Department of the Environment, Transport and the Regions reports that around 17% of total CHP installations in the UK are in hotels.

**Good Practice Tip**

CHP systems do not always bring financial returns. Specialist advice is needed to evaluate the feasibility of this option.

**Replace Older Equipment**

Older boilers and chillers are more energy-intensive than newer models. Replacing equipment over 15 years old will reduce energy bills by 10-15%. If equipment is less than 10 years old, investing in controls may prove more economical.

**Renewable Energy Options**

Renewable energy is a source of energy that can be produced at the same rate as or faster than it is consumed, and therefore does not deplete natural resources. Renewable energy technology for tourism and hospitality includes solar water heating, photovoltaics (PV), mini-hydro systems, wind turbines, bio-fuels and geothermal heat pumps.

The use of renewable energy will be discussed at length in Unit 5.

**Wall, Roof and Floor Insulation**

Around 80% of cooling and heating is lost through external walls. In conjunction with heating/cooling controls, wall insulation also reduces condensation and damp. Many recycled and more environmentally-preferable insulating materials are available and should be given preference. Formaldehyde should be avoided.

The types and methods of roof insulation depend on the roof pitch (sloping or flat),
boulders, eves, rafters, weatherproof coverings, etc. The most commonly used insulation materials are plastic (mainly polystyrene) and mineral wool.

Floor insulation is best done when floors are being replaced or extensions built. If insulation is laid above existing floors, care should be taken that the extra thickness does not affect existing fittings and skirtings. Floor insulation is especially useful to reduce heating and cooling losses in buildings with suspended wooden floors. Insulation materials include mineral wool, polystyrene and foam glass.

**Good Practice Tip**

As there are many specifications in the choice and the laying of insulation, specialist advice is needed.

**Examples of Good Practice**

Through power factor correction and the installation of a load-shedding system, the Hotel Inter-Continental in Sydney, Australia, is achieving savings in electricity costs of A$27,000 a year. A BEMS is used to control and monitor all chillers, boilers, steam generators and hot-water tanks.

70% of the hot water requirements of the Welcome Group Mughal Sheraton Hotel in Agra, India, is obtained through solar water heaters. Energy-efficient compact fluorescent lamps are fitted in guestrooms and public areas, and infrared sensors automatically switch off lights when rooms are vacant.

As a result of an environment status review on energy, The Renaissance Jamaica Grand Resort, Ocho Rios, Jamaica, has replaced its old chillers with new CFC-free equipment with 0.50kw/tonne energy-efficiency. The cooling towers have also been upgraded. The hotel is reviewing the feasibility of CHP.

Canadian Pacific Hotels and Resorts lowered water heating costs by insulating hot-water pipes and tanks, and regularly monitoring boiler thermostats. Some properties use solar water heaters to provide hot water for swimming pools.

Energy-management measures which collectively reduce energy costs by 20-25% per annum, at the Taj Residency, Indore, India, include:

- Timers on office air-conditioners to switch off units for 15 minutes every 45 minutes;
- BEMS and link panels to turn power on and off in guest rooms;
- Solar water heaters;
- Waste heat from air-conditioning units recovered and reused for water heating;
- Sun-control films on glass panes to reduce solar gain and air-conditioning loads;
- Roofs and outer walls of the rooms on the top floor, which are exposed to direct sunlight for long periods, embodied with 50mm of insulation to reduce heat gain.
ENVIRONMENT MANAGEMENT PROGRAMME FOR WASTE

Reducing and reusing waste is one of the easiest areas for environment improvement and therefore one of the best areas to start. The preliminary environment status review requires a list of all waste generated by the business. This can now be used to identify products that can be:

- Replaced with alternatives which avoid waste or generate less;
- Reused for the same or another purpose;
- Sorted and collected for recycling under municipal waste recycling schemes;
- Used for longer.

A checklist on waste management for hospitality facilities is given below. It follows the order of the waste management hierarchy:

1. Avoid
2. Reduce
3. Reuse
4. Recycle

WASTE MANAGEMENT CHECKLIST

1. AVOIDING WASTE AT SOURCE:

- Favour products with less packaging
- Invite suppliers to take back packaging, especially reusable boxes, crates, and pallets
- Buy in bulk rather than small packs
- Plant Christmas trees and reuse them every year

2. REDUCING WASTE:

- Avoid using individual food portions
- Avoid disposable cutlery and crockery; if you have to use them, choose biodegradable ones (e.g. starch-based or made from recycled paper and plastic)
- Mulch and compost garden and kitchen waste
- Send food waste to pig farms as feed
Replace individual toiletries in guestrooms with refillable fixed dispensers

Use both sides of office paper before disposal

Donate leftover food from buffets to charity

Switch from disposable to reusable laundry bags

Donate old furniture and linen to charity

3. RE-USE OPTIONS:

Re-use packaging containers for holding and storing other materials

Re-use glass/plastic bottles as toilet dams in cisterns

Re-use leftover guest stationery in the back office

Re-use old linen as cleaning rags and laundry bags

4. RECYCLING OPTIONS:

Establish in-house sorting and collection procedures for recyclable waste such as:

- Glass
- Plastic
- Paper
- Cardboard
- Aluminium
- Batteries

Contact local recycling dealers for information on the sale of waste for recycling.
How can the Separation of Waste be Easily Incorporated into Hospitality Operations?

- Place separate waste containers in rooms and invite guests to use the containers as labelled;
- Ask guests to sort out waste such as batteries for separate collection and disposal;
- Install housekeeping carts with separate waste containers;
- Place separate waste containers in kitchens, other F&B outlets, housekeeping and administration areas;
- Place bulk containers for separate waste in an appropriate back office area;
- Train employees in all departments to separate waste.

In the case of hazardous waste such as solvents, pool chemicals, paints, chemical pesticides and other such products, the local authority’s disposal stipulations should be followed. Hygiene and food safety codes provide guidance for food and packaging waste disposal, which will facilitate waste management.

Some Facts About Composting

Composting is the use of micro-organisms to break down organic waste (vegetable clippings, leaves, seeds, skins, shells, rinds, garden waste, etc) into inorganic form, which can then be used to improve the nutrient and water retention capacity of soil.

Composting techniques range from simple backyard heaps to in-vessel systems.

As composting waste is wet, backyard heaps need to be layered with dry bulking materials such as wood, sawdust, hay, leaves or shredded paper. Commercial compost activators can also be used. A small amount of nitrogen fertiliser can be added to increase energy content and speed up decomposition. Compost heaps need to be kept moist and thoroughly mixed to ensure waste breaks down rapidly. An unturned pile will become anaerobic (lack oxygen) and smell.

In-vessel systems allow waste to be composted in enclosed vessels, reducing composting time to less than 30 days. As the composting takes place in enclosed vessels, they can be installed indoors (in kitchens and corridors, for example) or outside without the problems of smell, space or leakage. These systems have loading and screening devices, computerised or mechanical aeration systems, and mixers to turn the piles.

Most composting systems recommend that only 15% of the waste heap consist of meat; in-vessel systems have partly overcome this disadvantage.

Good Practice Tip

Adding too much bulking material can create a low-energy compost mixture, which takes a long time to break down.
**Preparation of Waste for Recycling**

If waste is to be successfully prepared and used for recycling, it must be uniformly sorted and cleaned, and free from bottle-caps, food, metal, plastic, etc. Compactors can be used to reduce waste volume. This lowers the space required to collect and store waste and increases its value as a recyclable material. But compactors can be expensive and are only worthwhile in large properties with significant waste volume.

Plastic and paper waste usually needs to be baled and compacted before collection for recycling. Advice needs to be obtained from local and/or municipal waste collection and recycling schemes on the preparation of waste, use of compactors, baling specifications, and the market price for recyclables.

**COMMON QUESTIONS**  How high are revenues from selling waste for recycling?

Revenue from recycling waste depends on the type and volume of waste separated and made available for collection, the local market for recycled products, and local policies on the recycling of post-consumer waste. For best returns, the waste must be sorted and contamination-free. Working closely with recycling dealers will enable effective sorting and collection plans to be developed and returns to be optimised.

Is recycling the most environment-preferable option for post-consumer waste?

All recyclables need to be sorted, cleaned, and baled before collection from commercial sites, homes and businesses. They then have to be transported to material handling facilities where they are further sorted, cleaned, and crushed (or pulped in the case of paper) before they can go to manufacturing sites for reuse. The transport involved in recycling increases if people drive to waste collection points to dispose of their waste.

These processes and transport requirements can consume large amounts of water, power, fossil fuels and other materials, and emit wastes and emissions.

The key question is:

Are the resources used and waste generated by the recycling process higher than the resources used and waste generated if virgin materials were used for the same purpose?

The answer requires detailed environment, life-cycle and economic studies and will vary with each recyclable material. Consideration must also be given to the entire organisation, profitability, and growth prospects of the recycling market in question.

Some recent and controversial studies in the UK and the US show that for paper and plastic, incineration with energy recovery can be a better business and environment-preferable alternative than recycling; the parameters are too numerous to discuss here. But it should not be forgotten that incineration plants are very capital-intensive to build and operate, and even state-of-the-art incinerators can emit harmful gases, including dioxins. Another argument against incineration with energy recovery is that it drives down incentives for waste reduction.
The other waste disposal option is landfill, which has significant environment impacts. In an effort to reduce landfill waste volumes, landfill levies and taxes have risen significantly over recent years and legislation aimed at restricting the building of new landfill sites is being enforced in many countries.

In the light of these trends, recycling is expected to gain new ground in the future. As large generators of post-consumer waste, the hospitality industry has a key role to play in increasing recycling volumes and the market for recyclable products.

Examples of Good Practice

At the Trouville Hotel, Restaurant and Conference Centre in Hornbaek, Denmark, waste is separated as follows: organic waste, paper and board, coloured and non-coloured glass, returnable bottles, aluminium, and packaging material. Plastic materials are reused and do not enter the waste stream.

- Organic waste is frozen and sold for conversion into animal food;
- Paper and board are compacted and sold for recycling;
- Packaging materials are returned to suppliers;
- Glass is deposited at the nearest recycling collection point;
- Returnable bottles are sold for reuse.

The Trouville has also discontinued the use of disposable items. Shampoo and bath and shower gel are provided in refillable wall-mounted dispensers; glasses have replaced disposable plastic mugs. The use of individual packages of butter, marmalade, honey, cream etc., has been discontinued. Most brochures are printed on recycled paper.

The Trouville is a holder of the ‘Green Key’, the Danish national eco-label for environmentally-preferable hospitality facilities.

The Cama Rajputana Resort, Rajastan, India, composts all food, kitchen and garden waste through ‘vermicomposting’, the use of specially-bred worms to break down waste into compost. The hotel operates its own vermiculture laboratory that produces worms for composting on-site as well as for the local community. The resort is also working towards using the biogas generated during the breakdown of waste for cooking.

The Renaissance Jamaica Grand Resort, Ocho Rios, Jamaica, recycles paper through the Social Mobilisation and Self Help Project (SMASH), which uses waste paper to make hand-made postcards, birthday and business cards. Used cooking oil is collected and sold to soap manufacturers.

At the Hong Kong Hotel, Hong Kong, efforts are made to:

- Limit paper use in the back office;
- Replace disposable plastic newspaper bags with reusable cloth ones;
- Collect used cooking oil for sale and reuse in other industries;
- Replace plastic bottles in the mini-bars with glass ones;
- Use plants to decorate restaurant tables instead of flowers.
ENVIRONMENTAL MANAGEMENT PROGRAMME FOR PURCHASING ENVIRONMENTALLY-PREFERABLE PRODUCTS AND SERVICES

Along with waste management, purchasing is an easy and visible area to start environment action. Using environmentally-preferable products demonstrates a company’s environment commitment to employees, visitors and suppliers, and helps avoid and reduce waste.

The purchasing inventory compiled during the environment status review indicates the best place to start. Additional considerations include:

- Are products being purchased that are not being used? What are the levels of dead stock?
- Can the purchase of some items be discontinued? Could a similar level of service be provided without them? Might they be resourced/replaced with materials presently ending up in waste streams?
- What toxic products are being purchased? Could they be replaced with non-toxic alternatives? Consider the following examples:

<table>
<thead>
<tr>
<th>TOXIC PRODUCTS</th>
<th>ENVIRONMENTALLY-PREFERABLE ALTERNATIVES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pesticides and herbicides</td>
<td>Biological pest-control alternatives</td>
</tr>
<tr>
<td>Oven cleaners</td>
<td>Baking soda</td>
</tr>
<tr>
<td>Permanent ink markers</td>
<td>Water based markers</td>
</tr>
<tr>
<td>Photocopy toners</td>
<td>Recycled toners</td>
</tr>
<tr>
<td>Varnish</td>
<td>Varnishes with lower VOC content</td>
</tr>
<tr>
<td>Paints</td>
<td>Low VOC and water-based paints</td>
</tr>
<tr>
<td>Air fresheners</td>
<td>Pot-pourri and home-made solutions of vinegar and lemon juice</td>
</tr>
<tr>
<td>Aerosols</td>
<td>Pump spray products</td>
</tr>
<tr>
<td>Pool chemicals</td>
<td>Technologies such as ‘alternative’ salt, ammonia and baking-soda-based solutions, osmosis, ionisation and UV</td>
</tr>
<tr>
<td>Moth balls</td>
<td>Cedar and sandalwood chips and oil</td>
</tr>
</tbody>
</table>

- Have any food items been genetically modified or manufactured with genetically modified raw materials?
- Are items being purchased with high volumes of packaging? Can they be replaced with items with less, or less bulky, packaging? Can the packaging be returned to the supplier?
- Can the purchase and use of disposable items be discontinued? Can they be replaced with more environmentally-preferable alternatives, such as starch-based disposable plates?
- Can more effort be made to ‘buy recycled’?
- Can more effort be made to buy biodegradable products?
- Is preference given to environment certified products and services?
- Is preference given to locally produced goods and services?
- Are efforts being made to buy in bulk when possible?
- Have efforts been made to use products that require less energy and transport to manufacture, use and distribute?
- Do suppliers and contractors have environment policies?
- Have suppliers been asked to provide more environmentally-preferable alternatives?
Good Practice Tip

Excessive packaging is neither economical nor environment-suitable. However, a minimum level of packaging must be maintained to protect goods from contamination, prevent damage and spoilage, and facilitate transport, storage and end use. If a reduction in packaging results in increased product damage and spoilage, the effort is pointless. Food safety, hygiene codes and local packaging legislation will provide additional guidance on the minimum levels and types of packaging that need to be maintained.

Examples of Good Practice

The Steigenberger Kurhaus Hotel, Amsterdam, The Netherlands, has an active policy to ‘buy in bulk, recycled and biodegradable’. By working closely with suppliers, packaging is minimised and crates and pallets are collected and reused. All paints and varnishes used for redecorating are water-based and low in VOC content. The collective waste and purchasing management policies have reduced waste by 28%.

Results of the Taj Group of Hotel’s\textsuperscript{1} environment purchasing programme include:

- Hand-made recycled paper is used for visiting cards, stationary and menus. Biodegradable and natural ‘old-style’ products are used for cleaning;
- Packaging is kept to a minimum;
- Newspaper and laundry bags are of organic cotton, made in India;
- Guest slippers are of natural jute, made in India;
- Plastic bags have been replaced with reusable wicker baskets;
- Use of plastic is kept to a minimum.

The purchasing policy has been a central element in the EMS of the Hotel Inter-Continental, Sydney. Environment sensitivity, energy-efficiency, durability, price and quality are primary considerations. Suppliers are asked to reduce packaging, and to keep suggesting ‘greener’ alternatives as they arrive on the market. They are also asked to respond to the Hotel Supply Questionnaire about their products and commitment to environment responsibility.

As part of its award-winning EMS, the Sånga Säby Hotel, Study and Conference Centre, Svartsjö, Sweden, buys exclusively Swedish. Food is purchased from agricultural co-operatives. Transport distance being an vital element in purchasing, preference is given to locally grown and manufactured products.

Suppliers are required to enclose the following information with tenders:

- Environment policy;
- Public environment report;
- How raw materials are sourced, transported and used;
- Vehicles and fuels used for transport;
- Types and volumes of packaging and the percentage accepted for recycling.

\textsuperscript{1} The Taj Group of Hotels operates over 60 hotels in India and 8 other countries.

\textsuperscript{4} This paper, a traditional craft industry in India, is made from a mixture of jute, choir and cotton, and recycled paper.
ENVIRONMENT MANAGEMENT PROGRAMME FOR EMISSIONS CONTROL

Emissions from hospitality facilities are mainly emissions from vehicles and from the burning of fossil fuels used for space and water heating and cooking.

Regular maintenance checks should be conducted on boilers and generators. Filters and scrubbers should be fitted to exhaust fans, and be regularly cleaned and maintained. Local legislation on emission standards should be consulted before control devices are installed.

The use of vehicles, boilers and generators that can operate on ethanol blends and bio diesel should also be considered.

Some Facts About Bio-Fuels

(From the Argonne National Laboratory, Canada, 1997)

The use of 85%-ethanol-blended fuels has been shown to reduce greenhouse gas emissions by 30-36%. A 10%-ethanol blend results in a 25-30% reduction in carbon monoxide emissions (by promoting a more complete combustion of the fuel) and a 6-10% net reduction of CO₂. In addition, as ethanol oxygenates the fuel, there is a roughly 7% decrease in exhaust VOCs emitted from low-level ethanol-blended fuels compared with fossil fuels. In high-level blends, the potential for exhaust VOC reduction is 30% or more.

Examples of Good Practice

At the WelcomeGroup Mughal Sheraton, Agra, India, carbon monoxide and sulphur dioxide emissions from boilers are purified through scrubbers before being released. All fossil-fuel-operated equipment is maintained in good working condition to minimise carbon dioxide emissions.

The Sånga Säby Hotel, Study and Conference Centre, Svartsjö, Sweden, in association with the Swedish Ethanol Foundation, acquired the first rape methyl ester fuelled car in 1995. Today, all vehicles, tractors, boilers and some of the lawn mowers operate on rapeseed oil (the other lawn-mowers are powered by PV).

ENVIRONMENT MANAGEMENT PROGRAMME FOR MANAGING INDOOR AIR QUALITY

Indoor air pollutants include combustion gases such as carbon dioxide, nitrous oxides and hydrocarbons, tobacco smoke, VOCs, asbestos, ozone, dust and particles, CFCs and radon.

The worldwide ban on the manufacture of CFCs came into effect in 1999. The phasing-out of CFCs and other ozone-depleting substances used in the hospitality business merits detailed consideration, and is discussed in the following subsection of this unit. Detailed information on the management of ozone-depleting substances in the hospitality industry can be found in the UNEP DTIE publication, entitled How the Hotel Industry can Help Protect the Ozone Layer, in 1998.

Indoor environment quality depends on specific pollutants and their levels of concentration inside the building. Monitoring air quality will give the most accurate picture of the types and concentration of pollutants in the air. This requires specialist help and equipment that may not be available in-house.
Monitoring must be conducted over a long period to enable a range of data to be collected. A single monitoring attempt will not give a correct estimate of air quality, for pollution levels will vary at different times of the day and year, being influenced by weather conditions, activity levels and the air quality of the outside environment.

Whether or not monitoring is undertaken, efforts to improve indoor air quality are best begun by reducing the following emissions:

- Carbon monoxide arising from incomplete combustion of fossil fuels;
- Carbon dioxide arising from combustion and exhalation;
- Humidity arising from human activity;
- Over- or under-ventilation;
- Ozone drawn in from outside and as secondary emissions from fluorescent lights and photocopiers;
- Nitrous oxides from gas burner stoves;
- Tobacco smoke.

**Good Housekeeping and Maintenance Options for Maintaining Indoor Air Quality**

The first step is to regulate the changeover of air according to the number of occupants, concentration of pollutants in the air, level of activity and climate conditions. In a typical hotel in a moderate climate one change of air per hour is suitable for bedrooms, 5 per hour for offices, reception and lobby, and up to 20 per hour in kitchens, laundries and garages.

Exterior sections of the ventilating system should be kept clean and free of obstructions to airflow. This is vital to ensure that stale air does not re-circulate back into the ventilation system. Boilers, stoves and generators should be kept in good repair and vents and filters should be cleaned regularly. Filter replacement should be carried out according to the manufacturer's instructions.

**Retrofit Options for Maintaining Indoor Air Quality**

- In hot climates, a ceiling fan and an open window are less energy-intensive options than air conditioning;
- For buildings with no central ventilation system, window or wall type room air-conditioning units can be fitted on external windows or on wall areas where increased ventilation is required;
- Low-VOC paints, adhesives and varnishes should be used when redecorating. Formaldehyde building insulation should be avoided;
- If the building contains asbestos, specialist advice is essential. Asbestos releases fibres into the surrounding air, and if inhaled, this can be carcinogenic. If the fibres have deteriorated or are damaged, they must be removed or encapsulated and the affected part of the building must be evacuated until this has been done.

**Longer-Term Options for Maintaining Indoor Air Quality**

Employee and guest complaints about indoor air quality can be recorded and studied over time to identify regular patterns or sources. For example, if more complaints come from people spending time in newly decorated areas, it could mean a problem with VOC emissions from building materials. If employees working
in areas near busy garages and roads report dizziness, it could be caused by continued exposure to higher levels of carbon monoxide and carbon dioxide.

**Examples of Good Practice**

*The Tampere Hall Concert and Conference Centre, Tampere, Finland, adjusts air-conditioning during concerts and meetings according to load levels. Staff responsible for air-conditioning circulate in the halls with carbon dioxide meters and increase or decrease air-conditioning as required.*

*At the Maurya Sheraton Hotel and Towers, New Delhi, India, ‘ozoniers’ are installed in guest rooms to improve indoor air quality. These devices (sometimes referred to as ‘aranisers’) energise the oxygen in the air. Energised oxygen accelerates the breakdown of odours, pollutants and many other harmful substances.*

**COMMON QUESTION** What is an araniser?

*Air is purified naturally in several ways. The most frequent is during a thunderstorm, when the build-up of energy before a lightening strike charges the oxygen in the air. The charged oxygen reacts with contaminants in the air and destroys them. This process is partly why the air smells so clean and fresh after a storm.*

*An araniser creates an energy corona, a simulation of the natural phenomenon. It selectively separates the molecules of oxygen in the surrounding atmosphere and regroups them into ‘free’ nascent atoms of oxygen. These groupings have more power to combat pollutants.*

**ENVIRONMENT MANAGEMENT PROGRAMME FOR THE MANAGEMENT OF OZONE-DEPLETING SUBSTANCES**

The main uses of ODS in hospitality businesses are:

- Refrigerators, freezers including cold display cabinets, mini-bars, ice and vending machines, in which CFC-11, CFC-12 and CFC-114 may be used as refrigerants;
- Air-conditioning in buildings and vehicles in which CFC-11 and CFC-12 may be used as refrigerants;
- Dry-cleaning equipment which uses CFC-113 and methyl chloroform;
- CFC-11, CFC-12, CFC-113, and CFC-114 are used as blowing agents in the manufacture of plastic foams. Foams are used in hospitality for packaging, upholstery, pipe insulation, cushions, car interiors and carpet underlay;
- Halon-1211, Halon-2402 and Halon-1301 are used in fixed and portable fire extinguishers.

**ODS Management in Refrigerators and Freezers**

Discontinuing the use of ODS in refrigeration includes containment, recycling, retrofitting, and replacement.

- Containment means regular maintenance to prevent refrigerant leakage and thereby avoid the need to recharge or ‘top-up’ the system;
When ‘recycling’, a refrigerant may be removed from one system to another at the end of the service life of the first;

Retrofitting involves replacing the refrigerant but not the equipment;

Low- or zero-ODS refrigerants should be used to replace older equipment. Low- or zero-ODS models offer the added benefit of higher energy efficiency.

There are various specifications to consider in recycling and retrofitting refrigerants. They concern the refrigerant, the type of equipment, and the low- or zero-ODS substitute chemicals available. The advice of refrigerant specialists should be obtained.

**ODS Management in Air-Conditioning**

Feasible options are containment, retrofitting and replacement.

- Containment means regular equipment maintenance to prevent refrigerant leaks and optimise efficiency;
- Retrofitting involves replacing the original CFC-11 or CFC-12 refrigerants with more environmentally-suitable alternatives such as HCFC-123 or HFC-134a;
- Older equipment can be replaced with new equipment using low- or zero-ODS refrigerants.

**ODS Management in Dry Cleaning**

The best option in the case of ODS-containing dry-cleaning equipment is regular maintenance to avoid leaks, and working with suppliers to facilitate solvent recycling and recovery. When replacing equipment, suppliers should be consulted on zero-ODS alternatives.

**Good Practice Tip**

If dry-cleaning quantities are small, an economically and environmentally feasible solution could be to sub-contract to a dry-cleaning specialist working with zero-ODS solvents.

**ODS Management in Fire-Extinguishers**

As long as the halons in a fire extinguisher remain contained in the extinguisher and are not discharged, they do not contribute to the depletion of the ozone layer. Equipment should therefore be checked for leaks. Once the contents have been discharged or the extinguishers become redundant, they should be replaced with zero-ODS alternatives, which include dry carbon dioxide powder and foam appliances.

Halons in redundant equipment can be recycled at halon banks. National ozone units can provide information on halon recycling in each country. When replacing extinguishers it is important to consider optimising fire-extinguishing capacity. Employee and guest safety should never be compromised.
Managing ODS in Aerosols and Foams

With aerosols and foams, it is best to switch to zero-ODS alternatives as soon as current stocks have been used. Zero-ODS alternatives include natural fibre-based materials to replace foams, and pump-action or refillable spray cans to replace aerosols.

Examples of Good Practice

At the Steigenberger Kurhaus, Amsterdam, The Netherlands, all refrigeration systems are CFC-free. Refrigeration experts carried out the disposal of old equipment, to ensure that no CFCs leaked or evaporated during the process.

The Park Sheraton, Madras, India has installed zero-ODS refrigerators, walk-in cold rooms and deep-freezers. The CFC-11-based central air-conditioning unit has also been replaced with zero-ODS alternatives. Aerosol spray cans have been replaced with pump action sprays. Dry-cleaning machines now operate on perchlorethylene, which is not an ODS. Foam insulation has been replaced with natural materials. After working with suppliers and implementing a waste management plan, styrofoam packaging is no longer used and the use of styrofoam cups has been discontinued.

The Renaissance Jamaica Grand Resort, Ocho Rios, Jamaica, has replaced the old chiller with an HFC-134A-operated 350-tonne chiller which brings added benefits in terms of energy efficiency, 0.50 kw/tonne.

ENVIRONMENT MANAGEMENT PROGRAMME FOR NOISE MANAGEMENT

Good housekeeping options for noise management

- Ensure all doors are kept closed, especially those in noisy areas;
- Investigate if more regular maintenance will help reduce noise levels from appliances and equipment;
- Check if changes in operating procedures can help reduce noise;
- Require delivery and waste-removal vehicles to switch off their engines while loading and unloading;
- Use rubber mountings to soundproof isolated machines;
- Work towards eliminating false fire alarms;
- At night, switch off machinery located near guest rooms;
- Ensure that ear protection is worn by employees involved in very noisy work.

Repair and retrofit options for noise management

- Install quieter motors and fans in equipment;
- Use sound-absorbing devices to enclose entrances to noisy areas and equipment;
- Install noise-controllers on air-cooling openings;
- Encapsulate machinery with damping materials (e.g. elastic panel mounting);
- Install reinforced foundations for heavy equipment;
- Install automatic door closing in guest rooms;
• Use mini-bars with absorber refrigerators rather than compressors;
• Install double-glazed windows;
• Install quiet toilet-flush tanks (that also use less water).

Refurbishment options for noise management
Together with architects and engineers, look into property design and construction improvements, such as:
• Installing sound-absorbing inner walls, or insulating walls and floors; with mineral wool, fibreglass or rubber;
• Use of sound-absorbing building materials.

INTERNAL ENVIRONMENT COMMUNICATION, DELEGATION AND TRAINING

If an environment management programme is to be successful, employees must be motivated and trained to integrate reducing resource use and waste into daily operating procedures. In tourism and hospitality, it is the employees who are in contact with the customer, who create the experience, and who deliver the service. If they are well informed and motivated to achieve environment objectives, this will reflect in their working practices and improve service quality.

Employees are also the hospitality industry’s biggest public relations instruments. They are the best placed to inform visitors of the business’s environment policies. This will in turn enhance corporate image and reputation.

Well-trained employees can identify problem areas and suggest improvements more effectively than external consultants and managers.

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**Action Checklist on Internal Communication, Delegation and Training**

- The environment status review can be used to inform employees of the company’s environment commitment and that an environment management programme is in the pipeline.
- Once the environment policy has been established, it should be communicated to all staff, posted on notice boards, enclosed in internal newsletters, and announced at staff meetings. An informal meeting might be organised to mark the launch of the environment effort.
- Delegation and training become critical during implementation of the environment programme. Environment responsibility should be integrated at all levels and in all job descriptions. Delegation is best done within the formal management hierarchy and existing reporting lines.
The environment champion and the management team should serve as the central co-ordination unit.

The environment management team should include a representative from each department, with responsibility for ensuring that the environment management programme is implemented in that department.

Establishing departmental environment performance targets facilitates delegation of responsibility. For example, F & B departments could be required to reduce packaging waste by 20%, and housekeeping to reduce the use of toxic cleaners by 40%.

On-the-job training, supported by training instruction sheets in the case of complex technical work, is most suitable for integrating environment action into hospitality practices. Managers, supervisors, or external trainers could conduct this training. To support training efforts, informal seminars and poster displays could be organised.

Training programmes should be developed to inform and demonstrate to employees:
- What should be done;
- How it should be done;
- Why it should be done this way;
- How often it should be done (daily, weekly, monthly);
- Potential difficulties and how they can be rectified;
- What the expected results of their actions are.

Senior management should show leadership. Small actions such as switching off lights, using both sides of office paper and separating waste are good ways to demonstrate that environment management is a serious effort and has company commitment.

Networking is important. Businesses should participate in local environment initiatives such as round tables, industry partnerships, tree planting and wildlife conservation initiatives.

It is also good to subscribe to a few business and environment journals. This helps the environment champion and the management team to gain a deeper understanding of environment issues and how other businesses handle them.

As the environment management programme gets underway, employees should be kept informed of progress, with reports and monitoring sheets posted up, announced at staff meetings, and featured in internal newsletters. This will help reinforce responsibility and motivation. Employee morale may increase as staff come to realise they are working for a business that is concerned about working comfort, safety and environment improvement.

Participation in the environment management programme should be a criterion for performance evaluation. ‘Good environment ideas’ and ‘outstanding environment contributions’ could be rewarded with prizes. Some hotels organise ‘Green Employee of the Month/Year’ competitions.
Examples of Good Practice

The Taj Group of Hotels, India, has developed an in-house environment ‘train the trainers’ programme. Department heads and all senior-level staff are trained for two days on conducting environment awareness, resource consumption, waste reduction and environment performance monitoring classes for all staff in their respective units. Resource consumption training includes water and energy auditing procedures, cost-benefit analysis, benchmarking against international standards, energy and water conservation strategies, and building employee awareness on water and energy conservation. Training in waste reduction is based on the ‘3 Rs’—reduce, reuse, and recycle. The rationale of this programme is that increased environment awareness will raise commitment, enthusiasm, and participation in the EMS.

Senior staff are encouraged to attend the environment leadership-training programme conducted by the Indian Institute of Hotel Management.

The EcoTaj Environment Information Centre in Bangalore, India, has an EMS and conservation library and resource centre for the use of all employees. An in-house environment magazine is circulated to all units and employees.

All new employees undergo an environment-training programme as part of their induction.

COMMUNICATING ENVIRONMENT PERFORMANCE TO GUESTS

There is little point in implementing an excellent environment action plan if clients are not told about it. Guest communication is critical to optimise the business benefits of the EMS.

The preliminary environment status review provides initial insight into the environment awareness and demands of clients. If a business works with travel agents and tour operators who have environment policies, and if competitors have begun to work on EMS, it is likely that visitors will be receptive to environmentally responsible services. But even when environment action is not widespread, a business can enhance its corporate image by becoming a pioneer in environment action.

Suggestions for Environment Communication Methods

- Hang a framed copy of the environment policy statement in reception;
- Include the environment policy and information about the on-going environment management programme in brochures, guest information packages, and on the in-house television channel;
- Place tent cards suggesting guests use towels and linen for longer;
- Tell guests about the importance of saving water and energy, and reducing wastes;
- Provide information on local environment issues;
- Invite guests to participate in local conservation efforts;
- Suggest how guests might participate in maintaining and improving environment quality, both during their stay and when they get home.
Good Practice Tip

A business should never indulge in ‘green-wash’ or false environment claims. Care must be taken not to blow achievements out of proportion. If the business has a major environment impact, it is best not to draw attention to it before rectifying action is in place. There are many groups interested in the environment performance of businesses, including environment groups, non-government organisations, regulators, and competitors. While transparency is important, false green claims are always found out: this can seriously damage the reputation and credibility of the business.

Examples of Good Practice

The Hotel Inter-Continental, Sydney, Australia, organises regular service information sessions for corporate clients, to inform them of new packages and services available. Information on environment performance is always included in these sessions.

The Royal Castle Hotel in Dartmouth, Devonshire, UK, actively discourages guests from using their cars while on holiday. Vehicles are parked free of charge on arrival, and guests are provided with a wide choice of activities that can be done by bicycle, in group tours, on foot or by public transport. Guests arriving by public transport are picked up free of charge. An information leaflet, ‘20 Things To Do Without Your Car in Dartmouth and Devonshire’, is included in the guest brochure. A tent card outlining the Royal Castle’s environment commitment, and the in-house environment newsletter ‘Green Matters’ are placed in rooms.

The Hilton Batang Ai Longhouse Resort, Sarawak, East Malaysia, informs guests about its eco-friendly practices through formal presentations and informal chats. As a further incentive to adopt environmentally-friendly habits, the Housekeeping Department places a thank-you note in rooms whenever guests reuse their towels. Guests who write to the resort commenting on environment practices or giving suggestions are always acknowledged.

Examples of Good Practice

Communicating Environmental Performance

An important spin-off from EMS is environment improvement not just within the business, but also in the surrounding neighbourhood and community. Consider the following examples:

The Hotel Inter-Continental Sydney, Australia, cooperates in conducting environment training and networking programmes with:

- The Green Jobs Unit of the State Department of Employment, Education and Training;
- The University of New South Wales;
- Hotel schools in Sydney;
- The Taronga Zoo;
- Other hotels in Australia and overseas.
The EMS of the Hotel Nikko Hong Kong is used as a practical study programme for final-year students of the Department of Building Services of the Hong Kong Polytechnic University.

- The partnership began in 1992 when the students performed an audit on the hotel’s water and energy consumption and indoor air quality;
- In 1996, the hotel created an annual environment prize awarded to the final-year student of the Department of Building Services of Hong Kong Polytechnic University who demonstrates outstanding performance: a certificate, a trophy, and a scholarship worth HK$5,000;
- In 1997 the hotel and the Hong Kong Polytechnic University published ‘A Guide to Energy and Water Conservation in Hotels’, a practical guide for managers and engineering staff based on experiences gained from auditing hotels in Hong Kong;
- The hotel is currently working with Hong Kong Polytechnic University to develop training materials to assist the entire Hong Kong hotel and catering industry to implement EMS and work towards ISO 14000 certification;
- The Hotel is a sponsor of the Hong Kong Annual Business and Industry Conference and participates in tree-planting efforts and fund-raising activities for environment charities.

Eco Paradiso Hotel, Playa del Carmen, Quintana Roo, Mexico, collaborates with inhabitants of the neighbouring town, Celestun, in:

- Developing and updating an ecology information brochure made available to visitors;
- Conducting an ecology training programme for tour guides, all from surrounding villages.

The Casuarina Beach Club in Barbados has won an award for its continuing contributions to the St Lawrence community. The hotel has adopted a school, and sponsors and participates beach clean-up activities and tree-planting efforts. The hotel has also begun a turtle-watch programme involving guests and local people in protecting the nesting areas, observing turtle behaviour and, if necessary, assisting hatchlings to reach the ocean unharmed.

MONITORING AND DOCUMENTING THE PROGRESS OF THE ENVIRONMENT MANAGEMENT PROGRAMME

“You cannot manage what you cannot measure.”

Monitoring and documenting on-going environment performance will enable businesses to:

- Assess whether targets and objectives are being met;
- Identify plans that are not being successfully implemented;
- Identify the corrective and preventive actions needed to improve performance.

Monitoring should be regular. A standardised environment-monitoring format helps standardise data-collection and record-keeping across the company. The following is an example of a monitoring format used for documenting water and energy consumption.
Examples of Good Practice

Environment performance monitoring at the Steigenberger Kurhaus, Amsterdam, The Netherlands involves weekly and monthly reading of meters and checks of water and energy use, and volumes of waste handed to contractors. Waste contractors report twice a month on quantities of separated waste collected and estimated percentage of waste recycled. The results are reported at staff meetings.

The Taj Residency, Indore, India, has sub-metered all the different areas of the hotel to allow for monitoring water, fuel and energy consumption, and effluent and emissions output per department. Waste volumes of the entire property are monitored collectively. Department heads evaluate costs and benefits every three months.

At the Hotel Inter-Continental in Sydney, a detailed energy, water and waste (including emissions) monitoring exercise is carried out every three months.

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<tr>
<th>Date</th>
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<th>Comments</th>
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EMS STAGE 4: 
CONDUCTING THE EMS AUDIT AND 
REPORTING ON ENVIRONMENT 
PERFORMANCE

4.1 Environment Management System (EMS) Audit

The Environment Audit is necessary to:

- Verify the effectiveness of the environment management programme;
- Ensure that environment objectives and targets are being met;
- Evaluate how the EMS should be modified and expanded in the context of future business expansion, new environment legislation, emerging environment issues, and the growth of the tourism and hospitality industry as a whole.

The ISO 14000 series on environment management include three standards that provide guidance on environment auditing:

- ISO 14001 Guidelines for Environment Auditing; General Principles;
- ISO 14011 Guidelines for Environment Auditing; Audit Procedures; Auditing of Environment Management Systems;

EMS audits are generally conducted every one or two years. An audit can be performed by the internal environment management team, by an external environment auditor, or through a joint internal and external effort. In selecting auditors, it is important to bear in mind the following:

- The auditors should have a good appreciation of environment management systems and issues. ISO 14012 outlines specific criteria for environment auditors.
- The reliability of the audit is important. Auditors should be independent of the activities they audit. In other words, people cannot be asked to audit activities they have been working on, or the activities of their own department.

What Should an EMS Audit Produce?

An EMS audit should answer these questions:

- Is the environment management system complete?
- Have objectives and targets been set?
- Does the environment management programme cover all aspects of business activity? In hospitality businesses this includes front and back office, food and beverage, kitchens, housekeeping, laundry, maintenance, banqueting, conference centre, visitor centre, retail outlets (pastry shops, gift shops etc), business centre, sports and leisure facilities, gardens, transport and administration.
• Is information on environment performance communicated to employees?
• Are there adequate procedures for corrective action?
• Are environment practices integrated into daily operations?
• Is environment performance being monitored and documented?
• Does there appear to be a commitment to continuous improvement?
• Is the environment management system well implemented?

The best evidence of good implementation is the level of environment improvement. Other evidence can be found in resource and material use records, data sheets on waste and emissions, training instruction sheets, visitor comments, fines imposed, accident records, and equipment maintenance records.

• Is the environment management system sufficient to achieve objectives and targets? The best evidence of this is the variance between actual environment performance and the set objectives and targets.

Audit Procedures

The following audit procedures are based on the recommendations of ISO 14011:

• Determine the objectives of the audit and which sites and activities are to be audited. This is especially important for larger businesses, where several offices and operating sites may need to be audited;
• Establish priority areas and issues of confidentiality;
• Start with an opening meeting at which the scope, objectives and procedure of the audit are confirmed and the necessary resources obtained;
• Carry out the audit in consultation of environment performance monitoring documents (described earlier), interviews and site visits;
• Assess information quality – best done by comparing recorded performance data with results of interviews and observations made during site visits;
• Compile the findings into an audit report;
• Present the audit report to company management and the environment management team at a closing meeting.

4.2 Reporting on Environment Performance

A corporate environment report communicates to all stakeholders the company’s environment performance over a given period. It is a key indicator of the business’s environment commitment and an important tool for building dialogue and communication with local communities, legislators and non-government organisations.

Corporate environment reports detail the results of the EMS. They also catalyse environment action across the company, validate the efforts of environment managers and increase support for environment improvement.

The target audiences for information on corporate environment performance include employees, shareholders, legislators, customers, bankers, insurers, local
communities, environment organisations, suppliers, trade and industry partners, and the public at large.

Environment performance can be reported through a variety of methods – newsletter, press release, a section in the annual financial report, or a stand-alone corporate environment report.

National environment legislation has made such reporting mandatory for some industry sectors in Europe and North America. It is also mandatory under the EU Management and Audit Scheme (EMAS).

Over a hundred of the world’s leading companies and over 600 smaller ones report on environment performance. Some report annually, others every 2 or 3 years with annual interim updates.

Within the tourism and hospitality sector, major airlines, passenger transport companies, hotel chains and the larger leisure and entertainment providers report on environment performance. The Sånga Säby Hotel, Study and Conference Centre, Svartsjö, Sweden was perhaps the first independent hospitality business to report annually.

Contents of a Corporate Environment Report

A corporate environment report communicates the company’s environment-related performance over a given period. It reports on the:

- Environment policy;
- Objectives and targets;
- EMS implementation and results;
- Areas of environment performance which have improved or deteriorated;
- Objectives and targets realised;
- Compliance and fines;
- Accidents, emergency response, occupational illness;
- Environment improvement efforts in the local community and participation in industry networks and partnerships;
- EMS improvement plans for the future.

It is good practice for the environment report to include a statement from an independent environment verifier on the accuracy of the information contained in the report. Such verification is a mandatory requirement of the EU EMAS regulation and an optional requirement of ISO 14001.
The environment management programme was discussed under the action areas: water and wastewater, energy, waste, purchasing environmentally-preferable products, emissions, indoor air quality, noise, internal communication and training, visitor communication, and monitoring and documenting the progress of the environment management programme. These actions will now be briefly recapitulated as department checklists.

ENVIRONMENT MANAGEMENT CHECKLIST FOR ROOMS, HOUSEKEEPING AND FRONT OFFICE

- Train staff to use less hot water and electricity when cleaning;
- Use water-saving devices such as aerators, low-flush valves, low-flow showerheads, waterless urinals, toilet dams, etc;
- Avoid rinsing under running taps – use buckets or bowls instead;
- Run washing machines only when full;
- Place tent cards in rooms inviting guests to save water and energy;
- Use energy-saving 'fob' and 'link' controls;
- Fit energy-saving light-bulbs and translucent lampshades;
- Use hot/cold water mixes in all outlets;
- Avoid placing furniture in front of heaters and air-conditioners;
- Maintain hot water in taps at 50°C;
- Open and close curtains to maximise and minimise heat gain as required;
- Separate waste for recycling;
- Purchase reusable, recyclable, less toxic, biodegradable and lightly packaged products;
- Avoid individual toiletries – use bulk dispensers instead;
- Avoid disposable products;
- Reuse old linen, containers, and left-over guest stationary;
- Train staff in environment-related actions and keep them informed about environment progress;
- Co-operate with, and report repair needs to, engineering and maintenance departments;
- Keep proper records of environment performance.

ENVIRONMENT MANAGEMENT CHECKLIST FOR ADMINISTRATION, PURCHASING AND BACK OFFICE

- Train staff in water and energy conservation and waste reduction and separation;
- Separate waste;
- Keep abreast of environment news, including changes in legislation, tariffs and charges;
- Switch off equipment and lights when not required;
- Use energy-saving lighting;
- Implement environmental purchasing policies;
- Give preference to environmentally certified products and those with less packaging;
- Give preference to stronger, longer-lasting products;
• Invite suppliers to suggest environment-preferable alternatives;
• Make efforts to reduce paper and other office materials;
• Use energy-saving computers, copiers, fax machines etc;
• Recycle toner cartridges;
• Install individual thermostats on heaters and coolers;
• Co-operate with and report repair needs and malfunctions to engineering and maintenance departments;
• Communicate environment achievements to visitors, stakeholders, the local community and the wider public;
• Monitor resource use and waste output;
• Maintain records on environment performance.

ENVIRONMENT MANAGEMENT CHECKLIST FOR FOOD AND BEVERAGE AND KITCHENS
• Train staff in energy and water conservation;
• Separate waste, including organic waste, fats and oils;
• Replace old equipment with more energy-efficient models;
• Defrost at room temperature, not in hot water;
• Avoid using ozone-depleting substances;
• Match pan size to burner size;
• Use biodegradable cleaning products;
• Install hot water mixers in all water outlets;
• Compost organic waste;
• Send food waste to pig farms;
• Fit grease traps on all effluent outlets;
• Ensure all equipment is in good working order;
• Invite suppliers to take back and reuse crates, pallets and other packaging;
• Minimise the use of disposable cutlery, crockery, and other such items;
• Highlight local specialities on menus;
• Buy in bulk and from local producers;
• Donate left-over food from buffets;
• Co-operate with and report repair needs and malfunctions to engineering and maintenance;
• Monitor resource use and waste output.

ENVIRONMENT MANAGEMENT CHECKLIST FOR GARDENS
• Water in the evening or early morning;
• Direct water flow directly to roots;
• Use drought-resistant, native plant species;
• Compost garden waste;
• Collect rainwater for watering;
• Avoid pesticides, insecticides and chemical fertilisers;
• Reduce lawn areas;
• Plant trees (including deciduous trees) to reduce heat gain during the summer and increase it during the winter;
• Install timers on outdoor lighting;
• Look into PV-powered outdoor lighting;
• Co-operate with engineering and maintenance on EMS.

ENVIRONMENT MANAGEMENT CHECKLIST FOR POOLS
• Ensure adequate filtration and turnover of water;
• Experiment with water purification techniques other than chlorine;
• Maintain water temperature at around 29°C;
• Maintain indoor air temperature at the same temperature as, or slightly higher than, the pool water (up to 1°C);
• Maintain relative humidity at about 60%;
• A general guideline for ventilation for indoor pools is 4 to 6 changes of air per hour;
• Co-operate with engineering and maintenance on EMS.

ENVIRONMENT CHECKLIST FOR ENGINEERING AND MAINTENANCE
• Maintain water supply and distribution networks;
• Maintain energy and hot water distribution networks;
• Review insulation over the property, including hot water pipes;
• Check feasibility of wastewater treatment and reuse on-site;
• Look into automatic load-shedding systems;
• Install building management systems together with timers, TVRs, and thermostats on all equipment;
• Look into possibilities of heat recovery and CHP applications;
• Ensure energy and power controls are set according to levels of activity and climate considerations;
• Explore possibilities for the use of renewable energy sources onsite;
• Inquire into purchasing ‘green’ electricity generated from renewable energy sources;
• Inquire into calibrated water supply systems;
• Install water-saving devices in all outlets;
• Ensure adequate changeover on indoor air;
• Ensure the good working order of all equipment;
• Ensure that fans, vents and filters are clean and in good condition;
• Provide for the safe storage and disposal of hazardous waste;
• Use non-halon fire extinguishers;
• Ensure all vehicles are in good working order;
• Work on the sub-metering of different areas of the property to improve in-house data accuracy;
• Eliminate ODSs in refrigeration and air-conditioning;
• Seal gaps in windows and door frames;
• Monitor water, fuel, power use and indoor air quality;
• Use environment-preferable building materials during refurbishment and renovation;
• Co-operate with other departments in EMS management and monitoring.
1. Turtle Island, Yasawas, Fiji

The 500-acre Turtle Island, also known as Nanuya Levu, is part of the Yasawa Island group, a chain of small islands located approximately fifty miles northwest of one of the two main Fiji islands, Viti Levu.

In 1972, Richard Evanson took over the over-grazed island and initiated an intense reforestation programme: over the past 25 years, Evanson has focused on reviving the island’s fragile ecosystem by planting more than a quarter of a million trees and encouraging wildlife to re-establish itself. The island is now a luxury resort complete with secluded private beaches and fifteen thatched, hand-built Fijian-style beachside cottages (bures), and is home to 160 local inhabitants.

WATER

- While the quality of the water on the Island is good, the quantity is limited. Guests are encouraged to save water wherever possible by having short showers and by not requiring their towels to be washed every day;
- Each bure is fitted with water saving showerheads;
- The three-acre, organic vegetable and herb garden depends on a drip-feed watering system rather than a spray watering one, which minimises mid-air evaporation;
- Waste water is treated through an on-site treatment facility. The waste water is first pumped into sceptic tanks, where preliminary sedimentation takes place (heavy particles are allowed to sink to the bottom). Waste water is then introduced to grass-covered leach fields. Residue sediment is dried and used as fertilizer for forestry.

ENERGY

- Hot water is generated through solar hot water panels, situated on the roofs of all relevant buildings. Each bure has its own hot water panel, as does the kitchen, laundry and administration area;
- Outdoor photovoltaic lighting is used to light paths and walkways at night;
- All bures are fitted with low voltage lights;
- The drying room is heated by a co-generation unit which operates on waste heat generated by the resort’s diesel generators. The drying room is located next to the diesel generator and receives warm air from the generator’s radiator through a 60 centimetre square, sheet metal duct. The air escapes through the roof or the door at the end of the drying room, thereby preventing heat build-up. The drying room provides enough space to dry about 200 sheets at any one time. Harnessing this otherwise wasted energy is estimated to save AUS$5000 a year on energy costs.

WASTE

- Solid waste is separated into type – petroleum-based waste, metals, glass, plastics, organic kitchen waste and plant cuttings – at the time of disposal;
UNIT 4: ENVIRONMENT MANAGEMENT SYSTEMS

• Hazardous materials, such as batteries, are shipped to the mainland for recycling;
• All plant waste is fed into a high-powered chipper to create compost. This is stored in large heaps to enable bacteria to heat the compost and increase the rate at which it is converted to useful organic humus. This takes about seven months. The compost is then used as a soil enhancement in tree planting around the island and in the vegetable garden.

MONITORING
Turtle Island has commissioned a full Environmental Audit, which not only reports on what the Island is doing, but also makes recommendations as to how improvements can be made to environmental conduct. Regular updates to the original Audit act as benchmarks for assessing every new project undertaken, and many of the recommendations have now been implemented and absorbed into the daily life on the Island.

TRAINING AND MOTIVATING EMPLOYEES
• Environmental awareness programmes and training are constantly being developed to ensure that all staff understand the importance of their surroundings;
• Environmental meetings take place on a daily basis, and a scheme to award those staff who show the greatest initiative in regard to environmental conduct is currently being implemented.

COMMUNICATION

• Guests are exposed to the Turtle’s ecological activities even before setting foot on the Island through the resort’s promotional material, and in most cases, arrive keen to learn more about their role in preserving the environment. Accordingly, they are offered a tour of the island’s ecological zones and are encouraged to read the Environmental Audit, a copy of which is displayed in each bure.

SEA TURTLES
Between the coral reef and shore lies the lagoon, a shallow but rich area of marine life. In the “Blue Lagoon” facing the western side of Turtle swim hawksbill turtles, green turtles and manta rays. The staff of Turtle Island pay local Fijian fishermen a fee for any sea turtles delivered live. The shell is then scratched by Turtle staff and so becomes valueless to poachers and souvenir seekers. (No harm is done to the turtles in this process; it is just cosmetic.) These endangered turtles then have more of a chance to survive. In deeper waters cruise coral trout, swift barracuda, wahoo, mahi mahi, dolphins, walu and the occasional pilot whale andbillfish.

(Extract from brochure: “The Ecology and Culture of Turtle Island”.)
COMMUNITY ACTION

- The Turtle Island Community Foundation, a trust fund that goes towards the health, education and transportation for the local population, has been established;
- In 1990, a healthcare foundation for those who otherwise would not have had access to modern medicines, was established. Each year since, Turtle Island has hosted an eye clinic. A dental clinic and dermatology clinic have been set up in the same way, and there are plans to extend the eye clinic to other South Pacific islands and even to construct a permanent, state of the art hospital on the island in 2001/2.

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2. The Orchid Hotel, Mumbai, India

DESIGN

The 245-room, five star, ECOTEL-certified Orchid Hotel was designed from the outset with preservation of the environment in mind. Amongst the environmentally-preferable building materials used were fertilizer waste\(^5\), bricks containing 60% fly ash (a waste product of the power generation process from coal fired power plants), redundant rubber wood\(^6\) or medium density fibre wood (MDF)\(^7\).

Windows are triple glazed which prevents the sun's heat from entering and helps to conserve energy generated from air-conditioning: The reflective outer glass reduces heat load by 15 percent. The atrium provides natural lighting to the reception and lobby.

WATER

- Flow restrictors, low-flow showerheads and aerators have been installed in all guestrooms. Aerators reduce water usage from 200 litres per shower to 110 litres per shower, by restricting water flow;
- All rooms have been fitted with concealed cisterns which use only six litres of water per flush, as opposed to 15 – 20 litres used by conventional systems;
- Taps in the back of house are on timers;
  These measures have collectively reduced annual water use from 782.6 litres per available room to 614.3 litres. Water savings as a result of using the aerators alone produce savings of US$1,790 per year.

ENERGY

- Energy-efficient lamps are used, which provide as much light as ordinary bulbs, yet consume substantially less energy. A 10 Watt lamp is as bright as a 60 Watt incandescent bulb, yet the power consumption

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\(^5\) The fertilizer waste is phosphogypsum from the phosphatic fertilizer plant.

\(^6\) After producing rubber sap, the tree is cut down and cannot be used for any constructive purpose thereafter, as the wood from the rubber tree is soft. This rubber wood can, however, be processed using timber preservative chemicals to ensure dimensional stability, thereby allowing it to be used in construction.

\(^7\) MDF is manufactured using cotton stalks. The cotton tree is cut down after yield and rendered useless. However, through an advanced manufacturing process, the waste stalks can be chipped, sieved, washed and cooked to produce medium density fibre wood, which has all the features of natural wood.
of the lamp is only 25 percent of that of an ordinary bulb. Room lights only come on when a key card is inserted;

- Mini-bars in guest rooms save up to 40 percent energy as they are equipped with ‘fuzzy logic’ which senses the load inside the refrigerator and cools it accordingly;
- Photovoltaic lighting is used for lighting the outdoor terrace;
- A master control panel, incorporating a unique feature, known as the ‘green button’, is installed in each guest room. On pressing this button, the thermostat of the air-conditioning unit is turned up by 2 degrees. The saving in electricity resulting from this 2 degrees increase in temperature is converted into rupees and displayed on guest folio. This money is then used for funding NGOs and environment-related programmes on a long term basis. Additionally, a certificate is issued to the guest who has voluntarily participated in conserving energy, and they are later informed by direct mail of the hotel’s ongoing environmental activities.

Total savings per year in heat, light, power and guest amenities costs have reached US$152,471. Energy savings per available room are now 10 – 15 percent.

WASTE

- Virtually all in-room products are reusable or recyclable. For example, hangars are made from recycled sawdust and items such as pens and tissue boxes are made from chlorine-free cardboard and fibre wood respectively;
- Paper usage is kept to a minimum: Laundry is returned in reusable cloth laundry bags, newspapers are delivered on request in reusable cane baskets and no ‘Do Not Disturb’ or ‘Make Up the Room’ signs are used;
- Kitchen waste is treated in on-site vermiculture pits, which breaks down waste into compost;
- Waste water generated from the hotel amounts to approximately 120 kl per day. 90 – 95 kl of grey water is recycled at the on-site wastewater treatment plant, 30 kl of which is then used for gardening and air-conditioning purposes.

Total savings in water purchasing costs per year have reached US$13,440.
SUPPLIERS

- Preference is given to Indian-manufactured products and materials;
- Incoming packaging material has been reduced by 30%;
- Suppliers are regularly screened to ensure they fulfil the hotel’s stringent environmental criteria;
- All suppliers must deliver goods in reusable and returnable crates;
- Suppliers are encouraged to offer their own innovative suggestions as to how packaging can be reduced.

TRAINING AND MOTIVATING EMPLOYEES

- Employees undergo a thorough environmental induction programme, with monthly refresher courses to ensure their conduct conforms to the hotel’s eco-sensitive culture;
- Regular newsletters and site inspections also ensure staff are both informed of and behave according to the organisation’s environmental policies.

COMMUNICATION

- Internal environmental performance is communicated to staff through internal e-mail and notice boards;
- Guests are kept informed of environmental activities through a direct mailing system;
- The hotel spreads its environmental message externally through newsletters, electronic media, the organisation of conferences and seminars and by regularly reporting to its certifying body, ECOTEL;
- Staff also participate in events like World Environment Day and World Anti-Smoking Day through activities such as ‘clean up drive’, ‘no plastic bag’ and ‘pollution under control’ campaigns.

CONTRIBUTIONS TO THE LOCAL COMMUNITY

- In addition to training 140 temporary trainees and 71 apprentices, the hotel has created 430 new job opportunities for Indians living in and around the city of Mumbai;
- Prior to The Orchid’s opening, there were no local suppliers who manufactured or traded eco-friendly products. Today, the hotel’s persistence in educating, informing and negotiating with suppliers has resulted in the development of a fully-fledged industry supplying such products. This has generated further job opportunities within the local community;
- The Orchid promotes local culture and crafts wherever possible. Many guest supplies, for example, are produced by the local cottage industry, which has created employment opportunities for local craftspeople.

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3. Hotel Madhuban, Dehra Dun, India

DESIGN
When the Hotel Madhuban (42 rooms) was renovated a few years ago, windows were enlarged to allow more natural light to enter the building and old beams were dismantled, restored and reused. The additional timbers used were from authorised sustainable timber plantations. The roof of the hotel was painted with reflective paint to reduce heat gain.

WATER
- Grey water from the bathtubs and sinks is treated at the wastewater treatment plant located onsite. The treated water is used to water the lawns and gardens;
- Old toilet cisterns, which used 18-20 litres per flush, have been replaced with high-pressure flush cisterns that use 5-8 litres;
- Guests are given the choice of using their towels for more than one day. These measures have collectively reduced water use by 40%. Waste water volumes have been reduced by 60%.

ENERGY
- A solar water heater has eliminated the use of coal-fired boilers to provide hot water;
- Hot water at the tap is limited to 45°C;
- Together with the installation of an energy-management system, low-energy light bulbs are fitted in all areas of the hotel and motion detectors installed in corridors and some back-office areas;
- Master switches that turn off all power outlets are fitted in guestrooms. Air-conditioners are equipped with individual temperature controls. These measures collectively have lowered energy costs by 30%.

WASTE
- Paper waste is shredded and sold to recycling dealers;
- Food waste, kitchen trimmings and garden waste are composted and used as fertiliser;
- Old linen is converted into cleaning cloths;
- Plastic laundry bags and paper napkins have been replaced with cloth ones;
- The larger deep-fat fryer has been replaced with 4 smaller fryers of different capacities, which reduce waste fat.
Waste disposal costs were reduced by 3,100 rupees in 1997. The replacement of the large deep-fat fryer has reduced waste fat by 40%.

PURCHASING
- Efforts are being made to buy in bulk;
- Packaging is returned to suppliers for reuse or sold to recycling dealers.

MONITORING
The consumption of water, electricity, liquid petroleum gas, lubricant oils and cooking-fat is monitored weekly and comparisons are made with previous weeks and months. Allowances are made for fluctuations in occupancy and climate conditions.
TRAINING AND MOTIVATING EMPLOYEES
A competition for ‘best environment employee’ is held annually: the winner gets a cash prize and a certificate at a staff party.

COMMUNICATION
- Several environment awards and the ‘Green Hotelier’ certificate awarded by the International Hotel & Restaurant Association are displayed in the lobby;
- Guests are informed of the hotel’s EMS through an environment newsletter handed out at check-in, which also invites guests to reuse towels and switch off the power meter switch when leaving the room.

Dear Guest,
In keeping with our quest for a clean and healthy environment, we have discontinued the use of paper and plastic amenities. An effort is being made to replace the same with similar amenities derived from recyclable and environmental friendly materials.

While regretting any inconvenience that you may come across we look forward to your continued support and welcome your valuable suggestions which may prompt us to bring about improvements in the environment around us and make your stay at the Madhuban more healthy and comfortable.

Do let us know if you feel even a bit of bother, we’ll surely try and do something about it.

With regards,

(Manu Kochhar)
President.
4. Hotel Mocking Bird Hill, Port Antonio, Jamaica

DESIGN

This independent hotel was established in 1993 by converting a private villa into a hotel. During refurbishment, all original features of the villa were retained except for the small windows, which were replaced with larger ones to maximise natural light and ventilation. The only addition to the building was the gallery, which was built on slab columns rather than blasting rock to lay the foundation. The use of formaldehyde as a building material was avoided. Floors were tiled rather than carpeted to reduce heat gain and the need for vacuum cleaning. Furniture was made of Jamaican wicker and bamboo and the use of tropical hardwood avoided.

LANDSCAPING

• The hotel is built on a hill, the surrounding hillside terraced to minimise erosion. The soil washed down to the bottom of the hillside is reused for terracing;
• Pathways are gravel-paved to minimise run-off and allow rainwater to seep into the soil.

WATER

• Grey water from the kitchen, laundry and bathrooms is treated at the on-site wastewater treatment plant;
• The swimming-pool water is purified using solar-powered ionisation technology;
• Flow-reducing valves are installed on all toilet cisterns and washbasins;
• Linen is changed every three days and only towels ‘dropped in the shower’ are replaced;
• Rainwater is collected and used to supplement non-drinking needs.

ENERGY

• Passive solar design (through building orientation) and enlarged windows provide substantial light and cooling;
• A solar water-heating system provides hot water;
• Ceiling fans are used instead of air-conditioners in all areas;
• Guestrooms are not equipped with televisions or mini-bars;
• No dryers are used in the laundry;
• Motion-detectors are used to regulate all security lighting;
• Energy-saving light bulbs are fitted throughout;
• Exterior areas are lit by mercury vapour lamps;
• The use of extra-light linen reduces laundry weight and related water and energy consumption.

WASTE

• The following waste is separated for recycling: paper, glass plastic and cooking oils;
• Food and garden waste are composted;
• Individual guest toiletries have been replaced with wall dispensers;
• Laundry bags and napkins are made of cloth;
UNIT 4: ENVIRONMENT MANAGEMENT SYSTEMS

The ‘daily specials’ menu is written on a blackboard in the restaurant, avoiding the printing of new menu sheets every day;

Local fruits and flowers are used to garnish cocktails instead of disposable cocktail sticks;

Picnic lunches are packed in reusable boxes;

Beverages are bought in returnable deposit bottles;

No aluminium paper and cling film are used;

Only rechargeable batteries are used;

Old linen is reused as cleaning cloths;

The hotel makes its own jams, marmalades, bread, pasta and ice cream to minimise packaging waste.

PURCHASING

There is an active policy to ‘buy local’ and ‘buy environment’;

Products made of natural materials are given preference;

PR and marketing brochures are printed on recycled, unbleached paper;

All fresh produce is purchased from local farmers;

No pesticides or insecticides are purchased;

Washing powders are toxin- and phosphate-free;

Baking soda, boric acid and vinegar are used for cleaning.

EMISSIONS

Refrigeration equipment is CFC-free;

All vehicles operate on lead-free petrol.

TRAINING AND MOTIVATING EMPLOYEES

Employees are provided with on-the-job training to ensure that environment is well integrated into daily duties;

Managerial and supervisory level staff attend environment-training courses.

COMMUNICATION

Hotel Mocking Bird Hill markets itself as a hotel managed with environment awareness and reports that nature-oriented tourists are an important part of its clientele;

Information about on-going EMS and environment tips for visitors are included in the guest information brochure, which also contains information on Jamaican culture;

Tent cards in guestrooms invite guests to save water and reuse towels.

CONTRIBUTIONS TO THE LOCAL COMMUNITY

For every nature-oriented tourist staying at the hotel, a donation is made to a local non-government environment organisation.

CONTACT INFORMATION

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5. Saunders Hotel Group, The Lennox and Copely Square Hotels, Boston USA

WATER

• Both hotels participate in the US Environment Protection Agencies’ WAVE, a voluntary programme promoting water conservation in businesses;
• Low-flow showerheads, tap aerators, and low-water flush cisterns are installed in all bathrooms and toilets;
• A linen and towel reuse initiative is on-going;
• At the Lennox hotel, water-efficient washing machines and dishwashers filter the rinse water from one load and reuse it for the next.

The towel and linen reuse initiatives bring savings of over 3 million gallons of water and US$35,000 in water, energy and detergent costs a year.

175,000 gallons of water (40% of total water used in the laundry) are conserved through water re-use technology. Associated water and energy-related cost savings are about US$3,400 a year.

ENERGY

• Both hotels have retrofitted back-of-house and public areas with energy-efficient light bulbs;
• Motion-detectors are fitted in luggage rooms and storage areas;
• In guestrooms, signs above light switches remind guests to turn off lights when not required;
• An energy-management system has been installed at the Lennox Hotel, which provides for greater control heat, light and ventilation.

The Energy Management System at the Lennox Hotel brings savings of 88,000 kilowatt hours of electricity, US$37,000 a year.

The lighting retrofits save about 52,000 kilowatt hours of electricity.

WASTE

• Cardboard, paper, telephone cards, glass, plastic, aluminium, steel, toner cartridges and fluorescent light bulbs are separated for recycling;
• The number of pages of all printed documents was reviewed and reduced. Nightly reports are not printed and are maintained only on computer;
• Old toilet fittings were sent for reuse as road-fill;
• Leftover food and old furniture is donated to shelters;
• At the Copely Square Hotel, wall-mounted dispensers have replaced individual guest toiletries.

33% of the hotel’s waste stream is recycled, saving US$16,000 a year.

Reducing the volume of administrative reports and printed matter has saved US$22,000 in paper storage costs a year.

Wall-mounted dispensers for guest toiletries avoided wasting 272,222 one-ounce bottles a year.
In 1997, the hotels collectively recycled 22 tonnes of mixed paper including telephone directories, 35 tonnes of cardboard, 19 tonnes of glass, plastic and metals, and donated 45 tonnes of mattresses and furniture to shelters for the homeless.

PURCHASING
- There is an active policy to ‘buy recycled’;
- All regular purchases except fresh produce are made in bulk;
- Suppliers are asked to deliver all products in reduced or reusable packaging.

MONITORING
- The engineering department monitors gas, electricity and water use per occupied room every month;
- A weekly recycling review is conducted in every department;
- Environment performance data is posted on staff notice boards.

TRAINING AND MOTIVATING EMPLOYEES
The Saunders Group's environment policy and EMS are implemented through SHINE, the Saunders Hotels’ Initiative for Nature and the Environment. SHINE is designed to gain the active participation of all staff, from ‘green captains’ and recycling co-ordinators who have direct environment management responsibility, to seasonal and part-time employees. In-house environment education, training and motivation efforts include:
- SHINE Questions of the Week;
- The Bella Terra Newsletter;
- Monthly eco-tours of the hotel;
- Quarterly departmental SHINE briefings;
- Awarding SHINE pins to employees who participate in over five eco-activities;
- Recognition of employees with ‘bright environment ideas’ and high achieving departments at an environment award ceremony;
- The annual painting of the Earth Day mural;
- Presenting all employees with an organic, unbleached cotton T-shirt on Earth Day;
- The annual SHINE Bowl, where the teams from all Saunders hotels compete against each other on the basis of their environment-oriented achievements and knowledge.

COMMUNICATION
- Copies of the Saunders Group environment policy and awards achieved are displayed in the lobby;
- Tent cards in guestrooms ask guests to switch off lights and reuse towels;
- Guests get a brochure entitled ‘Planning for the Future’, which details the environment efforts of the Saunders Group;
- Press releases are sent out on the Group’s annual environment achievements.
OUR ENVIRONMENTAL ACTION PLAN
When The Copley Square Hotel celebrated its 100th Anniversary in 1991, we placed a time capsule in the cornerstone of our building. One item, stored away for future generations, was our written commitment to protect and preserve natural resources. Here’s a brief list of additional actions our employees have since put into place:

- **Employees** formed The Legacy Team to generate new environmental initiatives and to make them succeed.
- Our **housekeepers** offer you a choice to reuse towels and sheets a second time, saving water, energy and detergents. We also donate mattresses, bed springs and linens to homeless shelters.
- In the **restaurants**, we have eliminated many disposable items, including single-serving coffee creamers, paper placemats and plastic cups. Food scraps are used as animal feed and glass and metal containers are recycled.
- Our **engineers** installed energy efficient lighting in many public spaces, and have retrofitted our toilets, showers and air conditioning systems to save water. They’ve even recycled the old porcelain toilet bowls into road gravel.
- Our **purchasing agent** buys products made from recycled materials to help strengthen the recycling market. We’re a proud member of the Buy Recycled Business Alliance.
- At the **front desk** our new computer system prints only the reports we need, and we ask other companies to eliminate duplicate mailings; cutting paper waste in half.
- All **departments** pitch in with the recycling of cardboard, computer & office paper, newspaper & magazines, phone books; metal cans, glass bottles, kitchen grease, fluorescent light bulbs and laser toner cartridges.
- Our **communications** team designed eco-plaques for the guest rooms to help you, our guest; participate in this environmental effort.
- On Earth Day and throughout of the year, our **staff** participates in service, related projects, that help the environment and our community.

ENVIRONMENTAL POLICY
We have not inherited the earth for our ancestors, we are borrowing it from our children. Native American saying

All of us at The Copley Square Hotel are taking strides to make the world a cleaner, safer place for ourselves and our children. As Boston’s oldest continually operated hotel, the creation of our comprehensive environmental campaign demonstrates our ongoing commitment to future generations.

During the implementation of our environmental program we will:

- Identify and take action in every area where waste can be reduced or recycled, energy and water conserved, and our guests and employees educated;
- Introduce new products and services which are safer for our environment, visitors, neighbors and fellow workers.
- Maintain the high standards for which we have earned AAA’s three diamond rating and become known as “one of Boston’s most affordable treasures”.

By working together, we will all make a difference and will leave our children a planet that will heal and flourish.

TIPS FOR TREADING LIGHTLY IN YOUR TRAVELS
Traveling puts stress on us – and on our planet. Roughly 3,000,000 visitors stay in U.S. hotels each day. Imagine the combined water and energy used, and waste created by simple acts like showering, shopping and sightseeing. But you don’t need to sacrifice comfort or convenience to be conservation-minded on the road. Here are some tips to make your traveling experience more enjoyable and more earth friendly too.

LEAVING HOME

- Pack a canvas bag if you plan to shop – you won’t need a new paper or plastic bag with every purchase.
- If you’re driving make sure your car is well tuned and tires are fully inflated; you’ll increase your gas mileage up to 15%.
UNIT 4: ENVIRONMENT MANAGEMENT SYSTEMS

CONTRIBUTIONS TO THE LOCAL COMMUNITY

- The Saunders Group participates in Boston’s annual Earth Day event;
- It is corporate policy to host environment conferences and organise environment tours of the hotel properties for schools, other businesses and interest groups.

“The SHINE initiative has enabled the Lennox and Copely Square Hotels to generate US$120,000 from groups who have stayed in our hotels because of our visible environment commitment. Environment Management is good business.”

Mr. Ted Saunders, Executive Vice President and Director of Environment Affairs

IN YOUR HOTEL ROOM

- Turn lights, television and air conditioners off when not needed.
- Never use the toilet as a trash basket.
- Ask your room attendant to let you reuse your linens or towels a second night to reduce water, energy and detergent use.

DINING OUT

- Seek out local and organic foods – being fresher and less processed they are better for you and will enhance your understanding of the local cuisine and culture.
- Taking out? Grab only the napkins, utensils or condiments that you need.
- Bring a reusable mug or cup that can be used over and over, at home and away.

GETTING AROUND

- Plan your day with a map that has public transit information.
- Walk to nearby destinations for fresh air, to stretch your legs and take in the local sights, sounds and smells.

ECO-ACTIVITIES

- Experience the natural environs: Rent a bike or sailboat, and visit a local waterfront, park or zoo.
- “Leave nothing but footprints, take nothing but photographs” – and remember to reuse and recycle the plastic film containers.

ADVOCATE FOR THE ENVIRONMENT

- Vote with your dollars. Support “green” merchants & markets.
- Express your concerns about the environment via comment cards or in writing to the business that you patronize. Your voice does make a difference.

Annually, our small actions have:
- Eliminated 37 tons of trash: over 35% of our waste stream.
- Saved 1,700,000 gallons of water.
- Eliminated 112,000 paper placemats, napkins, cups and butter packets.
- Saved 110,000 kwh of electricity, enough to power 30 houses for one year.
- Saved 175 adult trees via paper recycling.

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6. Hotel Kurrajong, Australia

Hotel Kurrajong was one of the three hotels originally constructed for the early parliament in Canberra in 1926. It has been extensively modernised since then, and now houses a hotel school as well as 26 double rooms, restaurant, bar, and several meeting rooms. The hotel-school facility is apart from the hotel and includes classrooms, training areas and accommodation for 120 students.

Hotel Kurrajong began working on EMS as a participant in the Cleaner Production Demonstration Project of Environment Australia, Environment Protection Group.

WATER

- Dual-flush cisterns, reducing consumption by 6-7 litres per flush, are installed in all guest, student and staff toilets;
- Water-saving showerheads, limiting water flow to 12 litres per minute, are installed in all guest, student and staff bathrooms;
- Aerators reducing water flow to 5-6 litres per minute are fitted on all washbasins;
- A timer-controlled drip irrigation system is used to water the gardens;
- Storm water is collected and used to supplement garden water requirements;
- Guests are invited to reuse towels and only those ‘dropped in the bath’ are changed;
- For overnight guests, a limited linen change is proposed with only the top sheet being changed every other day.

At 70% occupancy, these water conservation measures have reduced flush and shower wastewater by 30%.

The towel and linen reuse programme has reduced laundry loads by 10%, saving 15 kilolitres of water a year.

Taking account concomitant reductions in washing powder and energy, savings amount to over AUS$2,250 per year.

ENERGY

- Low-energy light bulbs are used in most public areas, classrooms, dormitories and back-office areas;
- Timers are fitted to all bathroom heaters;
- Motion-detectors are used to activate lighting in residential corridors;
- The temperature of hot water at tap is lowered, especially in the summer, from 45°C to 40°C, lowering boiler fuel-consumption.

The following energy inefficiencies were identified in a 1994-95 energy audit. Rectifying these measures was estimated to reduce energy use by at least 10%, with savings of around AUS$8,000 a year. The payback period for the capital expenditure involved was estimated at 2 years. These measures are now being implemented.

- There was significant inefficiency in the computer-controlled main heating, lighting and ventilation unit. The software also needed upgrading;
- All areas of the hotel and hotel school were being cooled and heated even when unoccupied. The power distribution network needed to be
UNIT 4: ENVIRONMENT MANAGEMENT SYSTEMS

upgraded so that different sections of the property could be controlled separately and the power supply shut down when not needed;

• The kitchen exhaust fans were drawing air from the adjacent air-conditioned rooms;
• High-energy incandescent lights were still being used in some guest rooms;
• Occupancy detectors could be fitted to lighting in additional areas such as the student dining rooms;
• The kitchen exhaust hoods and attached air fans needed upgrading to improve kitchen ventilation and reduce noise;
• During low occupancy periods, the cold rooms were underused. In addition, weighted automatic closures could be fitted to the doors to ensure they were never left open;
• The energy awareness of staff and students needed to be increased;
• An energy manager was needed to improve the energy-efficiency of the hotel and school, responsibilities to include monitoring fuel and electricity use, ensuring correct timer-switch settings, rationalising the use of the cold room, maintaining energy records, raising in-house energy awareness, recording student and guest meal numbers, and maintaining weather data;
• It was decided that final-year students would be selected to perform the role of energy manager.

WASTE
The following recyclable wastes are separated and sent for recycling:

• Plastic, brown, green and clear glass, corks, cardboard, office paper and newspaper;
• Vegetable and food scraps are composted;
• Non-recyclable waste such as chemical containers, soiled plastic and paper, tins, wax paper and broken kitchen implements are collected and disposed of separately;
• Guests have separate bins for paper and other general rubbish;
• Dispensers have replaced individual bathroom products.

The waste management effort has reduced, annually:

• Waste volumes by 40%;
• Landfill space by 570 m³;
• Waste disposal costs by AUS$4,500.

Hotel Kurrajong also reports that:

• After the initial breaking-in period, the time taken for staff to segregate waste is negligible;
• The maintenance supervisor spends less than 3 hours a week overseeing the programme;
• Approximately 70% of recyclable waste is indeed being recycled. 100% of glass waste is recycled;
• Recycling efforts could be further improved through additional training for new staff.
PURCHASING
- Preference is given to non-toxic and biodegradable products;
- Products containing phosphates, silicates, formaldehyde, solvents and acid alkali are not purchased;
- All disposable items bought are made from recycled materials;
- Suppliers are asked to use packaging that can be collected and reused.

VISITOR COMMUNICATION
- Hotel Kurrajong’s ‘Statement of Environment Commitment’ is displayed in all guestrooms;
- Guests are invited to accept the limited linen and towel change and to switch off lights, heaters and coolers when not required.

TRAINING AND MOTIVATING EMPLOYEES AND STUDENTS
- Information on the environment management programme is included in the induction and orientation of new staff and students.

“It is our objective to make environment protection a norm, where ‘being green’ becomes second nature to staff and students. The value of our environment programme has been more than just cost savings and a marketing edge – it enables us to incorporate practical examples of environment management into the hotel school’s teaching programmes.”

Representative, Hotel Kurrajong

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7. The Severin Sea Lodge, Mombasa, Kenya

The Severin Sea Lodge is a 400-bedroom beach holiday and leisure complex. In 1999, the hotel began a 120-point environment action effort.

WATER
- In 1999, The Lodge began building an on-site three-stage wastewater purification plant. The objective was to treat all wastewater from rooms, kitchen and laundry. The treated water is used for landscaping, flushing and other non-drinking uses.

ENERGY
- Hot water is provided by 300 square metres of solar panels. The use of the diesel boiler has now been completely eliminated;
- Thermostats have been installed on all air-conditioners.

WASTE
- Paper, plastic, glass and metal wastes are separated and sold to recycling companies;
- Food waste is used as feed in pig farms;
- Garden waste is composted;
- Batteries are sent to a supplier in Germany for recycling.

PURCHASING
- All suppliers are asked to deliver goods in reusable containers;
- Plastic laundry bags have been replaced with recycled paper bags.

LANDSCAPING
- When redesigning the gardens, walls are replaced with fences and hedges, more trees are added to provide additional shade to reduce heat gain inside buildings, and small drains are added to provide for the collection of storm water.

“We take the responsibility for the resources at our disposal and we view nature as an equal partner. This is why environment protection is a part of company policy. We are the first hotel in Kenya to have an environment officer on its staff.”

Representative, The Severin Sea Lodge

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8. Bass Hotels & Resorts (BHR)

Bass Hotels & Resorts (BHR) operates over 3,200 hotels worldwide. BHR's brands include:

- Inter-Continental;
- Crowne Plaza;
- Holiday Inn;
- Express by Holiday Inn;
- Staybridge Suites.

BHR is a division of Bass PLC. The headquarters of the group are in London, UK, with regional offices in Atlanta for the Americas, Hong Kong for Asia Pacific, and Windsor for Europe/Middle East/Africa.

Each region has an environment team leader who reports to the Vice-Chairman of BHR. The vice-chairman is the company sponsor of the BHR Environment Initiative, and as such represents BHR on the Bass PLC Environment Working Group.

One of BHR's worldwide environment initiatives is the Conserving For Tomorrow programme. With over 1,100 participating hotels worldwide, it focuses on energy and water conservation and offers guests the opportunity to reuse towels and sheets during multiple-night stays.

Towels and linens are washed every three days. Based on the number of participating hotels, the programme is estimated to save 7,038,000 gallons of water and 46,920 gallons of detergent every month, in addition to the energy savings from using less hot water. BHR conducts on-going guest surveys to measure consumer perception of the towels and linen programme: response has been very favourable.

The Conserving For Tomorrow programme also focuses on lighting. From 1 January 2000, Holiday Inn hotels have been required to switch to compact fluorescent lighting, which meets specific criteria to ensure that guests have more light, but for less energy. The lighting programme also calls for a reduction in mercury lighting, which reduces not only environment impact but disposal costs as well.
ACHIEVEMENTS OF SOME BHR HOTELS:

• A hotel in Mexico has realised 20% savings on energy costs by placing presence sensors in guestrooms to control air-conditioning and lighting;

• A hotel in Turkey has reduced its energy consumption through moderate adjustments in the building's automated temperature settings – savings of over $71,500 in one year;

• A hotel in Canada saves $65,000-plus a year in recognisable costs – particularly in waste-disposal and laundry, with savings of over $30,000 a year in these two areas alone;

• This same Canadian hotel uses the Conserving For Tomorrow programme as a sales tool when soliciting group business. It has so far helped secure two environment conferences worth some $50,000;

• A Bahrain hotel lowered water costs by 4.5% and fuel costs by 4.3% in one year, despite increased occupancy and food/beverage sales;

• Many hotels have found that their environment programmes have increased their involvement with local communities.

BHR-owned and managed hotels use environment self-audits to measure their progress, covering energy and water conservation, waste management, water quality, product purchasing, indoor air quality, external air emissions, noise, stored fuel, PCBs, pesticides and herbicides, hazardous materials and asbestos.

One goal of the BHR environment team is to increase awareness and use of this self-audit within the franchise community.

Within the Inter-Continental brand, individual hotel audit scores are rolled into regional scorecards, with awards and recognition for high performers.

BHR also recognises hotels that have achieved significant results in a hotel-level environment effort. The Environment Award is presented at BHR's annual Worldwide Conference, attended by over 2,500 owners and operators.

Bass PLC publishes a corporate environment report every two years.

BHR continues to look for ways to expand its environment initiatives. The company is working on:

• A comprehensive guide to energy management;

• A standardised environment self-audit form for use by all BHR brand hotels;

• Including conservation information on the company's brand Internet sites;

• Building better alliances with suppliers of environmentally-preferable products and services.

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9. ‘Golden Tulip Goes Greener’: Environment Management at Golden Tulip Hotels

Golden Tulip Hotels is a leading hospitality company with 67 owned hotels and a great many more franchised and licensed properties all over the world. The 5 and 4-star hotels operate under the brand name ‘Golden Tulip Hotels’, while the 2-star category is marketed as Golden Tulip Inns.

GREEN TEAMS AND ENVIRONMENT CO-ORDINATORS

The corporate environment effort began in late 1997 with a bottom-up approach: Green Teams and Environment Champions were appointed in all Golden Tulip-owned hotels and inns in the Netherlands. The members of the Green Teams are volunteers from all levels of hotel staff. Most co-ordinators are employees with a high level of social awareness and an overall appreciation of environment issues. While they are well placed to identify practical and low-cost good housekeeping improvements, it was found they did not have the overall business perspective needed to integrate environment management into business operations and to ‘sell’ the needs and benefits of environment management along the management hierarchy.

To address this issue, the Golden Tulip Business School has developed an in-house training pack for Environment Co-ordinators and Green Team members on:

• Obtaining the active participation of general managers in environment management;
• Creating and maintaining environment-oriented enthusiasm among colleagues and employees.

ENVIRONMENT MANAGEMENT

The objective was to begin action with no-cost and low-cost good housekeeping and repair activities and move on to more capital-intensive improvements at a later stage. Action therefore began in a phased effort, with a new environment action area being introduced every month. The action areas implemented to date are water, waste, energy and chemicals. Newsletters introducing and discussing each environment action area were distributed to all employees. The Green Teams were invited to submit lists of environment management actions that could be undertaken in each action area. The lists were then compiled into a series of department and operation specific-action checklists called ‘Golden Tulip Goes Greener, Water/Energy/Waste/Chemicals Tips’. The departments and operations are included. The checklists were distributed to all Green Teams, which have begun to use them in the implementation of environment action.

ENVIRONMENT TARGETS

To help maintain enthusiasm and continued environment action, the Green Teams have been given broad environment performance targets and standards for each action area. This has also helped shape systematic environment-monitoring and data-recording procedures across Golden Tulip Hotels and Tulip Inns.

CORPORATE ENVIRONMENT POLICY

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8 The newsletters include general environment information on the specific action area, resource use/waste volumes statistics, ‘tips’ and ideas on resource conservation and waste management, quizzes and crossword puzzles and news briefs on the environment performance of selected Golden Tulip Hotels and Inns.
The Golden Tulip Hotels’ Corporate Environment Policy, established in 1999, has validated the efforts of Green Teams and is effectively gathering support for further environment improvement.

ENVIRONMENT REPORTING
A section on the environment is included in the Golden Tulip Hotels’ 1998 Social Report.

ENVIRONMENT ACTION IN 2000
Integrating and implementing the environment policy into everyday business was the main objective for 2000. Activities included:

• Environment training programmes for Green Teams and Environment Co-ordinators (discussed above);
• Two new action areas:
  – The Guest and the Environment
  – The Supplier and the Environment;
• Commencing environment action in the other divisions of Golden Tulip Hotels – Sales and Marketing, Human Resources, Purchasing and Development;
• Establishing a standardised corporate environment-performance auditing procedure;
• Carrying out environment-performance audits in all owned Golden Tulip Hotels and Tulip Inns, comparing actual performance against targets, and identifying areas for further improvement;
• Initiating environment management at Golden Tulip Hotels licensed and franchised businesses.

“For us in the hospitality business, environment management is imperative for continued business success. We began environment action in a practical and hands-on manner, and used this experience to establish a corporate environment policy. We are now working on improving environment performance with increased support from top management and an effective environment policy behind us.

For Golden Tulip Hotels, environment action is not a marketing tool, but a business and social responsibility. We are not planning to market our environment performance until fully-fledged environment-management programmes are up and running, and valid performance data is available.”

Representative, Golden Tulip Hotels

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This section introduces cleaner production, eco-efficiency, industrial ecology and life-cycle assessment, which will provide the reader with a greater appreciation of the EMS philosophy.

5.1 Cleaner Production

While traditional environment action has focused on cleaning up waste and pollution after it has been created, cleaner production aims to avoid the generation of waste and pollution in the first place. Strategies for cleaner production include:

- Reducing the use of raw materials and energy;
- Reducing the use of toxic raw materials;
- Reducing toxic waste output;
- Reducing environment impacts during the lifecycle of products and services – from raw material extraction to manufacturing, production, storage, distribution, consumption and recycling and/or final disposal.

In economic terms, cleaner production means reducing material and energy use and related costs, auditing, adopting more efficient production processes, lowering waste volumes and disposal costs, eliminating clean-up costs, fines and charges, and producing higher quality goods and services.

Cleaner production is the continuous application of integrated preventive strategies applied to processes, products and services to increase efficiency and reduce risks to humans and the environment.

(UNEP DTIE 1996)

5.2 Eco-Efficiency

Eco-efficiency is about doing more with less – using the same or a lesser amount of materials and energy to deliver a higher quality or quantity of goods and services. The World Business Council for Sustainable Development (WBCSD) provides the following definition:

Eco-efficiency is reached by the delivery of competitively priced goods and services that satisfy human needs and bring quality to life, which progressively reduces ecological impacts and resource intensity throughout the life cycle, to a level that is at least in line with the earth’s carrying capacity.

5.3 Industrial Ecology (Systems Thinking)

Industrial ecology refers to business operations that mimic the natural ecosystem, where an industrial system is managed like an ecosystem - a continuous and sequential flow of materials, energy and information.

The two major concepts of industrial ecology are sealing the material cycle and dematerialisation:

- Sealing the material cycle means carrying out production in closed-circuits, in the same way as an ecosystem. For example, through
photosynthesis plants produce carbohydrates. These feed herbivores, which then fall prey to carnivores, whose waste is, in turn, food for detritus organisms. Similarly, industries could reuse waste as raw material and reuse or recycle end products after they have been consumed. In this way materials and waste would move round in closed circuits.

- Ecosystems have built-in methods for optimising the use of materials and energy. Similarly, dematerialisation is about doing more with less: optimising the use of raw materials and extending the service life of end products. An additional benefit in extending service life is that it creates new job opportunities, especially in maintenance and repair.

**Industrial Ecology in Practice**

One of the best examples of industrial ecology in practice is the case of the Danish town Kalundborg.

Kalundborg has four main industries:

- Asnaes Power Station, a coal-fired plant;
- Novo Nordisk, producing enzymes and pharmaceuticals;
- Gyproc, a plasterboard manufacturer;
- Statoil, an oil refinery.

The evolving industrial ecosystem works as follows:

- Asnaes produces steam and heat while generating electricity, and sends some of its steam to Statoil and Novo Nordisk. Statoil, which gets 40% of its steam requirements from Asnaes, uses the steam to heat pipes and tanks. Novo Nordisk gets 100% of the steam it needs from Asnaes, and uses it as a source of heat and pressure.
- Asnaes also pipes excess heat to local fish farms and some homes. Plans are underway to expand this to all homes in Kalundborg by 2005. This process of heat and steam recycling has raised the efficiency of coal burning from 40% to over 90%.
- Asnaes’ waste steam and the by-product gypsum (produced in the scrubbers which reduces sulphur dioxide emissions) are used by Gyproc to make plasterboard. The remaining gypsum is sent to local cement producers.
- At the Statoil Refinery, flue gas is created as a by-product of oil refining. The gas first goes through a de-sulphurisation process. The hot, liquid sulphur captured is sold to the Kemira Acid Plant in Jutland. Statoil’s sulphur-free flue gas goes to Asnaes and Gyproc, instead of being burned off. Asnaes thus saves 30,000 tonnes of coal a year. Statoil’s flue gas meets nearly 95% of Gyproc’s gas needs.
- Novo Nordisk gives its nitrogen-rich sludge to local farmers via pipeline or truck. This is reported to save each farmer about US$50,000 a year in fertiliser costs.
- This evolving symbiotic scheme is also being extended to water use.
5.4 Life Cycle Assessment

Life Cycle Assessment (LCA) is a method of assessing the environment impacts of a product or service during its life cycle – extraction, processing, manufacturing, transport and distribution, consumption, maintenance, reuse and recycling, and final disposal. It is a quantitative and scientific analysis, designed to generate objective information about environment impacts. Economic and social issues only enter the picture once the scientific analysis is complete.

LCA can be used to:

- Develop new products and services;
- Improve manufacturing/service delivery;
- Provide consumers with credible information on the environment aspects of products/services;
- Develop environment-preferable purchasing policies;
- Improve the quality of existing products and services.

Specialised life cycle analysis software, together with methodology improvements and increased data availability, is making LCA easier to carry out.

LCA methodology consists of four main stages.

1. DEFINITION OF THE SCOPE OF THE LCA
   Questions arising at this stage include:
   - What will the results of the LCA be used for?
   - What aspects and functions of the product or service must be taken into account?

2. INVENTORY ANALYSIS
   A detailed inventory of:
   - All inputs (land, energy, water, and raw materials used);
   - All outputs (waste, emissions and by-products) is developed and quantified for each process. This information is then developed into a process flow chart.

3. IMPACT ASSESSMENT
   - The checklist and flow chart are quantified into a number of selected impact categories;
   - These are then weighted in importance.

4. IMPROVEMENT ASSESSMENT
   All opportunities to reduce impacts are systematically evaluated.
Case Study: The LCA of a Vending Machine

An LCA was conducted on a fully automated hot drink dispensing machine for tea, coffee and chocolate. The LCA findings showed that:

- The energy consumption was highest for the production and transport of the ingredients and for the use and servicing of the machine;
- 70% of the energy used during the lifetime of the machine was to maintain it on stand-by;
- The majority of waste and emissions came from the use and servicing of the machine;
- The material input for the ingredients (tea, coffee, chocolate, hot water, milk, and sugar) was 10 times greater than the material input in the manufacture of the dispensing machine.

These findings were used to implement the following improvements:

- The ingredients in the machines were replaced with more environmentally-preferable alternatives;
- The ingredient containers were enlarged;
- Daily servicing was reduced to weekly servicing;
- The hot water tank was insulated.

Ingredient and energy use was reduced by over 10%. As servicing costs were also substantially reduced, the price of the hot drinks dispensed could be lowered.
• Businesses have realised that if they are to remain profitable and competitive, they must integrate environment management into daily processes and practices.

• National legislation that makes EMS and environment reporting mandatory is on the rise. Taxes on emissions and waste are adding momentum to EMS implementation. Non-compliance will be punishable with heavier fines and even imprisonment.

• Increased environment expertise, together with more efficient and cleaner technologies, will greatly facilitate environment improvement.

• EMS will also move from piecemeal improvements to reducing the overall impacts of production and processes. Eco-efficiency, cleaner production and industrial ecology will move from being noteworthy but isolated achievements to common practice.

• EMS goals are fast evolving from environment management to sustainable development. Companies will not only have to reduce resources and waste, but also take steps to improve social welfare and the quality of life in the societies in which they operate. Corporate social responsibility involves good management, better pay and benefits, health and safety in the workplace, training, non discrimination, indigenous rights, avoiding child labour, and transparency in product and service procurement.

• The market and immediate stakeholders are demanding greater transparency. Companies have to not simply carry out environment management efforts, but report on environment performance with independent verification of performance data.

• There will be greater transparency on corporate lobbying activities, and the role of companies in influencing public policy on sustainable development.

• In tourism, leading airlines, airports, tour operators, hotels, and visitor attractions are working on EMS. There is still much scope for improvement – especially in small and medium-sized businesses that constitute a large part of the industry.
UNIT 4: EXERCISES

1. GROUP PROJECT

Develop and Implement EMS in a hospitality business

Ask hotels and restaurants in the region if they would be interested in having a group of students develop an EMS for their business. This will provide a hands-on practical project for several groups of students (5 to 6 students per group), and help local businesses improve environment performance.

The first group of students would visit the property, interview the management and employees, and:

- Conduct a preliminary environment review (including research on level of compliance, fines and charges, costs of resource use and waste disposal);
- Analyse the findings of the review;
- Develop an environment policy;
- Establish environment objectives and targets;
- Develop a baseline environment management programme.

A group of students from the next semester could:

- Help the business finalise the environment management programme
- Implement the programme;
- Set up regular performance monitoring practices;
- Analyse environment progress.

A group of students from the semester after that could:

- Carry out an environment audit;
- Assess the findings of the audit;
- Make recommendations on further improvements, revise targets and objects for continual improvement;
- Investigate how to maintain enthusiasm about the environment within the business.

2. GROUP PROJECT

Develop an EMS training programme for the management and employees of a small hotel or restaurant in the region. The exercise should involve site visits, a short preliminary environment review and interviews with management and employees. Make a presentation describing the programme. (Managers of the hotel/restaurant could be present during the presentation).

3. GROUP DISCUSSION OR GROUP PROJECT

Consider the environment management concepts and tools, cleaner production, eco-efficiency, industrial ecology, and life-cycle analysis. Devise examples of the application of each of these concepts in a hospitality business. Make a presentation of your examples.
4. WRITTEN ASSIGNMENT
Critically discuss the following statements. Your answer should be about 1,500 words long.

‘Whose responsibility is environment quality? The tourism industry’s, the hospitality business’s, the tourist’s, the supplier’s, or all?’

‘Tourism and hospitality trade associations can be very effective in promoting EMS in the industry.’

‘EMS is equally important for small to medium-sized businesses and large companies.’

5. GROUP PROJECT
Develop and carry out an environment status review of your hotel school or the hotel and hospitality department (if it is part of a larger college or university). Based on the findings of the review:

• Create an environment policy for the school or department;
• Establish environment objectives and targets;
• Develop an environment-management checklist.

6. GROUP DISCUSSION OR WRITTEN ASSIGNMENT
Critically review the following article. Then consider this question:
What EMS steps and wider sustainable tourism actions could be taken in the Egyptian Museum in Cairo and in Egypt as a whole to improve conservation and environment protection?

Many Mummies
From The Economist, 31 July-6 August 1999

Egypt has more antiquities and tourists than it can cope with. Stopping the latter from destroying the former is its biggest challenge.

Many countries would envy Egypt’s predicament. With the possible exception of Italy, no place in the world contains such a colossal stash of antiquities. Trouble is, Egypt enjoys only a small fraction of Italy’s wealth. Just coping with what has already been found (let alone with the artefacts that keep pouring out of Egypt’s bottomless archaeological motherlode, or with the hordes of tourists who want to see the stuff, or with the constant threat of encroachment on sites) is an increasingly onerous burden on the government and museum authorities.

At the Egyptian Museum in Cairo, the numbers are awesome. With more than 120,000 ancient objects on display, and even more crammed in the basement, the century-old building is stretched far beyond capacity. Despite costly renovations completed last year, the hall containing the gold of Tutankhamun packs in such a crush of visitors it is beginning to resemble Grand Central Station at rush hour. Over the next decade the numbers are expected to rise from 2m to 8m a year. Controversial plans for a mega-museum have been mooted, but its construction remains a distant prospect.

In the field meanwhile, each week produces exciting new finds, creating yet more pressure on bulging storerooms, as well as on the time and budgets of those
who analyse, catalogue and restore artefacts. “The last thing we need is more mummies,” groans one archaeologist, faced with the recent discovery of a desert cemetery that Egyptian experts believe holds as many as 10,000 graves from the Greco-Roman period. Only a few choice pieces, some with gilded facemasks, will be displayed near the site in the oasis of Bahariya, a little over 300km southwest of Cairo. The rest will have to be reburied.

Rainer Stadelman, who is retiring as director of Cairo’s German Archaeological Institute after four decades in Egypt, explains that you can dig practically anywhere and find something. “More than 3,000 years of high civilisation — and I’m only talking about Ancient Egypt — gives an enormous wealth of antiquities,” he says.

Although nothing quite so flush with loot as Tutankhamun’s tomb has been unearthed in the past ten years, recent discoveries have greatly enriched the science of Egyptology. At Abydos, 400km south of Cairo, a German team excavating a royal cemetery from the middle of the fourth millennium BC believes it has found the world’s oldest readable writing. Inscriptions on ivory labels attached to oil jars show that officials of the First Dynasty used primitive hieroglyphs to record where the jars came from. Overturning the theory that Egypt adapted the art from Mesopotamia, the phonetic symbols put back the ‘invention’ of writing by two or three centuries, to around 3,300 BC.

Across the Nile at Akhmim, Egyptian archaeologists are beginning to uncover a temple precinct that may prove as large as the temple of Karnak at Luxor. This would make the site rank next to Angkor Wat and the Vatican as one of the world’s biggest religious complexes — only many centuries older. The Akhmim site has already produced an exquisite 14-metre-high limestone statue of Ramses II’s daughter, Merit-Amun.

In Luxor’s Valley of the Kings, Kent Weeks, an American archaeologist, continues to explore a vast underground funerary complex dating from the reign of Ramses II (1304-1237 BC). With more than 200 rooms uncovered since excavation started in 1995, the purpose of this mysterious warren of chambers remains unknown. Theories range widely: perhaps it was a tomb for all of Ramses’ 52 sons, perhaps a model representing stages of the afterworld.

Other recent finds include an intact pyramid capstone (at Dahshur), a tomb belonging to Tutankhamun’s nurse that is decorated with beautiful relief carvings (at Sakkara), a cemetery devoted to the workers who built the pyramids (at Giza), fortresses in the Sinai Peninsula dating from 1500 BC, and a palace in the Delta decorated with Minoan paintings that prove there was a close trading relationship between Egypt and the ancient Cretan civilisation.

Leaving aside Ancient Egypt, finds from later periods are just as alluring. Divers off Alexandria have uncovered sculptures from the famous Ptolemaic lighthouse as well as Greco-Roman ports and palaces. The site where Napoleon’s flagship, L’Orient, was sunk by Lord Nelson in 1798, with an estimated 10m gold francs of treasure aboard, has also been found. Far out in the desert, meanwhile, an Italian team has just finished restoring a chapel in the Coptic monastery of St Anthony. The stunning 13th-century frescoes on its walls, completely obscured by soot until three years ago, now rank among the most brilliant examples of Eastern Christian art.

All this work costs money. With Egypt’s own resources severely strained, and with 20-odd foreign missions facing cutbacks, archaeologists must increasingly scout for their own backing. Rival French teams in Alexandria have each sought corporate sponsorship. Both have signed away exclusive rights for television coverage of their finds. To support his work in the Valley of the Kings, Mr. Weeks is
obliged to spend half his time in pursuit of private funding.

Egypt's own Supreme Council for Antiquities is beginning to go commercial. Earlier this year, its officials obligingly staged the ‘discovery’ of a tomb by the Giza pyramids for Fox Television. The US network paid US$60,000 for the privilege. National Geographic recently coughed up US$30,000 for exclusive film rights to the cache of mummies at Bahariya.

These sums are paltry compared with the task at hand, however. Much of the site at Akhmim, for example, lies beneath a village and a modern cemetery. Relocating them will cost as much as $10m. The budget for dismantling and rebuilding the 2,500-year-old Temple of Hibis at the oasis of Kharga, which is threatened by rising groundwater, is a hefty $6m. This is only one of hundreds of monuments — including some 200 medieval buildings in the centre of Cairo — that need urgent attention.

Fixing the Temple of Hibis is likely to exhaust funds earmarked for work in Egypt's oasis regions. Too bad, because these remote areas have lately produced remarkable finds: some recent desert discoveries include a Sixth-Dynasty governor's palace that proves early Egyptian occupation of the oases, a gold crown from the Ptolemaic period, and a surprising cache of Greek papyri, among them unique scriptures from the Manichaean religion that vied with early Christianity.

More pressing perhaps is that many desert sites need protection from treasure hunters. At an abandoned Roman fortress town 40km from Kharga, scavengers last year used backhoes to rip open cemeteries, leaving a macabre scattering of discarded mummy parts. At a nearby site that can be reached only by four-wheel drive vehicles, a desert guide recently caught a group of American tourists red-handed. They were using metal detectors and air compressors to sift through the ruins for booty.

Yet the damage from pilfering pales in comparison with the organised menace of mass tourism. At sites such as the Valley of the Kings or Sakkara, thousands of visitors mill about each day in cramped tombs that were designed for one occupant's afterlife. The deterioration of the paintings and reliefs on their walls is plain to see. Even the apparently indestructible pyramids of Giza are suffering. With each visitor who descends to their inner chambers exhaling some 20 grams of clammy water vapour, cracks have begun to appear. The antiquities service now works the great structures in shifts, closing one each year for rest and recuperation. Sadly, this solution cannot work for monuments that are more unique or more delicate.

“Tourism is already a catastrophe,” says Mr. Stadelmann, who like most Egyptologists is understandably worried about the future. “But we have to admit that without tourism there would be no public interest, and without that there would be no money for our work.” He is right, but as tourist numbers grow, Egypt is going to have to find a better balance between showing off its heritage and preserving it.
7. GROUP PROJECT

EMS for the Eland Safari Lodge

You have been invited by the National Park Authority and the owners of the Eland Safari Lodge to develop an EMS strategy for the Eland Safari Lodge. The objectives are to:

• Reduce material and energy use;
• Reduce the output of waste emissions and effluents;
• Reduce noise and the disturbance to animals;
• Teach visitors about the ecosystem, game species and the importance of environment protection;
• Raise the environment awareness of staff;
• Enable the Eland Safari Lodge to contribute towards conservation and the improved management of the Park.
Read the information given below and develop a report containing:

- An overall EMS strategy;
- A preliminary environment review checklist;
- A checklist of activities that could be undertaken in an environment management programme, including staff training and visitor communication;
- A monitoring checklist to assess the achievements of the environment management programme.

Make a 15-30 minute presentation outlining the contents of the report.

**BACKGROUND INFORMATION**

The Eland Safari Lodge is located on the outskirts of a major game reserve, somewhere in Central Africa. It operates 83 rooms, two indoor restaurants, a garden bar and restaurant, a lounge bar, a swimming pool, and a pool bar. The back office areas consist of administrative offices, kitchen, storerooms, a cold room, and maintenance rooms.

The average length of stay is 4-6 days. Over 70% of guests are from overseas.

The Eland Safari Lodge also operates a safari (wildlife viewing) service ‘Savannah Calling’. The welcome and information desk is located next to the Lodge’s reception, and this enables guests to confirm bookings directly upon arrival. Savannah Calling operates 5 open-roof, four-wheel drive vehicles, which seat 7 passengers, and 3 open-roof, 16-seat minibuses. The service employs 6 full-time game rangers. During the peak seasons 3 to 4 additional wildlife enthusiasts are hired to work as ranger-chauffeurs. Savannah Calling operates a programme of 4 game drives a day – at dawn, late afternoon, dusk and night. Each drive lasts around 2 1/2 hours.

The surrounding landscape is typical of the savannah bush: dryland vegetation and grass plains interspersed with wooded areas, ponds, and the occasional small lake. There are two monsoon seasons per annum. However, over recent years, the monsoons have not been regular and annual rainfall has halved.

The Park originally covered 1,700 square kilometres but today incorporates 1,500 square kilometres. This size reduction is due to:

- Increasing pressure for agricultural land from the local population living in the buffer zones;
- The lack of adequate funds to maintain 1,700 square kilometres as a protected area.

Resident wildlife species include over 300 species of birds, elephant, wildebeest, rhino, hippopotamus, zebra, giraffe, antelope species such as gazelle, topi and eland, crocodile, fox, hyena, and the big predator cats – lion, leopard and cheetah.

The local population live around the buffer zones of the Park, and continue to rely on the Park’s ecosystems for fuel and building materials such as peat and grass. They are also allowed to hunt ‘permitted species’ for meat.

The nearest large town, Pembroek, is 250 kilometres north of the Park – five or six hours by road. The capital city is 400 kilometres west of the Park. There are 2 flights a week from the capital to a small airport located around 100 kilometres north of the Park.
ISSUES TO CONSIDER

WATER AND WASTEWATER

- Despite prevailing droughts and water shortages, no water conservation measures have been taken at the Lodge. Towels and linen are changed daily and gardens and lawn are watered throughout the day. All rooms are equipped with large baths – no provisions are made for showers. The interior floors and windows are mopped and exteriors are spray-washed every day. The swimming pool is refilled twice a week during peak season and chlorine is used as a purifying agent. Many cold and hot water taps and toilet cisterns in guestrooms, back office and F&B outlets leak continuously. Water pressure at tap is not regulated. Hoses and sprinklers used to water the garden do not fit the water outlet, and here again there is significant water loss.

- Fresh water to the Lodge is usually supplied through a small diversion from the nearby river Nila, after purification in a water supply purification plant. Prevailing droughts have, however, drastically reduced the river water level, and water is now being supplied from the aquifer that lies directly beneath the park. Park authorities are concerned that the water levels of the aquifer are decreasing. The aquifer is critical to the maintenance of the Park’s entire ecosystem, supplies the natural ponds and lakes that serve as waterholes for the animals, and provides water (through boreholes) to the local population.

- The wastewater from the Lodge is said to be treated at the wastewater treatment plant that serves the town of Pembroek. However, local citizen groups have reported that the wastewater ends up without treatment in the River Nila – the outfall being only a few kilometres upstream from the water supply diversion to the Lodge.

ENERGY

- Hot water, maintained at 70°C at tap, is provided by fuel-operated boilers. All other equipment operates on electricity, obtained partly from the national grid, and partly from the Lodge’s own noisy and expensive diesel generators located onsite. Grid electricity is generated through hydropower. Peak tariffs are charged for power use between 08.00 and 10.30 and 17.00 and 20.00 hours.

- The garden restaurant operates a nightly barbecue dinner where coal and wood are used for torches and cooking.

- Prevailing droughts and low water levels across the country are now causing grid electricity shortages. The grid supply is interrupted from 23.00 to 05.00 hours at night and from 13.00 to 16.00 hours during the day. At these times, the Lodge makes maximum use of its diesel generators to produce electricity.

- Incandescent bulbs are used for lighting in all areas of the hotel, except the back offices and kitchens where fluorescent tubes are installed. Lights in public areas and corridors are left on throughout the day and at night.

- All guestrooms are equipped with single-unit air-conditioners. However, the thermostats of most units do not function, and therefore when turned on they only work at full capacity. Guests often have to open the windows as the rooms get ‘too cold’. Most units are also noisy and leak water produced by condensation.
• No other areas of the hotel are air-conditioned. Ceiling fans operate day and night in public areas and restaurants.
• It is usual practice for the kitchen stoves to be turned on at the beginning of the day and left on the whole day until the dinner service is complete.
• There appear to be significant quantities of flash steam escaping from the boilers.
• The refrigeration system in the cold rooms is often out of service.
• Stoves, boilers and washing machines are over 10 years old. Dishes are washed by hand in tubs and buckets.
• There is no awareness of energy saving, how to lower energy use, renewable energy, or of equipment maintenance and monitoring. Little help is available from the national electricity company.

WASTE
• No waste is separated and all waste including food, kitchen, and garden is sent for landfill. Old linen and uniforms are included in the waste stream.
• Owing to problems with refrigeration in the cold rooms, leftover food from the breakfast and barbecue buffets is not reused. Significant quantities of food are therefore wasted.
• Paper napkins and tumblers, cocktail sticks, paper cups and glass holders are the main sources of disposable waste. Plastic waste includes packaging, food and cleaning products and chemical product containers. All beverages are purchased in glass bottles, which can be returned on a deposit refund scheme. However, no separate sorting system is in place and glass bottles are also sent for landfill.
• Items with longer shelf life such as dry food, tins, stationery, office supplies and cleaning supplies etc. are bought in bulk.
• There were some attempts to compost kitchen and garden waste. However, owing to poor maintenance and the contamination of the compost heap (by plastic, glass, animal fats and meats included in the compost), it began to attract rodents and birds, and gave rise to unpleasant odours. The effort was therefore abandoned.
• A significant volume of paper is used in the back office.
• No attempts have been made to reduce or reuse waste. There are two recycling companies based near the airport, but they have not been contacted for information on and assistance with the collection of waste for recycling.

PURCHASING
• All items, including fresh produce, are sourced directly from the capital city 400 km away and transported by truck twice a week. No attempts have been made to source goods locally or use the produce of local farmers, expect for game meat.
• Despite the availability of a good selection of nationally-produced alcoholic and non-alcoholic beverages, preference is given to imported products from Europe, the USA or South Africa.
• Chemical cleaners, non-degradable detergents and pesticides are freely used all over the property.
• Stationery is printed on imported bleached gloss paper.
• Even though some purchases are made in bulk, they include substantial volumes of packaging, which is sent for landfill with the rest of the Lodge’s waste.
• There is no awareness of how to purchase environmentally-preferable products, except for buying in bulk.

EMISSIONS
• All the air-conditioners, refrigerators and the cold room use CFC-11 as a refrigerant. During repair, significant amounts of refrigerant are allowed to escape. The fire extinguishers contain halon. Insecticides and air fresheners are purchased in aerosol spray cans. Foam is regularly used as packaging.
• All Savannah Calling’s vehicles operate on diesel. Owing to poor maintenance, the engines are noisy and give out copious exhaust fumes.
• The lobby, public areas and back office are all designed as open verandas, so the Lodge’s management is confident that indoor air quality is not an issue. However, the kitchen and laundry exhaust fans are in poor working condition and there is no ventilation in the boiler room.

TRAINING EMPLOYEES
• Overall environment awareness is low to non-existent. Management does agree that ‘the environment is important’, and that ‘it is good to recycle’, but have no further environment expertise.
• The Park authorities require that only licensed game rangers - those that successfully complete the recommended series of ecology, conservation and communication courses - conduct safari tours. There is also a special license for ranger-chauffeurs. However, the Lodge has not verified if any of the rangers and chauffeurs employed by Savannah Calling hold the required licence.
• It is further reported that rangers and chauffeurs are very willing to drive off-road to get close to animals for better photographs and even chase and track down bigger species when large tips are imminent.

COMMUNICATION TO VISITORS
• The Park has put together one brief wildlife information leaflet on resident and migratory species, the only information available to guests. The leaflet contains only scant information and needs to be upgraded.

RELATIONSHIP BETWEEN THE PARK AUTHORITIES AND THE LOCAL COMMUNITY
• The Lodge has just began talks with the Park authorities on a series of management-related problems including conflicts of interest with local communities, poaching, costly administrative delays, poor environment and visitor management, lack of funds and the gradual degradation of the Park’s ecosystem. The Lodge’s management and the Park authorities are working on how the Lodge could contribute towards increasing conservation funds, ensuring game ranger licensing, increasing visitor management and implementing EMS.
• The Lodge has no direct contact with the local communities living in the
buffer zones, except for the purchase of game meat. A handful of people living in the buffer zone villages work as housekeeping staff and kitchen hands. The rest of the employees are from Pembroek and its suburbs. They are provided with employee housing next to the hotel.

GLOSSARY OF TERMS AND ABBREVIATIONS

baling  packing together and weighing materials (in this context, for recycling)
BEMS  building energy management system
benchmark  a given quality, quantity or performance level that is used as a standard for comparison
BOD  biological oxygen demand
CFC  chlorofluorocarbon
CHP  combined heat and power
CLF  (low energy) compact fluorescent lamp
compacting  pressing materials together so that they become reduced in volume
environmentally-certified product  product formally approved as being environmentally-preferable
EMAS  eco-Management and Audit Scheme, a voluntary regulation of the European Union
EMS  environment management system
hybrid engine  engine that can operate on two types of fuel
ISO  International Standards Organisation
ISO 14000  a series of standards and guidelines on environment quality management systems, developed and implemented by ISO
Legionella pneumophila  water contaminant that can cause legionnaire's disease, a serious and potentially fatal infection of the lungs
LCA  life cycle analysis
national ozone office  A government office that implements the national ODS unit phase-out strategy. This focal point should be able to provide additional information about country-specific technical and financial assistance
ODS  ozone-depleting substance
organic  carbon-containing, derived from plants and animals
SWOT  strengths, weaknesses, opportunities and threats analysis
renewable energy  energy that can be generated as fast as it is consumed
TQM  Total Quality Management
TRV  thermostatic radio valve
UV-C  Ultra Violet - C
VOC  volatile organic compound
WBCSD  World Business Council for Sustainable Development
THE SUSTAINABLE SITING, DESIGN AND CONSTRUCTION OF TOURISM FACILITIES
UNIT 5
THE SUSTAINABLE SITING, DESIGN AND CONSTRUCTION OF TOURISM FACILITIES

The tourism and hospitality industry invests heavily in building new structures and renovating and converting existing ones. This unit introduces the key features of sustainable building siting, design and construction. They make buildings more durable, comfortable, and cheaper to operate and maintain, while facilitating the implementation of EMS during occupation.

Unit Outline
The unit is organised as follows:

Section 1
What is sustainable design?
Why is sustainable design important in tourism and hospitality?
The benefits of sustainable design

Section 2
Sustainable siting of buildings
  2.1 Site selection;
  2.2 Carrying capacity;
  2.3 Environment impact assessment;
  2.4 Building placement.

Section 3
Sustainable design of buildings
  3.1 Architectural features: including passive solar design, day lighting, renewable energy, reducing and reusing water, and landscaping;
  3.2 Environment considerations for the building ‘shell’: including windows, insulation, and environment-friendly building materials;
  3.3 Providing for the use of resource-efficient technologies and appliances during occupation.

Section 4
Reuse of existing buildings

Section 5
Sustainable construction of buildings

Section 6
Case studies on environmentally-sound siting, design and construction of buildings
Section 7
Case studies

Learning Objectives
At the end of this unit, students should be able to:

- Appreciate the importance and benefits of sustainable building siting, design and construction;
- Identify some features of sustainable design;
- Appreciate how sustainable siting and design will facilitate the implementation of EMS;
- Discuss the potential for incorporating sustainable design features into existing buildings and how it will facilitate EMS;
- Discuss sustainable siting and design for new buildings and how it will facilitate EMS.
What is Sustainable Design?

Sustainable design involves buildings that need fewer resources and materials to build, occupy and maintain, and are more comfortable and healthy to live and work in.

‘Sustainable design is not a new building style. Instead, it represents a revolution in how we think about, design, construct and operate buildings. Sustainable design aims to lessen the harm caused by poorly designed buildings by using the best of ancient building approaches in a logical combination with the best of new technological advances. Its ultimate goal is to go even further and build offices, homes, even entire subdivisions, that are net producers of energy, food, clean water and air, beauty and healthy human and biological communities.’

The Rocky Mountain Institute, USA

Buildings have significant impacts on the environment. In most industrialised countries, carbon-dioxide emissions from buildings account for half of total national carbon emissions, while construction waste amounts to 35-40% of national annual waste output. In the UK, each person uses over 6,000kg of building materials every year.

The 1960s was the most notorious era for the construction of uneconomical and uncomfortable buildings which, as described by the celebrated architect Lewis Mumford, can “only be inhabited with the aid of the most expensive devices of heating and refrigeration.” Admittedly, modern buildings are much more resource- and energy-efficient than those built 30 years ago, but they are still far from sustainable, and continue to be designed with little regard for climate, improved comfort, or reduction of water, energy and waste during construction and occupation.

We all pay the costs of unsustainable buildings. Employees working in badly ventilated and illuminated offices perform poorly and register high levels of occupational illness. Companies and homeowners face rising bills for heating damp, draughty buildings. Multiplier effects go even further – tropical forests are logged to provide timber for buildings in Europe, Japan and North America, and large rivers are being dammed to generate hydro-electricity for energy-intensive homes, business and other sites.

Why is Sustainable Design Important in the Tourism and Hospitality Industry?

The tourism industry, notorious for erecting buildings that ruin the beauty and integrity of their surroundings, ironically spends around US$701 billion a year on capital investments, which include hospitality businesses, airports, visitor centres and offices.

With the expansion of the nature, adventure and rural tourism markets, more and more structures are being built in remote and fragile environments where it is vital that impacts be kept to a minimum. Tourism buildings, due to the intensity of use, need to be regularly repaired and refurbished, which involves further impacts.

Tourists are also responding to good design. According to a 1996 study by the Travel Industry Association of America, some 43 million Americans are willing to pay an 8.5% premium to stay in what they perceive to be an environmentally sensitive property.
The Benefits of Sustainable Design

- **FACILITATES ENVIRONMENT MANAGEMENT**
  Sustainable design greatly facilitates the implementation of EMS. Some of the greatest challenges for EMS are finding ways to reduce resource use and waste output in buildings that offer very little scope for low and medium cost improvements. But a building constructed to maximise day lighting, lower heat loss or gain, use renewable energy, provide plumbing for the reuse of grey water, and lower watering needs through thoughtful landscaping, makes the implementation of EMS much easier.

- **LOWER ENERGY USE**
  As discussed in Unit 4, repair and retrofit options can reduce energy consumption by 30-50% in most buildings. This can be increased to 80% if coupled with sustainable design features.

- **PEOPLE PREFER ‘GREEN’**
  There is an increasing demand for airy, comfortable homes and offices in neighbourhoods with open spaces, parks, trees and greenery. Sustainable design demonstration projects show that people are willing to pay a premium for ‘green’ homes and buildings.

- **IMPROVES PRODUCTIVITY AND ENHANCES CORPORATE IMAGE**
  Improving employee productivity is a strong incentive for ‘green’ offices. As salaries account for the highest proportion of operating costs, the business benefits of increased productivity can make a substantial contribution towards offsetting payback periods for building improvements. ‘Green’ buildings can also improve corporate image.

Sustainable design results in durable, attractive buildings, reduced operating and maintenance costs, improved comfort and convenience and low environment impact.
2.1 Site Selection

Site selection is the first step in the sustainable design process. The site must be compatible with the purpose of the proposed development and be suitable for building.

A site selection checklist for hospitality and tourism businesses is given below. The developer alone will not be able to provide all the answers. A pluri-disciplinary approach with input from ecologists, architects, construction engineers and environment specialists will be needed to determine the appropriateness of the site.

Site Selection Checklist

1. WHAT ARE THE ECOLOGICAL CHARACTERISTICS OF THE SITE?
   - An overview of the hydrology and geology of the site is needed to determine the rate of erosion and if soils are stable enough for building;
   - How fragile and valuable is the topography? To what extent will it be disturbed or destroyed by the proposed development?
   - Has the site been degraded by previous building, industrial or agricultural uses? To what extent can the proposed development restore the productivity and biodiversity of the site?

2. DOES THE SITE HAVE SPECIAL CULTURAL SIGNIFICANCE?
   - Is the site of cultural, religious or archaeological significance?
   - Are there structures on the site that are of cultural, religious or historical importance?
   - Will there be social conflicts if the land is used for the proposed development?
   - To what extent can existing structures be preserved and enhanced by the proposed development?

3. ARE THERE BETTER USES FOR THE SITE?
   - Given the ecological and cultural significance of the site, should it be used for the proposed development?

4. IS THE SITE NEAR EXISTING INFRASTRUCTURE SUCH AS ROADS, POWER LINES, WATER SUPPLY AND WASTE DISPOSAL SITES?
   - This question is crucial to determine the multiplier impacts. If the site is remote from existing infrastructure, what will be the impacts of extending essential infrastructure to it?
   - Will the proposed development contribute to the expansion of urban sprawl?
   - Can the proposed development be built as a self-contained unit in terms of water, energy and waste disposal?
5. WHAT IS THE STATE OF THE ENVIRONMENT OF THE SITE?
• Has it been used for industrial purposes?
• Have water and soil contamination tests been carried out?
• Are strong electromagnetic fields present?
• Is the site clear of deposition from surrounding industrial sites?
• Does the vegetation on the site show any signs of stress?
• What is the potential for passive solar design and renewable energy?
  This is especially important if the site is far from the grid.

6. REUSE OF EXISTING STRUCTURES:
• Can existing structures be reused or upgraded as part of the development?
• If the structures are beyond repair, can some building materials be recovered and reused for the new development?

7. HOW WILL FUTURE LAND-USE PLANS FOR THE AREAS SURROUNDING THE SITE INFLUENCE THE PROPOSED DEVELOPMENT?
• Are industrial and commercial developments planned for surrounding areas? Will this increase or decrease the value and aesthetics of the site?
• Will these developments affect the site’s access to sunlight, water or power?
• Might these developments cause air and water pollution, or increase noise levels or congestion?

2.2 Carrying Capacity Considerations

In tourism, carrying capacity is the maximum number of visitors and supporting infrastructure, that can be maintained in a given site or destination before environment damage occurs. When the threshold is exceeded, the resources required and pollution generated by tourism begins to degrade the natural environment.

Carrying capacity is important in site selection, because it encourages developers to consider

• Capacity thresholds for buildings and visitor numbers right from the start;
• A range of alternative sites;
• The human and financial resources needed for environment impact mitigation before the final choice of site is made.

Calculating Tourism Carrying Capacity

Ecological sensitivity differs from ecosystem to ecosystem. Coastal areas and wetlands are, for example, more dynamic and fragile than prairies. Likewise, rocky cliffs are more resistant and less dynamic than mountain forests. Furthermore, tourism is a dynamic business and visitor numbers fluctuate greatly from season to season. Given these factors, the carrying capacity of a site will depend on:
• Number of tourist arrivals;
• Patterns of visitor arrivals and length of stay;
• Tourist activities;
• Number of local people living in the area;
• Facility design;
• Destination management strategies;
• Characteristics and quality of the surrounding environment.

While the concept of carrying capacity works well in theory, its practical application can be challenging. When determining the levels at which the threshold should be set, it is necessary to consider what level of activity can be considered too much, and what level of environment modification can be regarded as acceptable. Natural resource management researchers often use the ‘Limits of Acceptable Change’ principle, which attempts to set measurable limits to human-activity-induced changes in natural areas. This principle is widely used in the management of natural parks and protected areas.

### 2.3 Environment Impact Assessment (EIA)

The next step is to study the potential impacts on the environment of the proposed development, and how they could be avoided or reduced. The method used for this is known as the Environment Impact Assessment (EIA).

EIA is a procedure to forecast and assess the environment implications of proposed developments. It provides the opportunity for:

- Identification and accounting for direct and indirect environment impacts before a decision is made as to whether the proposed development is to proceed as planned;
- Modification of development proposals in order to avoid and reduce the potential environment impacts.

EIA is about identifying environment impact, that is the change in environment conditions that will be induced by the proposed development. This change is compared with the environment situation as it would be if the development did not occur. The natural environment is not static: there are different processes and rates of change in all ecosystems, and assumptions must be made as to the natural changes of the site. For example, in an EIA of a beach resort, the clearing of coastal vegetation on the immediate hinterland can have direct impacts on the beach ecosystems. It can change the natural patterns of deposit and erosion, and increase the silting of shallow waters. This may in turn increase silting in nearby lagoons and estuaries that will reduce the growth of fish and shellfish. An indirect impact of the proposed development could therefore be the losses encountered by the local coastal fisheries industry.

#### The EIA Process

The main stages of the fully-fledged EIA process are:

1. **Screening**: Establishing the need for an EIA.
2. **Scoping**: Determining the scope of the EIA.
3. Conducting the EIA, which includes:
   - Identifying direct impacts;
   - Forecasting indirect impacts;
   - Assessing the significance of direct and indirect impacts;
   - Identifying measures to avoid and reduce impacts;
   - Outlining strategies to monitor the success of impact avoidance and reduction measures.

4. Preparing the environment impact statement, which reports on the findings and recommendations of the EIA.

5. The environment impact statement is submitted together with the overall building application to the building authorising agency for review and approval. Simultaneously, the environment impact statement is also:
   - Subject to external checks by experts commissioned by the authorising agency;
   - Made available for public consultation.

6. The environment impact statement is finalised on the basis of the outcome of point 5.

7. The final version of the environment impact statement is then re-reviewed by the authorising agency.

8. The development application is approved or rejected.

9. If the application is approved, environment impact avoidance and reduction measures are implemented and monitored during specification and construction.

10. Periodic environment impact audits are conducted to verify that impacts are being minimised as planned.

Most countries require the developer to conduct the EIA and submit the environment impact statement as part of the overall application for building authorisation. Questions arise as to how objective the EIA will be if it is conducted by the developer, who will have every interest in ensuring that the proposal is authorised. The issue is that if external experts or the authorising agency conducted the EIA, it would remove the EIA process from the conception and formulation of the project. But since it is unrealistic to expect the developer to be completely objective, an external review is required to ensure that the environment impact statement does not become a means to obtain authorisation by presenting only the positive findings.
**Common Question** What is public consultation?

Development proposals cannot fully succeed if those who are most likely to be affected by them do not support them. Following the principle of public participation, discussed in Unit 3, public consultation means that all interest groups, local communities, environment groups, non-government organisations, etc can review the environment impact statement and officially record their comments.

For tourism, public consultation is perhaps the most critical component of the EIA process. Local communities and businesses are an integral part of the tourism experience. They are also likely to know the local environment better than the developer or the authorising agency. Co-operating with them may greatly facilitate forecasting impacts and selecting measures to mitigate them. It is therefore useful to involve the local public and learn about their concerns as early as possible. Some concerns may well be ill-founded but, if not identified at the start, they could present serious and expensive difficulties later on.

The procedures for public consultation (sometimes called public participation) differ from country to country. National legislation on EIA should be consulted for further information.

### Conducting an EIA

An EIA can be conducted through a range of methods, including:

- **IMPACT CHECKLISTS:**
  The simplest approach. The disadvantage is that checklists must be exhaustive to ensure that no impact is overlooked, and an exhaustive checklist with 45-50 sub-categories can be cumbersome to work with.

- **NETWORK AND SYSTEM FLOW DIAGRAMS:**
  Useful for revealing indirect impacts, and those that can occur through more than one pathway.

- **IMPACT MATRIXES:**
  One is the commonly used ‘Leopold Matrix’, designed to identify around 8,800 impacts, although only 25-30 would apply to any one project.

- **THE ‘QUANTITATIVE INDEX METHOD’**:
  Involves the weighting, standardising and aggregating of impacts to obtain a composite score index of positive and negative impacts. Long-term irreversible impacts are given a greater weighting coefficient than short-term reversible ones.

- **Other pluri-disciplinary approaches involving geographical information systems, mathematical and computer models, pollution studies and land suitability analysis.**

### Quick-Track EIA

For smaller-scale projects the ‘conventional’ EIA process is often condensed. This so-called ‘Quick-Track’ EIA is conducted using currently available information and uses checklist methodologies with some input from impact matrixes and simple network flow diagrams. Quick-Track EIA also makes substantial reference to carrying capacity studies. In the case of tourism, carrying capacity studies are a prerequisite for Quick-Track EIA.
**Good Practice Tips**

- EIA is a combination of science and judgement: it is all about asking the ‘right’ questions;
- Asking the right questions requires a good understanding of the natural environment;
- Public consultation can be invaluable to bridge the gap between science and judgement.

### 2.4 Building Placement

Once the site has been selected and ways to minimise environment impacts have been identified, the developer needs to determine where on the site the buildings should be placed:

- They should be placed on the ecologically and culturally least interesting part of the site;
- They can be placed and oriented according to annual sun cycles and shadow patterns from surrounding buildings, to optimise passive solar design potential;
- They can be placed to maximise aesthetic views, but still provide privacy and security;
- Placing should take advantage of natural land formations. For example:
  - Existing trees might be used to provide cooling and reduce solar gain in summer and increase it in winter;
  - The building might be terraced to suit natural grading patterns, rather than having the site flattened and levelled; an earth berm can be a valuable buffer against winds and facilitate passive solar design.
The sustainable design of buildings will be discussed under three broad, interdependent areas:

3.1 Architectural features
3.2 The ‘building shell’
3.3 Providing for the use of resource-efficient technology, fittings and appliances during occupation

### 3.1 Architectural Features of Buildings

#### 3.1.1 Passive Solar Design

Passive solar design means designing a building to take the best advantage of natural sunlight and air flow in order to create a comfortable, energy-efficient indoor environment. The idea is to plan the shape, interior, and layout of the building around the sun’s daily and seasonal cycles. Passive solar techniques that collect, move, and store or reduce light and heat through natural heat-transfer mechanisms like conduction and convection are not new, and have been used in vernacular architectural techniques all over the world.

**Building Orientation**

In cold climates, it is important to maximise heat gain. A building should be elongated on its east-west axis, with glazing and the areas needing the most heating facing south when in the Northern hemisphere, and facing north when in the Southern hemisphere. Areas that need less heating can be located on the other side. Overshadowing from surrounding buildings should be avoided to benefit from mid-winter sunshine.

In hot climates, the goal is to reduce heat gain and increase airflow and cooling. The building should be elongated on an axis perpendicular to prevailing wind. Cross-ventilation can be maximised through the alignment of doors and windows. U-shaped buildings and interior courtyards greatly facilitate air movement. Broad-leaf trees provide shading and reduce solar gain, as well as improving air quality and aesthetics.

In temperate climes, solar gain needs be reduced in summer and increased in winter. An east-west elongated, rectangular building, with well-calculated roof overhangings (based on latitude, sun patterns, and climate) is the most suitable.

Note: Inexpert passive solar design can make a building too hot or too cold, which can result in significant energy waste.

**Direct Gain**

Direct gain means allowing sunlight to penetrate a building to provide light and heat. The most essential requirement for direct gain is that the building be sufficiently ‘thermally massive’ to provide storage and to avoid overheating in the summer. If the building is thermally lightweight, the internal temperature will rise too high and the sunlight will be more of a nuisance than a gain.
For example, it takes more time for heat to move through brick than fibreboard. So a brick house with more thermal mass will yield more moderate changes in indoor temperature compared to the outside air, thus remaining cooler during the daytime and warmer at night, than a lightweight structure of fibreboard, which heats up and cools down more quickly.

Thermal mass materials have the ability to conduct, store and release energy back into the living space when it is needed. Ideal mass materials for floors and walls include clay, adobe, concrete, brick, and rock. The ideal thickness for mass materials is 10-12cm.

Heat always moves from a point of high temperature to a point of low temperature. During winter, sunlight first heats up the air. Since the mass floors and walls are cooler, the heat is absorbed and conducted into these materials. Later, when the sun has set and the room air temperature falls, the mass materials will be warmer than the room air temperature and stored heat will return to the room.

During warmer periods it is important to reduce heat gain and increase ventilation. This can be done by employing various techniques such as:

- Installing insulating curtains, moveable insulation, shutters and curtains in glass areas;
- Landscaping with deciduous trees and vegetation to provide shading;
- Using light coloured low mass constructions such as ceilings and partition walls;
- Installing overhangings on the south or north side (according to latitudes).

### 3.1.2 Daylighting

Daylighting is a combination of energy conservation and passive solar design. It means making the best use of natural daylight to illuminate interiors. While all forms of vernacular architecture incorporate daylighting, most modern office buildings are deep-planned and rely heavily on electricity which can account for 30-40% of total delivered energy used. Although in winter heat from artificial lighting can contribute towards space heating, in summer it can cause overheating and increase the demand for air conditioning.

Traditional daylighting techniques include:

- Shallow plan design which allows light to penetrate all rooms and corridors;
- Light wells in the centre of the building;
- Roof lights;
- Courtyards;
- Tall windows which allow light to penetrate deep inside rooms;
- The use of task lighting directly over the workplace instead of lighting the entire interior;
- Deep window reveals and light room surfaces to decrease glare.
Modern variants on these include:

- Glass panels;
- Steerable mirrors and light shelves, which are reflective, horizontal shelves fixed along the inside or outside of windows, either along the windowsill or at the top. They reflect light inwards and upwards, enabling it to reach further inside the building;
- Optical fibres;
- Light monitors and light reflectors which can be used to operate skylights and window shades to increase or decrease the quantity of daylight entering the building.

Admittedly, deep plan office buildings are advantageous in that they have a smaller surface area per unit volume than shallow-planed buildings and therefore require less energy to heat. Is this worth the sacrifice for the absence of daylight? There is no correct answer - compromises based on location specific conditions will have to be made.

It should also be noted that inexpert day lighting will increase glare or gloom. When artificial lighting is needed, however, it should be turned off when adequate natural light is available. Automatic lighting control systems can be extremely cost-effective and reduce lighting-related energy costs by over 50%.

**Greenhouses, Conservatories and Atria**

Incorporating greenhouses, conservatories and atria on the south side of buildings when in the Northern hemisphere, and on the north side of buildings when in the Southern hemisphere can provide a habitable solar collector space, as the heated air will be carried over to the building. The building itself acts as an energy store.

Adding such features to existing buildings can be expensive and difficult to justify in terms of energy savings alone. Rather, they should be incorporated as additional areas of unheated habitable space as these they only bring energy savings if they are unheated. In new buildings, however, they can be incorporated into the initial design at a significantly lower cost.

**Trombe Walls**

Named after their inventor Felix Trombe, Trombe walls consist of a glazing-encased thin airspace in front of a thermally massive wall. Sunlight first warms the air space and this heat is absorbed and conducted into the thermally massive wall. The heat in the wall is then radiated into the cooler building behind. Trombe wall are sometimes called ‘storage walls’, as they work as solar collectors with thermal storage areas immediately behind.

Trombe Walls should be built on the angle of maximum solar exposure. They work best in sunnier climates. Since a larger part of the building needs to be hidden from the sun behind the thermally massive wall, careful design is needed to make sure that direct heat and daylight gains are not blocked out.
Windows and Vents

Windows and vents can be used in combination with insulation and direct gain to direct natural ventilation, heating and cooling as required.

Examples of Good Practice

An example of the use of passive solar in a large commercial building is the 250,000 square foot Codex World Headquarters building in Canton, Massachusetts, USA:

- The building is lit by natural daylight year round, through a range of passive daylighting devices including the extensive use of windows and skylights, as well as a high central garden with a large glass roof supported by slender white columns.
- The garden is landscaped with date palms and fig creepers, all drought-resistant plant varieties.
- The garden provides natural light to the office floors that are served by windows opening to the garden on three sides.

In Santa Fe, New Mexico, a series of ‘solar clay’ homes demonstrate passive solar design principles for the region’s mix of hot summer days, cool nights and cold winters.

- All public rooms, including the dining/kitchen area, have at least one window and sometimes a door leading to a greenhouse. In winter, the windows are opened to allow the heated greenhouse air to circulate through the house.
- The concrete-block and clay walls between the greenhouse and the house can prolong the sun’s radiated heat for up to five overcast winter days (a rare occurrence). Since by natural convection hot air rises and cool air sinks, the greenhouse is placed lower. The heated greenhouse air circulates through the house, falling as it cools. Solar engineers refer to this natural movement as a ‘thermosiphon’. No fan or other mechanical device is needed.
- In summer, the greenhouse is isolated from the house, and is shaded and vented to keep it cool. On summer nights, windows to the house are opened.
- A solar water-heater on the south face of the greenhouse provides hot water.
- The house requires no back-up heating.

3.1.3 Renewable Energy Use

Renewable energy is energy that can be produced at the same rate as or faster than it is consumed. It therefore does not contribute towards the depletion of natural resources. It also avoids carbon dioxide and other greenhouse-gas emissions. Renewable energy sources include solar, hydro, wind, bio-fuels and geothermal energy.

‘Renewables technology’ has gained much ground in the last ten years:

- There have been significant improvements in the efficiency of renewable-energy technology;
- Related capital costs have dropped;
The deregulation of energy markets gives renewables open access to national electricity grids. Power companies are offering businesses and homes the choice of using ‘green’ electricity generated from renewables;

- Equipment and appliances are becoming ever more energy-efficient. This makes the use of renewable energy increasingly feasible;
- Concerns about air quality, global warming and climate change provide added impetus to reducing both our dependence on fossil fuels and greenhouse-gas emissions. This is increasing the focus on renewable energy sources.

Many governments and power companies provide loans, grants and subsidies to promote the use of renewable energy. For tourism and hospitality businesses in rural areas, including those more than a kilometre away from the national grid, renewable energy is usually a good cost-efficient alternative, especially in view of the financial and environment costs of extending the grid.

**Solar Water-Heating**

Solar water-heating is well established as a cost-effective and sustainable energy source for hot water supply. The technology consists of:

- A collector surface heated by the sun, over which the water to be heated passes;
- A heat-transfer medium;
- A storage tankback-up water heaters to meet peak demand periods, to heat water to higher temperatures, or to provide hot water when there is no sun.

To optimise exposure to sunlight, collector panels are usually put on the roof, either flush on the surface or up on brackets. If roof space is not available, the panels can also be installed at ground level, with the disadvantage that if the building is more than one storey high, the hot water will have to be pumped to higher levels, using additional energy (e.g. an electric pump).

For best performance, collector plates should face north when in the southern hemisphere and south when in the northern hemisphere. They should be inclined at an angle from the horizontal equal to the latitude, although this may vary with latitude. The most efficient systems include collector panels with special coatings which absorb direct solar radiation (visible light) and radiate little direct heat (infrared radiation) back into the surrounding air. This enables the collector to reach much higher temperatures, meaning smaller collectors to heat larger amounts of water, which in turn can greatly reduce the space required.

In colder climates, it is necessary to have a freeze protection on the panels to prevent damage from the expansion of water in the collector pipes. Anti-freeze solar technology includes cells with anti-freeze liquid, panels fitted with small electric heaters, or anti-freeze valves.
Experience in Australia, the Mediterranean and the Caribbean show that the payback period for solar water heaters is usually 2-5 years. An important consideration is the price of the fuel-powered backup water heaters. Solar water heating systems are generally guaranteed for 10 years.

**Examples of Good Practice**

A solar thermal water-heating system provides St. Rose Hospital in San Antonio, Texas with up to 90% of its hot water needs, by using 5,000 square feet of flat-plate solar collectors. The system can hold 9,000 gallons of heated water at once. It is estimated to save the hospital close to $17,000 a year compared to the alternative of using a steam boiler fired by fuel oil.

The residents of a 20-storey condominium in Honolulu, Hawaii opted in 1984 to use solar energy to provide hot water because of the high price of oil. The system uses some fifty 48-square-inch flat-plate collectors to meet 70% of the hot water needs of the building.

At the Youth Club in Hilo, Hawaii, 54 flat-plate 4-by-10-inch collectors covering the south roof of the building maintain the water in the swimming pool at 80°F. This is the largest system of its kind on the island. The system also supplies hot water to the locker-room showers.

**Photovoltaics (PV)**

As the name suggests, photovoltaic cells convert light into electricity. They are made of a semi-conductor material, typically crystalline silicon, formed into thin wafers or ribbons. One side of the cell has a positive charge, the other side a negative. When sunlight hits the cell, the electrons on the positive side activate those on the negative side to produce an electric current.

PV cells are electrically connected to each other, packaged in a transparent cover (usually glass or plastic), and encased in a watertight seal to form a panel or module. The panels are wired together to form a larger array, the size of which will depend on the power requirements of the user.

PV can be used as a stand-alone system or a grid interface system. A stand-alone system consists of:

- PV array;
- Structure to mount the array;
- Batteries to store power;
- Converter to turn the stored direct current (DC) into alternating current (AC) - most household appliances work on AC;
- Electric cables that enable electricity to move between cells, batteries and usage points;
- Backup diesel generators to ensure a reliable supply of energy when there is no sunlight.

Grid interface systems do not store energy. Instead they supply PV-generated power to the grid when excess power is being produced (i.e. when the sun is shining), and use power from the grid when no energy is being produced. The interface between the PV system and the grid can be metered in such a way that when power is being supplied to the grid the meter will run backwards. When power is drawn from the grid, the meter will move forward in the usual manner.
Mounting PV Cells

PV only works when the sun is shining, so optimal exposure is crucial. The panels should face north when in the southern hemisphere and south when in the northern hemisphere, at about the angle of the latitude. The minimum angle is 20° from the north horizon (this will also enable the panels to be cleaned when it rains). For large installations it may be wise to invest in a tracker, which will move the panels according to sun patterns throughout the day.

Example of Good Practice

On Coconut Island, near Australia, the only electricity available to the 135 inhabitants came from diesel generators scattered throughout the community. But since 1987 a hybrid PV-diesel generating system has provided power at a level of quality and availability that rivals or exceeds that on the mainland.

Geothermal Heat Pumps

The Earth absorbs almost 50% of all solar energy, and maintains relatively constant temperatures of 50°F to 70°F depending on geographic location. GHP work by using the earth’s interior as a heat resource in the winter and a heat sink in the summer. The pumps are located inside the building, with its essential components - sealed plastic pipes - installed vertically in boreholes (30-100m deep) or horizontally in trenches, in which water or a refrigerant solution circulates. In winter, the heat pump extracts heat from the hot water or steam in the interior of the earth, brings it up through the water or antifreeze liquid that circulates inside the plastic pipes sunk in the ground, and transfers it inside the building. In summer, the pumps move heat from the building into the earth. The same plastic loop is used as in...
winter, but the direction of flow is reversed. This technology takes advantage of the fact that the temperature in the ground varies less with the seasons than does the temperature of the atmosphere.

As geothermal heat pumps use electricity to move heat and not generate it, they are extremely efficient and generate three to four times the amount of energy they consume. Buildings using this technology have lowered heating/cooling-related electricity consumption by 50-80%.

Geothermal resources with temperatures as high as 648°F can be used to heat water as well as produce electricity. Large resources can be used to produce district heating. In Iceland for example, the entire city of Reykjavik is heated by geothermal energy. The USA, Switzerland, Austria, Germany, Sweden and Canada are pioneers in geothermal technology. Many hotels in these countries operate individual geothermal wells, and even use them to melt ice on driveways. In Sweden, the construction of two nuclear power plants has been abandoned in favour of geothermal technology.

![Diagram of geothermal heat pump](image)

The geothermal heat pump (GHP) concept used to extract heat from the ground to supply a building. In the winter heat is removed from the earth and delivered in a concentrated form via the heat pump. Because electricity is used, in effect, to increase the temperature of the heat, not to produce it, the GHP can deliver three to four times more energy than it consumes.

Source: Renewable Energy

**Small Hydro Power Systems**

![Diagram of small hydro power system](image)

The Ecowatt micro hydro-electric system

Source: Working Group on Technology
Water flows from high to low points by the force of gravity. There is energy embodied in this flow of water, which hydroelectric power systems capture to produce electricity. Small hydropower systems produce less than 20 megawatts of electricity, while micro-hydro systems typically generate less than one megawatt of electricity. This technology is best used in tourism facilities in mountainous regions where gradient rivers and streams provide a continuous source of flowing water.

The components of small hydro systems are the:

- Dam or weir to block the flow of water in a stream and create a reservoir;
- Feeder canal to allow water to flow from the source stream into the reservoir;
- Reservoir, which holds the water between the feeder canal and the intake pipe;
- Intake pipe connecting the reservoir and the powerhouse;
- Powerhouse, which houses the turbine and other power producing and controlling equipment;
- Outflow canal, which allows water to flow from the powerhouse and back into the source stream.

Hydro-electricity is generated by water entering the intake at a higher level, and falling through a pipeline onto blades/buckets of a turbine located lower. The water (with most of its energy removed) then flows away from the turbine and is returned to the source stream.
The power available from flowing water depends on the:
- Vertical distance over which the water ‘falls’;
- Volumes of water flow;
- Pressure of the water entering the power plant via the inset pipe;
- Efficiency of the turbine and generator equipment.

The basic small hydropower equation therefore is:

\[ \text{Power (kilowatts)} = 10 \times \text{flow (m}^3\text{)} \times \text{fall (m)} \times \text{turbine efficiency} \]

Friction losses can be accounted for by decreasing the fall variable by an appropriate amount.

In terms of design, small-scale hydro systems can be run-of-the-river or water storage developments. As the name implies, run-of-the-river developments use water that is available in the natural flow of the waterway, and does not involve water storage lakes or flooding. The power output, therefore, fluctuates with the availability of water, and during dry seasons power production may have to cease altogether. A dam or weir may, however, still be required if the waterway needs to be diverted, especially if the diversion is to take advantage of existing downward gradients in the waterway.

Water storage developments involve the construction of dams or weirs to divert water, as well as the construction of new reservoirs or ponds to store water. The benefit of such systems is that they can generate electricity on demand.

**Good Practice Tip**

Except in very remote areas where the price of energy is high, creating lakes and reservoirs will be too costly (both in economic and environmental terms) for most small-scale hydro developments.

The drawbacks are significant environment impacts. The construction of dams, weirs and canals alters the nature of streams and causes erosion, while the diversion of water into the turbine affects volume and flow of water downstream.

Run-of-the-river-system plants offer some possibilities of minimising impacts. As the system uses the embodied power in the river water as it flows through the plant without causing appreciable changes in the river flow.

**Example of Good Practice**

A micro-hydropower system provides reliable electricity supply while being economically compatible with the location of the Lemonthyme Lodge, between the Lemonthyme Valley and Cradle Mountain in the forest above Lake Cethana, in Northwest Tasmania.

The complex has an open living area, a restaurant, conference facilities, 18 self-contained cabins, a craft shop, guest and staff laundries, and staff accommodation.

Water from a stream which passes close to the Lodge enters an intake pipe and flows down a steel pipeline, falling over 200m to attain the water pressure necessary to run the 52-kilowatt turbine. The turbine, located near the Lodge, provides electricity 24 hours a day for lighting, refrigeration and some heating.
The total power requirement of all lighting is approximately 6 kilowatts with an average of 70 lights on during the evening. The system also supplies the Lodge with drinking water and serves as a fire-fighting facility.

The micro-hydro system was selected because the closest power lines were about 2km away through forest and the connection costs would have been over A$40,000. In addition, the two options for grid connection would have caused major impacts on the landscape. The shortest and cheapest option, from the grid through the forest to the Lodge, would have had the greatest environment and aesthetic impact, as it required repeated clearing under the power lines. Following the road would have had the least impact, but increased connection costs due to the greater distance. A diesel generator was considered but was rejected as the potential noise and emissions from its operation were incompatible with the wilderness experience.

The ‘essential ingredients’ for the successful installation and operation of the system include:

- The possibility of collecting water in the intake pipe;
- Suitable fall: the water effectively falls the net equivalent of 142m with a flow rate of 46 litres per second;
- Turbine location at the Lodge, where it provides a rated maximum of 52 kw of power and operates at around 48 kw capacity. The noise level immediately outside the turbine is low, and is inaudible at short distances.

The cost of the micro-hydro system was A$130,000.

Wind

Wind is air in motion, caused by the uneven heating of the earth’s surface. Wind turbines capture the solar energy stored in the wind and convert it into electricity. They can be used as remote power systems or as grid-connected applications.
The basic components of a wind system are:

- **THE BLADES OR ROTORS**
  Blades are required to ‘catch’ the wind. When the wind blows against the blades, they change the horizontal movement of the air into a rotational force which turns a shaft. The generator then turns this movement into electricity. There are many blade designs and sizes; the largest blades used today are over 50m long.

- **THE GENERATOR**
  The generator turns the mechanical energy into electrical energy. In some countries, the generator and the gearbox are referred to as ‘drive train equipment’.

- **THE TOWER**
  The tower is needed to lift the turbine so that it can take advantage of the stronger and more consistent winds which blow higher up. The optimum height is 60m where ‘free-standing’ winds blow at maximum speed. Height consideration however will differ according to the power rating of the turbine and the surrounding topography.

- **BATTERIES AND BACKUP POWER SYSTEMS:**
  These are critical for remote systems to ensure a continued power supply whatever the variations in wind speed. Backup systems can be either diesel generators or PV arrays.

**Wind Power Evaluation**

Evaluating the feasibility of wind applications is not simple. A few initial considerations are given below:

- **WIND FLOW**
  For maximum efficiency, the wind flow should be reasonably constant and smooth. Turbines are best sited in windy locations with level ground, away from obstructions such as buildings, trees and mountains. Ideal sites for wind turbines are flat open plains, mountain passes and coastlines. Steep slopes and urban areas are not suitable, as obstructions such as mountains and buildings may cause winds that are too strong or turbulent for energy generation.

- **WIND SPEED**
  The energy available in the wind is proportionate to the cube of its speed, which means that the doubling of the wind speed will increase the availability of energy by a factor of eight.

  Wind turbines have a minimum speed at which they begin to rotate and generate electricity, called the ‘cut-in’ speed. The power production increases as the wind gets stronger and the blades rotate faster, and levels off when the system reaches maximum efficiency. Some of the increasing power will not be captured owing to design constraints.

  Grid connection applications require a minimum cut-in wind speed of 5 metres a second (18kph), while remote systems require a minimum speed of 3-4 metres a second (11-15kph).

  The cut-out wind speed is the speed at which the turbine will shut down to prevent self-destruction of the blades, gearbox and generator.

- **CAPACITY FACTOR**
  This refers to the expected energy output of a wind turbine per year.
Capacity Factor = \[
\frac{\text{Actual energy produced}}{\text{Energy produced if the turbine operates at ‘rated power output’}}
\]

The ‘rated power output’ is the maximum amount of power that can be produced from a turbine. A reasonable capacity factor would be 0.25 to 0.3. A very good capacity factor would be 0.4. It is important to note that the capacity factor depends entirely on wind speed.

• **BLADE AIRFOIL SHAPE AND DIAMETER**
  The best rough estimate of a wind turbine's energy production capability is the diameter of the blade, which determines the area ‘swept’ or ‘captured’. The turbine may have a good rated power, but if its blade diameter is too small, it will not be able to capture that power until wind speed increases, and little or no power will be produced during moderate winds. Blade foil shapes are primary factors in determining power production at moderate wind speeds.

• **BATTERY BANKS**
  Battery banks must be housed in a dry, warm and well-ventilated area and be well maintained to allow maximum efficiency. Anti-freeze and anti-boiling liquids may be required for batteries in extreme temperatures.

### Examples of Good Practice

**At the New Haven Residential Village, 20 km north west of Adelaide, Australia,** wind turbines were installed to reduce the diesel fuel consumed by the power station by 10% or 360,000 litres a year. This represented a reduction of greenhouse-gas emissions of 1,000 tonnes a year.

The wind turbines performed better than expected. After ten months of operation they produced 1.276 gigawatt-hours, which was the figure expected for twelve months. The system consists of two 225-kilowatt turbines, and monitoring devices. The turbines start to generate power at a wind speed of 3 metres a second (11kph). Optimum performance is 22 metres a second (80kph), and if wind speed exceeds 45 metres a second (160kph), the turbines automatically shut down.

**The Yumi-Ha Village Resort, South of Cancun, Mexico,** operates on wind and PV-generated power and treats its sewage at an on-site treatment plant. The cabana cabins and bar-restaurant palagas are designed using traditional Mayan village building techniques – open plans, stone walls, and wood framing.

**The Cousteau’s Fiji Island Resort,** a 20-room hotel on Vanua Levu, the second largest island of Fiji, operates at night on PV and wind-generated power with battery storage.

### Bio-fuels

Bio-fuels include a wide range of energy resources derived from biomass – all the earth’s living matter and the many products and by-products that are derived from it. The main sources of bio-fuels are:

- Energy crops such as a coping plantations and rapeseed for the extraction of rape seed oil;
- Crop residues such as rice husks and straw;
Crop wastes such as potato and beetroot tops;
Animal agricultural waste, such as slurry and dung;
Household waste;
Industrial waste.

The most widely used bio-fuels are discussed below:

• **STRAW AND CORN WASTE**
  Straw and corn waste burning systems can be used for cooking and space and water heating. The only processing required is drying and shredding the waste. It is critical that the waste is dried, as burning wet plant residues releases nitrous oxide - a major contributor to acid rain.
  In some countries these wastes are available as dried, shredded and compressed briquettes, which offer the added advantages of being easier to package, transport, and use, especially in smaller domestic heating systems.
  As wet waste, straw and corn residues can also be digested to produce biogas.

• **NURSERY, GARDEN AND KITCHEN WASTE, DAMAGED AND SURPLUS FOOD**
  These wet wastes are good fuels for digestion and biogas production. They are an interesting fuel option for tourism, as kitchen and garden wastes can make up almost half the volume of a business’ waste output. Note: Many hospitality businesses compost kitchen and garden waste and use the resulting residue as fertiliser.

• **RICE HUSKS**
  Rice is the staple diet of vast number of countries and rice husks account for over 1/5 of the dry weight of un-milled rice. Husks can be dried and burnt in stoves for cooking or space and water heating.
  Rice husk stoves are widely used in small and medium-sized tourism business in Mali, China, Indonesia and India.

• **SLURRY**
  Slurry (a mixture of animal bedding, urine, faeces and water) is an excellent fuel for anaerobic digestion as it is wet and rich in nutrients. However, as slurry is wet, contains a lot of liquid, and carries a strong and unpleasant odour, it is difficult to collect, transport and handle.
  If not managed carefully, slurry can run into surface water bodies and percolate into aquifers where the groundwater table is high.

• **POULTRY LITTER**
  Poultry litter, unlike slurry, is a relatively dry waste and can therefore be burnt directly. The disadvantages with this fuel are, again, its unpleasant smell and the fact that it is usually available only in small quantities. Collection and direct burning systems can only be successful in large poultry farming areas.

• **FOREST RESIDUES**
  The large volumes of waste created when plantations are thinned and when the felled trees are trimmed can be dried and chipped for direct burning or be turned into charcoal. Wood chips can be directly burnt for cooking and space and water heating.
• TIMBER PROCESSING WASTE

  Sawdust and off-cuts can be burnt for space and water heating and cooking.

• INCINERATION WITH ENERGY RECOVERY

  Large-scale municipal waste incineration with heat recovery is becoming a valuable ‘waste to energy’ option for many countries. The heat generated by the incineration process is used for district heating to generate electricity. The residue ash is used in road building.

  The advantage of incineration is that it reduces the demand for landfill sites and landfill related environment issues. The disadvantages of incineration is that modern state-of-the-art incinerators are very expensive, and their operation needs to be very carefully managed to avoid harmful emissions of acids, metals, organic compounds and particles. Environment experts also oppose incineration as a sustainable waste and energy option, as it drives down the impetus and viability of recycling.

• LANDFILL GAS

  The anaerobic digestion of wastes in landfill sites generates landfill gas, which contains around 50% methane. This gas can be captured and used for heating and cooking.

• REFUSE DRIVEN FUELS

  Municipal waste such as paper and cardboard can be sorted, shredded, dried and formed into briquettes and pellets to be used for direct burning in stoves and boilers.

• ENERGY CROPS

  Energy crops are plantations that are grown specifically to be used as fuels. In environment terms they are attractive as they bring a net reduction in carbon dioxide emissions, offer an alternative to fossil fuels, and reduce dependence on fossil fuels. In industrialised countries, energy crops are also becoming an attractive alternative crop for surplus agricultural land.

  - Wood is certainly the most widely used energy crop. Alternative methods of forestry are now used to provide wood as a fuel source and combat deforestation in a singular effort.

  - Ethanol is produced through the fermentation of starch crops such as sugar cane, maize, sorghum, corn, cassava, sweet potatoes and wood. It used blended with gasoline to increase octane and improve the quality of combustion emissions. A few years ago, the most widely used ethanol blend was E10 (10% ethanol and 90% gasoline), though higher concentrations such as E85 (85% ethanol and 15% gasoline), and pure ethanol are now commercially viable.

  Various plant oils, after being esterified - a chemical process through which the oils are combined with ethanol or methanol - result in bio diesel, which is blended with diesel in a similar manner that ethanol is blended with gasoline. Bio diesel is typically used as B20 and B30 (20% or 30% bio diesel and 80% or 70% diesel), although other blends can be used based on the type of combustion engine and the benefits desired. Rapeseed oil is the foremost plant oil grown for energy in Europe; the blend is usually referred to as ‘rape methyl ester’ or ‘RME’. Similarly, soya bean and rapeseed are used in the USA, coconut oil in the Philippines, castor oil in Brazil and sunflower oil in South Africa.
Examples of Good Practice

At the Sänga Säby Hotel, Study and Conference Centre, Svartsjö, Sweden, since early 1996 all vehicles and boilers have been powered with rapeseed oil. In addition, all gardening equipment operates on rapeseed oil, apart from one lawnmower that is solar-powered. The objective is to replace bio-fuels with renewable energy in the long term.

At the Central Romana Sugar Mill in the Dominican Republic, bagasse (the waste by-product left over after processing sugar-cane) is burnt in a large-scale cogeneration operation to produce more than 20 million watts of power for on-site energy needs and for nearby industries, hotels and residences.

3.1.4 Architectural Features to Reduce and Reuse Water

This sub-section will consider:

- Collection and use of rainwater;
- Grey and black water (sewage) treatment and reuse;
- Composting toilets.

Rainwater Collection

Rainwater from roofs, patios, driveways and other paved areas can be collected through a network of gutters and pipes and channelled into a cistern or a catchment basin. In larger buildings and areas where there is much rainfall, downspouts in gutters should be located every 20 feet (instead of the usual 40 feet) to ensure that they do not overflow. Catchment areas can be landscaped to look like ponds or marshes, which will increase the aesthetics of the landscaping effort.

Rainwater can be used for irrigation as well as a number of in-house uses such as washing and flushing, in evaporative cooling equipment and, after purification, in swimming pools.

Good Practice Tip

Rainwater can contain many forms of impurities, especially in areas where rainfall is not frequent. If it is used for purposes other than irrigation, the quality of the water may need to be monitored.

Grey Water Reuse

The first consideration is to distinguish between grey water and black water. In hotels, grey water is wastewater from bathrooms, laundries and kitchens; black water is wastewater from toilets. Black water contains pathogens and almost 10 times more nitrogen than grey water. It therefore needs to go through a two- or three-stage biological treatment process before it can be reused. Grey water treatment is less intensive and can safely be conducted on-site. The treated water can be used for irrigation, toilet flushing and other non-drinking uses.

Over the last 10 years, a number of national water supply and plumbing regulations have been modified to accommodate the reuse of grey water. A suitable system is most easily incorporated into the initial design of properties, as separate drains
and septic tanks have to be built. In the case of existing buildings, the feasibility and costs of retrofitting drainage systems and tanks within the existing structure must be studied closely. Lower water bills and effluent disposal charges will offset investments.

The level to which grey water needs to be treated will depend on the level of biological oxygen demand (BOD) of the wastewater and the purpose for which the water is to be reused. The level of BOD refers to the level of oxygen extracted from the water by bacteria when the pollutants decompose. The more organic materials present in the wastewater, the higher the amount of oxygen needed to support the decomposition of the pollutants.

In most hospitality businesses, grey water is reused for irrigation or flushing toilets. In this case, passing the wastewater through a sand filter may be sufficient. To maximise the efficiency of sand filters, it is important to minimise the suspended solids in the wastewater. Bathroom and laundry outlets should therefore be fitted with filters and grease traps should be added to kitchen outlets. But if the grey water is to be used for drinking purposes, it must go through a complete biological treatment process.

### Black Water or Sewage Treatment

Hospitality businesses, especially in remote areas, coastal regions and on small islands, are sometimes required by law to build sewage-treatment facilities.

Sewage is a mixture of suspended and dissolved organic matter. The strength of sewage effluent is described in terms of suspended solids (SS) and biochemical oxygen demand (BOD). Conventional sewage treatment is a 3-stage process: preliminary treatment, primary sedimentation and secondary (biological) treatment.

- **During preliminary treatment**, the effluent is passed through large screens which filter out the larger floating particles and objects. This does not significantly reduce the pollution load of the effluent, but makes it easier to treat, as the large particles, which can block and damage equipment, have been removed.

- **The next step is primary sedimentation.** The effluent is piped into specially designed sedimentation tanks where the suspended solids are allowed to settle. The floating scum and the settled sludge is then removed. Over 55% of suspended solids are removed during primary sedimentation.

- **The effluent goes through a secondary biological treatment process,** which involves a reactor containing micro-organisms which oxidise the pollutants. The effluent is then pumped into a secondary sedimentation tank in which the micro-organisms are separated from the final effluent. The treated effluent is then discharged into a watercourse.

The treatment of sewage sludge (from the primary sedimentation and secondary biological treatment process) is an integral part of sewage treatment. Sewage sludge has an offensive odour and is a health hazard as it contains bacteria and pathogens. It requires anaerobic digestion treatment during which the organic matter present in the sludge is converted into methane (70%) and carbon dioxide. Anaerobically digested sludge is often further de-watered in lagoons prior to disposal at sea or as fertiliser on land.
Alternative Sewage Treatments

These systems are designed to mimic natural wetland ecosystems. The wastewater is passed through a series of plants and micro-organisms to remove solids, bacteria and pathogens present in the sewage. Traditionally such systems required a fair amount of land, but modern technology enables the wastewater to pass through a series of ponds and tanks where plants, invertebrates, fish and sunlight are used to clean it.

Examples of Good Practice

A successful wetland wastewater treatment system, the Splash Carnivore, has been constructed on the edge of Nairobi National Park, Kenya. The construction of the wetland was completed in mid-1994, and its performance has continuously improved with the biological maturity of the wetland.

The wastewater first passes into a settling pond where the solid particles are allowed to settle to the bottom. The water then passes through beds of gravel where bacteria and aquatic plants such as bulrushes, sedges and reeds act together to break down sewage. The water then passes through a series of terraced ponds where other plants further purify the water. The water is now clear and odourless and when it reaches the subsequent open ponds the sun’s UV-C rays effectively eliminate remaining pathogens. The sewage nutrient-rich bacteria falls prey to small crustaceans. Green algae and the absorption of oxygen from the surrounding air also play important roles in purifying the water.

This mini-ecosystem is now attracting numerous species of birds and other aquatic wildlife.

The only maintenance required is to consistently clear away the excess vegetation, for vegetation falling and rotting in the waterways increases the nutrient levels in the water, and this interferes with the effectiveness of the natural water purification process. The removed vegetation is composted or laid on access footpaths to buffer the impact of foot traffic.

The Carnivore Restaurant actively participates in the project by channelling its wastewater to the wetland for treatment. At first, the high level of fat in the restaurant wastewater caused problems. This has now been rectified through the separate collection of waste oils and fats, the fitting of grease traps to the kitchen’s wastewater outlets and the introduction of selectively bred bacteria in the gravel beds. The restaurant further ensures that all cleaning materials are free from phosphates and chlorine.

Composting Toilets

Composting toilets allow for the composting of waste in the toilet structure itself and do not require water for flushing. As with all composting practices, bulking material (hay, sawdust, wood shavings etc.) need to be added as regularly as the toilet is used to maintain the carbon and nitrogen balance, and the pile needs to be turned regularly. In cold climates, the toilet chamber needs to be insulated and heated.

The heat generated from the composting process causes the moisture from the waste to evaporate. Therefore the toilet needs to be aerated through a vent and/or mechanical aerator. If the pile is well maintained, no odours will arise.
In areas where water is scarce and water treatment is difficult, composting toilets can be an ideal alternative. Even when water is available, composting toilets will eliminate black water, which will greatly facilitate on-site wastewater treatment.

3.1.5 Landscaping

Landscaping greatly improves aesthetics, and can be used to increase and decrease heating and cooling loads, improve air quality, provide a ‘sense of place’, and keep the occupants ‘in touch with nature’.

The need to air out buildings through the provision of open spaces is now widely accepted, but is all too rarely given consideration until the site has been cleared and the buildings erected. Sustainable design encourages developers to consider landscaping when the buildings are being designed, and to use the existing physical features of the site to enhance and improve the efficiency of sustainable design. For example, large deciduous trees can be used to reduce cooling loads in the summer and increase solar gain in the winter. Natural gradients can be used to facilitate the collection of rainwater and the landscaping of ponds, mini-wetlands and other features.

Landscaping checklist for tourism facilities:

• Open spaces, gardens and outdoor swimming-pools should be considered as ‘outdoor rooms’. They should be as comfortable and relaxing as the interiors.
• During building and excavation, preserve as much of the original vegetation as possible. Give special attention to mature trees that take years to grow and rare species that may be difficult to regenerate.
Select new plants that are native species and will blend in with the existing ecosystem.

Design to promote the composting of kitchen and garden waste, dispensing with chemical fertilisers.

Make provisions for edible landscaping. Vegetable plots and orchards can be interesting and innovative landscape features; produce can be offered on the menu (as seasonal or home-grown specialities) and used for preserves and marmalades.

Experiment with permaculture, the growth of different types of fruit trees, vines and ground crops that support each other in a symbiotic manner.

Water in the evening or morning to reduce evaporation. Where water is scarce, use drought-resistant plant species.

Collect and use rainwater and grey water for irrigation.

Resist the temptation to create lawns on parts of the site where the natural vegetation was destroyed. Preserving and restoring vegetation will add landscape features and provide for a series of small lawns that are less resource-intensive to maintain.

Xeriscaping®

‘Xeriscaping’ means saving water through landscaping. It involves a range of techniques including soil improvement, plant selection and lawn areas that allow irrigation water requirements to be met by rainwater and natural water percolation in soils.

Some Xeriscaping tips:

- Plants with similar water requirements can be planted in groups or beds, and not scattered all over the area. This allows irrigation to be zoned according to the plants’ needs.
- Slopes can be terraced to allow water to soak into the soil. Plants with the most water needs should be placed on gradients, which receive the most water. Raised beds should be avoided as they can dry out very quickly.
- Plants that need a lot of water can be placed near buildings where they can be supplemented with wastewater from vehicle washing, kitchens or run-off from paved areas.
- Stronger and more drought-tolerant plants should be exposed to prevailing winds: they will provide a buffer for more fragile species.
3.2 Environment Considerations for the ‘Building Shell’

3.2.1 Windows

Windows can be used to enhance day lighting, control ventilation and humidity, provide pleasant views and make the building more attractive from the outside. There has been great improvement in the design of windows. Among the latest innovations are the diverse models of triple-paned windows, usually made of argon or krypton glass. Some models have low emissivity coatings, which allow varying levels of natural light (short-wave radiation) to enter, and prevent heat (long-wave infra-red radiation) from entering and leaving. It is therefore possible to select window models based on the orientation of buildings as well as the lighting, heating and cooling loads required. Windows with integrated PV cells are also available.

Architects are working on varying the functions of windows through increasing use of skylights, vents, and glass roofing features, and on the innovative placement of windows in balance with interior and exterior doorways.

3.2.2 Insulation

Heat transfer through walls, floor and roof occurs through infiltration, conduction and radiation. Insulation is essential to minimise heat loss. Different types of insulation are discussed in Unit 4. Two points need to be reiterated:

1. The thickness of the insulation is crucial. Ensure at least 200mm for maximum efficiency.
2. The R-values should be a key consideration in the selection of insulation material. The R-value is a measure of thermal resistance. The higher the R-value, the greater the insulating properties.

3.2.3 Environment-Preferable Building Materials

Environment-preferable building materials include:

- Products that are stronger and more durable;
- Environmentally-certified materials, such as timber carrying a ‘sustainable-felling stamp’;
- Products with reduced toxicity such as low VOC6 paints;
- Materials made of recycled materials such as recycled glass insulation and roof systems;
- Products with improved efficiency such as double-glazed and triple-glazed windows;
- Locally produced building materials, which are likely to have lower life cycle impacts owing to considerably shorter transport distances; ‘buying local’ also helps promote local industries;
- Materials with a lower embodied energy; embodied energy is the total amount of energy needed to produce a given material - the energy needed to grow, log and shape timber, to mine, extract, refine and produce copper, aluminium, steel and concrete, to polymerise and manufacture plastics from petroleum, etc;
- The American Institute of Architects provides the following recommendations:

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6 VOCs are volatile organic compounds that can vaporise into the atmosphere. Examples include chlorine, vinyl chloride, benzene, lindane, dieldrin, and DDT. In Europe and North America, the emission of many VOCs is now regulated with guidelines and maximum-concentration-admissible values.
3.3 The Use of Environment Management During Occupation

Sustainable building design is not the end, just the beginning. Buildings have to be used and maintained to optimise the benefits of the sustainable features incorporated in them. Lower energy use, material use and waste output during occupation also facilitates the implementation of EMS.

A few examples of environment management technologies, fittings and appliances are given below. Many of them have been discussed earlier in this Unit and in Unit 4:

**WATER RELATED TECHNOLOGIES**
- Grey water reuse systems;
- Water-saving products such as low-flow showerheads and tap aerators;
- Low-flush toilets and vacuum toilets;
- Waterless urinals;
- Alternative sewage treatment systems;
- Dishwashers that operate on 5.3 gallons (as opposed to 12.5 gallons) and 40% less energy than conventional models;
- Washing machines and dryers that use 14 gallons per full cycle; conventional models use 50 gallons of water and 50% more energy.

**HEATING AND COOLING EQUIPMENT**
- Renewable-energy systems;
- Solar-powered fans, cooling systems and refrigerators;
- Solar space heaters;
- Hydraulic space heating systems;
- Heat-recovery systems;
- Building management systems;
- Combined heat and power systems.

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**Coefficient of Embodied Energy of Building Materials**

<table>
<thead>
<tr>
<th>MATERIAL</th>
<th>COEFFICIENT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wood</td>
<td>1</td>
</tr>
<tr>
<td>Brick</td>
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<tr>
<td>Cement</td>
<td>3</td>
</tr>
<tr>
<td>Glass</td>
<td>4</td>
</tr>
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<td>Fibre Glass</td>
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<td>Steel</td>
<td>8</td>
</tr>
<tr>
<td>Plastic</td>
<td>30</td>
</tr>
<tr>
<td>Aluminium</td>
<td>80</td>
</tr>
</tbody>
</table>
ENERGY-EFFICIENT LIGHTING:

- Low-energy lighting fixtures;
- Control systems such as dimmers, timers and photoelectric cells;
- Solar-power DC exterior lighting.

WASTE MANAGEMENT TECHNIQUES:

- Paper and plastic compactors;
- Composting vessels;
- Paper and plastic bailing equipment;
- Composting toilets.
Sustainable design recommends, as far as possible, retrofitting and repairing existing buildings, instead of continuing to build new structures. If existing structures are beyond salvation, it is important to see if any of the materials can be reused in the new buildings.

**Examples of Good Practice**

The Narayani Safari Lodge and Hotel, Nepal was built on low-value agricultural land. Wooden beams, doors and window-frames from the old houses on the site were reused for building the single-storey cottages of the hotel and lodge. Elephant-grass was initially used to thatch the cottage roofs. However, because these tended to leak slightly, locally-made clay tiles replaced the grass.

The US company Brennan Beer Gorman Architects is in the process of redesigning a 100,000-square-foot office building in Washington DC, into an eight-storey, 158-room Marriott Hotel. The company suggests the following considerations for office-to-hotel conversions:

- **BUILDING SHAPE**
  Does the building have a workable floor plate with column spacing that accommodates an optimum room width of 12 to 15 feet? Does the building have a core- façade dimension of 30 to 40 feet? Unusual L, T or W shapes hinder efficient and flexible office layouts but can work well for guest room modules.

- **WINDOWS**
  Are existing windows openable? Many codes require openable windows in guest rooms while many office buildings have fixed windows. Does the existing window module align with the proposed guest-room module inside, or will the façade need extensive reworking?

- **FLOOR-TO-CEILING HEIGHT**
  Office buildings with ceilings that are too low for today’s market may work well as hotels with eight-foot guest room ceilings.

- **STRUCTURAL CONSIDERATIONS**
  Can the structure easily and economically accommodate stair relocations and the tremendous number of floor penetrations that hotels require for ductwork and piping?
If the full benefits of sustainable site selection and building design are to be realised, the construction phase must also be planned and conducted with environment consideration.

In the run-up to the construction phase, it is common practice for some design and material specifications to be revised and alternatives considered. Care must be taken to ensure that the chosen alternatives do not impair the sustainable design features, reduce the energy and material efficiency of the building, or compromise on the use of environment-friendly building materials.

The environment integrity of the site must be preserved at all costs. Bulldozing is to be avoided, vegetation cleared only where buildings are to be erected.

The recommendations of the EIA should provide valuable guidance throughout construction, especially in identifying vegetation that needs to be protected, reducing waste and emissions, the use of prevailing vegetation in landscaping, and preventing the erosion of topsoil and the silting of nearby waterways.

Sustainable construction is also about making the construction site a cleaner and safer workplace:

- Separate areas should be provided for the storage of hazardous and toxic materials;
- Recycling collection points for construction debris, food waste and packaging waste need to be set up;
- Safety equipment and protective clothing should be provided;
- Safety standards on the use of construction equipment and exposure to toxic materials should never be compromised;
- Procedures and safety measures in the case of fire, spills and accidents should be clearly understood and respected.

These criteria also apply to the refurbishment of existing buildings.
Environmentally-sound Siting, Design And Construction Of Buildings

Since the early 1990s, there has been a tremendous increase in the application of sustainable design. In many countries, EIA legislation is now mandatory for large and medium scale tourism developments, while passive solar design and energy-efficiency considerations has been incorporated into building codes.

In June 1993, the International Union of Architects and the American Institute of Architects signed a joint Declaration of Interdependence for a Sustainable Future. This declaration makes a formal commitment to place environment and social sustainability at the core of architectural and building design considerations.

Developers should not be discouraged if sustainable design requires extensive budgeting at the onset, for it will bring considerable overall savings later. For example, PV roofing and double-glazed windows may be more expensive to purchase, but these costs will certainly be absorbed by the energy savings made when the building is in operation.

Case Studies on Environmentally-Sound Siting and Design

1. ING Bank, The Netherlands

(Source: Rocky Mountain Institute, Canada, and ING Bank, The Netherlands)

In 1978, the leading Dutch and European Bank ING (then known as Nederlandsche Middenstandsbank, NMB) was considered stodgy and conservative. Needing a new image and a new headquarters, the bank’s employees and board of directors voted for constructing a building that was ‘organic, with the criteria to integrate art, natural materials, sunlight, plants, energy conservation, low noise, and water’.

A multi-disciplinary team of architects, construction engineers, landscape architects, energy experts and artists were commissioned to design the building. They worked for three years on the design with ongoing input from the future users. Construction began in 1983 and was completed in 1987.

ING Bank’s new head office, south of Amsterdam, is considered even today as an important example of sustainable design. The Bank’s 2,400 head office employees now work in a 50,000m² building, broken up into a series of ten slanting, brick-faced, precast-concrete towers. The ground plan is an irregular S-curve, with gardens and courtyards interspersed over the top of 28,000 m² of structured parking and service areas. Restaurants and meeting rooms line the internal street that connects the ten towers. The high-density residential, office, and retail development surrounding the bank reinforces the image of a medieval castle with its surrounding village.

Maximum floor depth was determined by the criteria that no desk could be located more than about 7 metres from a window, and is directly related to the day lighting design. Interior louvers are used to bounce daylight from the top third of exterior windows onto the ceiling of office spaces. This design, in combination with window-lined interior atriums that penetrate through the towers to the mezzanine level internal street, provides a significant portion of the building’s lighting.
Additional lighting needs are provided by task lighting, custom decorative wall lustre, and limited overhead fixtures.

With regard to the building's thermal design, double-glazing is a feature, as it was built before the time of high-efficiency windows. A sheath of insulation separates the outer brick layer from the precast-concrete structure. The structure itself is used to store heat from simple passive solar measures and from internal gains such as lighting, equipment and people. Additional heat is supplied through radiators connected to a 100m³ hot-water storage system in the basement. This water is heated by a combined heat and power facility located within the structure and by heat recovery from the elevator motors and computer rooms. The building also makes use of air-to-air heat-exchangers, which capture heat from outgoing exhaust air and transfer the heat into intake air.

The building is not air-conditioned, relying instead on the thermal storage capacity of the building fabric, mechanical ventilation, natural ventilation through openable windows, and a back-up absorption cooling system powered by waste heat from the combined heating and power system.

Design integration extends into interior decoration through artwork, plants and water. Circulation spaces throughout the bank are filled with artworks. For example, pieces of coloured metal in the top of the tower atriums reflect coloured light down to light sculptures in the base of the atriums, which then bathe the surrounding plastered walls with coloured light. In keeping with the desire for natural materials, interiors are finished with a simple palette of materials - texture paint over the precast concrete, wood trim, with wood-slat and some drop ceilings. In addition, where the brass plate covering an expansion joint in a major corridor travels up a wall, it becomes a piece of relief sculpture by being recessed into the wall and surrounded by a fan of coloured marble and cove lights.

Rooftops, courtyards, atriums and other interior spaces are landscaped using a variety of garden styles. Cisterns capture rainwater for use in fountains and landscaping. Flow sculptures that maintain a pulsing stream from a constant flow of water are used extensively, even as handrails for multi-story ramps. Beyond their visual appeal, the water features serve to add moisture to the air.

ING Bank reports that construction costs for the building were 3,000 Dutch gilders per square metre of land, structure, landscaping, art, furniture and equipment. In the mid-1980s, this was comparable to or cheaper than, other office buildings in the Netherlands. In terms of energy savings, the building consumes 0.4 gigajoules/m² annually. (ING Bank’s former head office building consumed 4.8 gigajoules/m² of energy annually). The additional construction costs attributed to the building's energy systems was around $700,000, however the annual energy savings are estimated at $2.6 million (Vale, 1991, and Olivier, 1992).

Other benefits of the better work environment are a drop in employee absenteeism and a great improvement in the bank's corporate image.

2. Plymouth College of Further Education, UK

Plymouth College of Further Education (PCFE) provides a range of degree programmes, 300 vocational courses, 30 different General National Vocational Qualifications, over 20 A Levels and GCSEs and several ‘return to learn’ programmes. The entire college has over 20,000 students. The Department of Hotel, Leisure and Beauty, is one the largest departments of PCFE, with over 2,000 students, offering degree-level and vocational programmes.
Environment action at the PCFE began in 1997 with the primary objectives of:

- Developing an ‘environment culture’ – making resource-efficiency and waste minimisation a part of the daily activities of staff and students;
- Proving that environment improvement costs need not be higher than similar, lesser environment-friendly alternatives;
- Demonstrating that environment management is good business.

In 1997, PCFE commissioned a feasibility study to assess the interest of industry, especially small and medium-sized enterprises (SMEs), in the establishment of a centre for environment excellence and/or an environment-management advisory bureau to provide guidance on environment management. Manadon Associates, a local consultant with a strong environment bias, carried out the study. The results showed that an environment advisory bureau would receive strong support across all industry sectors.

“The role of the bureau will develop with time, but it needs to provide a high-quality, professional and independent service that responds to the needs of SMEs. The bureau should be housed in a purpose-built unit which should incorporate examples of good practice relevant to SMEs.”

Paul Barton, Manadon Associates.

Following further consultations within PCFE, as well as with industry, local government and other organisations, PCFE decided to construct an environment-exemplary building to house the environment advisory bureau as well as a number of existing departments with space constraints. Funding for the new building is being provided by PCFE, with additional support from the European Union and the Further Education Funding Council.

Kay Elliott Architects and Hoare Lea & Partners, Consulting Engineers, were selected to design the building.

The building will consist of 2,000m² of teaching, exhibition, office and refectory areas and associated ancillary space. It is to be sited in an existing car park and linked to surrounding buildings at the ground and first-floor levels.

The design objectives are to:

- Develop a low-maintenance but usable and comfortable building that provides for the flexible use of space;
- Achieve low-energy consumption and low/zero emissions;
- Provide environment conditions within acceptable tolerance levels for each activity to be undertaken within the building;
- Apply cutting-edge technology to provide low-complexity design solutions;
- Use current building materials and construction techniques;
- Produce replicable concepts for small businesses;
- Achieve all of the above within the cost limit for equivalent comparable buildings: £850 per square metre.
Some of the key ‘green’ design features are listed below:

- The south-facing facade will be maximised, with minimum facades facing the southeast and southwest. Such a building orientation is needed to maximise the control of solar gain. It was designed based on a number of studies including the annual/daily sun path at the latitude of the site, 51.7°N.

- At the core of the design is a south-facing facade; a massive heavyweight structure which will act as a thermal storage unit for heat or cold depending on the season. It will slow down the transfer of heat from outside to inside and help moderate temperature fluctuations inside the building.
UNIT 5: THE SUSTAINABLE SITING, DESIGN AND CONSTRUCTION OF TOURISM FACILITIES

First floor plan

Ground floor plan

study/display area  
seminar room  
standard teaching  
office  
general office  
atrium  
standard teaching  
standard teaching  
standard teaching  

refectory  
male  
female  
plant  
kitchen  
atrium  
entrance  
refectory  

Ground floor plan
- A building-management system will be used to automatically control heat, ventilation and air-conditioning (only when and where needed), operate the automatic windows and vents, and monitor and record data on systems and equipment. It will comply with existing control and fire alarm systems.

- The atrium will be designed to draw fresh air through the refectory space on the ground floor from outside the building, and emit used air to the exterior via the windows and roof vents.

- Large floor-to-ceiling heights, as well as automatic (linked to the building-management system) and manually operated high-and low-level windows/vents on each floor; the roof will be designed to ensure adequate cross-ventilation and maximise natural lighting.

- To further facilitate natural ventilation and free cooling through cross-ventilation, the distance between the exterior walls and the internal atrium will be below 10 metres.

- The penetration of north-light natural lighting into the building will be maximised through the north facing roof-light glazing, the atrium, translucent interior walls and windows with solar shading (when needed). This will be supplemented with artificial lighting when external conditions provide insufficient natural lighting. The design aims to achieve power consumption of less than 12 watts/m² with all light fittings in use. Daylighting has been designed to achieve a daylight factor of 4% in most areas except toilets, plant rooms and the sub-basement computer rooms.
• The vents in the north-facing roof will also provide automated night ventilation to cool the building, especially in summer.
• Existing energy utilities will be extended into the new building and new contracts will be set up to provide green electricity produced by renewable sources. The building will therefore have low/zero carbon-dioxide emissions. Current best practice in carbon-dioxide emissions from buildings in the UK is 12-34 kg/m².
• The building aims to operate on an energy target of less than 83 kWh/m²/annum. Current best practice in building energy efficiency in the UK is 83-100 kWh/m²/year.
• The following areas will be naturally ventilated by means of openable windows/vents: teaching areas, labs, interview room, refectory, study/display area, seminar room, general office, toilets and atrium link corridors.

The toilets and atrium will include a supplementary extract vent to assist natural ventilation if required.

• The following areas will be mechanically ventilated: sub-basement area (computer rooms), kitchen/servery, internal offices and fileserver/communication rooms.
• Solar water-heaters located on the south facade shading panels will heat the hot-water storage cylinders.
• Two wind turbines will be installed to supplement electricity supply to the building.
• Both the physical location and the use of the massive structure will separate acoustically-sensitive areas from noisy areas.
• The computer rooms will be located in the sub-basement to allow the heat gain in the area to rise naturally and be exhausted (via an air-handling unit) into the atrium.
• Radiators and heating/cooling circuits will be weather-compensated and fitted with thermostatic radio valves to allow the temperature to be regulated by occupants.
• Lighting will be controlled via manual light switches. Some fittings on the ground, first and second floors will have additional photocell controls to dim lighting, depending on daylight level. Occupancy sensors will be installed in the sub-basement computer rooms.
• External lighting will be minimised and controlled by photocells and time switches.
• Electricity, gas and water supplies to the building will be metered.

**Staff and Student Travel and Parking Plan**

To complement the new building, PCFE has commissioned Manadon Associates to develop a sustainable travel and parking strategy for staff and students. (PCFE already offers a subsidised bus service to all students and operates a free college shuttle.)

“It is our intention to produce a building that will influence future building design and demonstrate that environment-intelligent initiatives are cost-effective and good for business. We are also in the process of developing an environment management programme, following a preliminary environment review, which was completed in May 1999. A lot of planning goes into our work, for we want to
be absolutely certain that it will result in genuine environment improvement. Environment stewardship is not about piece-meal efforts and short term gains, but longer-term accountability.”

J. Gilbert Snook, Head of Estates
UNIT 5: EXERCISES

1. GROUP PROJECT
Develop checklists for environmentally-sound:

- Siting;
- Building design and orientation;
- Renewable energy use;
- Construction and selection of building materials.

for each of the following hospitality businesses:

- A 1,000-room city hotel;
- A 25-room mountain guest house;
- A 100-room beach hotel;
- A 15-room holiday village bordering a rainforest;
- A desert campsite for approximately 35 people on desert safari, located a 500 metres from an oasis.

2. GROUP PROJECT OR WRITTEN ASSIGNMENT
Develop guidance notes on 'energy sources and energy efficiency' for hospitality developers in:

- The northern hemisphere;
- The southern hemisphere.

3. WRITTEN ASSIGNMENT
Are there trials and demonstration projects for environment-friendly building design in your country or region? (These need not be tourism or hospitality businesses). Arrange a field visit to one of these properties. Include a question-and-answer session with the developers and managers.

Write a report of 1,500 words on the sustainable design features used and the benefits they are bringing to the property.

4. GROUP PROJECT OR WRITTEN ASSIGNMENT
Using materials produced within your region/country, and in keeping with your region/country’s typical and traditional designs and styles, develop an interior decorating and furnishing checklist for:

- A 500-room city hotel;
- A 25-room rural guest house.

5. WRITTEN ASSIGNMENT
Critically discuss the following statement:

“Just as hospitality developers as a group are becoming more sophisticated, travellers are seeking to transform their lives in some sort of way, through education, culture, and recreation. The designing of the resort can enhance this..."
kind of experience. Travellers know the difference between a well designed and a poorly designed resort. As a result, it is much easier now to appeal to the conscience of the developer and explain why an environment-sensitive design makes sense – because ‘eco’ also stands for economics.”

Howard J. Wolfe
Vice President and Principal
Wimberly, Alison, Tong and Goo (WATG), a resort design firm, Honolulu, Hawaii.

GLOSSARY OF TERMS AND ABBREVIATIONS

AC  alternating current (electricity)

anaerobic  not containing oxygen

BOD  biological oxygen demand

coefficient  a number that expresses a measurement or quantity of a given substance

conduction  process by which heat or electricity passes through or along something

convection  process by which heat travels through air, water and other gases and liquids

DC  direct current (electricity)

EIA  environment impact assessment

EIS  environment impact statement

embodied energy  total amount of energy needed to produce a given material

EMS  environment management system

energy efficiency  rational use of energy

greenhouse gas  gas that causes global warming and climate change, discussed in Unit 1
infiltrate
ion
organic
oxidise
PV
radiation
remote power system
resource efficiency
SS
sedimentation
VOC

enter gradually
atom which possesses an electric charge
carbon-containing material derived from plant and animal material
when a substance oxidises, it changes chemically because of the effect of oxygen on it
photovoltaic
energy, especially heat that comes from a given source
power system that functions independently of the grid electricity supply
rational use of resources
suspended solids
the settling of solid materials at the bottom of a liquid
volatile organic compound which can vaporise in the atmosphere
“Expand your vision until it includes the whole earth as your home, and recognise and respect life in all its forms.”

Stephan C. Paul, psychologist

According to a new index from Dow Jones and Sustainable Asset Management, companies with an eye on their ‘triple bottom line’ - economic, environment and social sustainability - are outperforming their less fastidious peers on the stock market. The world’s top 200 sustainable firms listed in the index outperformed the rest, particularly those in technology and energy.

A great many tourism and hospitality businesses are responding to the environment challenge with the same bottom line, that environment management is critical to maintaining business success. Many businesses find that after an initial period of success, it can be difficult to maintain enthusiasm and continue the effort. At such times, systematic performance monitoring becomes even more important, for it provides the data and encouragement to work towards increasingly higher levels of environment-related achievement. For if one business does not, its competitors will.

Action by a handful of companies, however, is not sufficient. All tourism and hospitality businesses and institutions have to accept responsibility and take action towards improving the environment. It is not just good business and good citizenship; it will also ensure that our children and grandchildren have spectacular and inspiring destinations to visit in the years to come.

Drivers that will continue to forward the environment and business agenda include:

1. The expanding body of environment legislation that is not only becoming more stringent but is also being increasingly enforced. The challenge is to be a step ahead of legislation, rather than merely complying with it.

“It is always better to act before we are told - especially by regulators – that we have to do it.”

Gilbert Snook, Head of Estates, Plymouth College of Higher Education, UK

2. Both governments and industries are realising that technology and trade are a double-edged knife. While technology has enabled us to maximise output from each resource unit, be it a hectare of land, a litre of fuel oil, a cubic metre of water or a kilo of wood, this same technology has degraded lands, contaminated water, poisoned wildlife and people, and polluted the surrounding air. Similarly, trade practices that farm products in one part of the world, then process them for final consumption in another, are extremely profitable in our market system. This is because we fail to recognise and account for the environment costs incurred in the process – wasteful resource use and pollution at all processing points, transport-related emissions, health risks, etc.

Many environment sceptics see no reason to worry. They argue that the invisible hand of the market will take care of environment problems when the time arises. As forests, clean water and agricultural land become scarce, their prices will rise and that will provide the necessary incentives for using resources more carefully and managing pollution. What such sceptics fail to realise is that once a forest is turned into an industrial estate, or a mangrove has been reclaimed for resort
development, it cannot easily be returned to its original state and
made to produce timber or fisheries again. There are limits to the
carrying capacities of the earth’s resource base, and once these limits
have been surpassed there will be rapid declines in all natural,
economic and social systems. Herman Daly, a former senior executive
of the World Bank, best sums this up through the following often-used
analogy:

“Ship captains continuously monitor the Plimsoll line indication of
their boats. For if water rises above the Plimsoll line, it is a sign that
the boat is too heavy and is in danger of sinking. At this point, there
is little choice but to reduce the weight of the cargo and crew on the
ship – simply rearranging items will not prevent the ship from sinking.
The problem is the total weight, which is over and above the carrying
capacity of the ship.”

3. Many governments are now working on national environment accounts
and adjustments to gross domestic product calculations to reflect
environment losses and gains. The objective is to produce a more
accurate picture of national production and consumption costs and
revenues.

4. Companies are experimenting with a variety of methods to evaluate
not simply resource inputs, waste and emission outputs, but also their
‘environment burden’ - their actual contribution to environment change
and degradation.

5. As the power and size of companies grow, their consumers, competitors
and investors no longer judge them by profits and product quality
alone, but also on their overall contribution to society. Companies
today are expected to be socially and environmentally accountable and
play a leading role in improving the environment and the quality of life
of their host. The 1998 GlobeScan Survey on Sustainable Development
Trends states that ‘corporate reporting on social performance is
predicted to be more common in five years than is corporate
environment reporting today’.

6. There is also increasing focus on environment defence expenditure –
the costs of anticipating and avoiding environment damage as well
as pollution clean-up and regeneration costs - and ways and means
to incorporate them into market prices. We cannot begin to work
towards improving the environment if it is more cost effective to waste,
contaminate and pollute than it is to anticipate, avoid, manage and
regenerate.

This manual, which has discussed the tourism and hospitality industry’s
environment agenda, environment management systems and sustainable siting,
design and construction, is only the beginning. It is all too important to bear in
mind that to overcome environment challenges, we need not only conciseness and
expertise, but also persistence, courage and vision.

“We have to acknowledge the facts. We cannot create a sustainable future if we
keep dragging a veil over reality, not only ignoring depletions and the collapse of
life support systems, but actually counting this as progress. The limits to growth
will then hit us even faster.”

Dr. Alexander King, Member of the Club of Rome
The following is a limited list of further resources on the environment.

**Unit 1**

GEO 2000
Published by Earthscan Publications Ltd (www.earthscan@co.uk) for and on behalf of UNEP (1999)
ISBN: 1 85383 588 9 (paperback), 1 85383 587 0 (hardback), ISSN: 0 1366 8080
Website: www.unep.org/Geo2000/

The Economist, published every week by The Economist Newspaper Limited
Website: www.economist.com

Climate Change and its Impacts on Tourism
Worldwide Fund for Nature (WWF) publication, 1999
Website: www.panda.org

Global Warming: Health and Disease
Paul R. Epstein
Website: www.panda.org/climate/climate_docs/health_factsheet/preface.htm

IUCN World Conservation Union
Website: www.iucn.org

International Institute for Sustainable Development (IISD)
Website: www.iisd.ca/linkages/

Living Planet Report 1999
Worldwide Fund for Nature
Website: www.panda.org/livingplanet/lpr99/index.html

World Resources Institute
Website: www.wri.org

World Watch Institute
Website: www.worldwatch.org
Unit 2

Friends of the Earth  
Website: www.foe.co.uk

Responsible Tourism Institute  
Website: www.sustainable tourism.com

The Earthscan Reader in Sustainable Tourism  
Edited by Leslie France  
Website: www.earthscan@co.uk

The Green House Effect – An Integrated Approach to Sustainable Tourism and Resort Development  
Conservation International Publication  
Website: www.conservation.org

Tourism Development and Community Issues  
By C. Cooper, S, Wanhill  

Unit 3

Awards for Improving the Coastal Environment  
ISBN 9 28071 625 5  
Fax: +33 1 44 37 14 74  
Website: www.unep.org

EMAS legislation  

European Environment Law  
Website: www.eel.nl

International Organization for Standardization (ISO)  
Website: www.iso.ch

International Environment Law and Treaties  
Website: www.globallaw.com

US Environment Protection Agency  
Industry Partnerships  
Website: www.epa.gov/epahome/industry.htm

Eco Labels in the Tourism Industry  
Website: www.unep.org
Unit 4

Being Green Keeps You Out of the Red
Published by the Tourism Council of Australia
Fax: +61 2 9358 6055
Website: www.tourism.org.au

Corporate Environment Management I (2nd Edition)
Edited by R. Welford
Website: www.earthscan.co.uk

Green Hotelier
International Hotels Environment Initiative magazine, published quarterly
Compiled and edited for IHEI by Claire Baker Corporate Communications
Website: www.ihei.org

Environment Action Pack for Hotels
UNEP Industry and Environment, International Hotels and Restaurants
Association, International Hotels Environment Initiative publication, 1995,
ISBN 1 899155 901 0
Website: www.ihei.org / www.ih-ra.com

Environment Good Practice in Hotels
UNEP Industry and Environment, International Hotel & Restaurant Association
publication (Out of print; available in pdf format to hotel schools buying
this pack. Contact infos@ih-ra.com)
ISBN 9 28071 623 9
Website: www.ih-ra.com

Environment Management Training Resource Kit
UNEP Industry and Environment, International Chamber of Commerce,
FIDIC publication, 1997
ISBN 9 28071 147 9
Website: www.unep.org

How Can the Hotel and Tourism Industry Protect the Ozone Layer
UNEP Technology, Industry and Economics/Multilateral Fund for the
ISBN 9 28071 668 9
Website: www.unep.org

Life Cycle Assessment: What It Is and How To Do It
UNEP IE publication 1996, ISBN 9 28071 546 1
Website: www.unep.org

Tomorrow Magazine
Website: www.tomorrow-web.com
**Unit 5**

A Primer on Sustainable Building  
D. L. Barnett, W. D. Browning  
Published by the Rocky Mountain Institute, Canada  
Fax: +1 (303) 9273420  
Website: www.rmi.org

Building Research Establishment, UK  
Website: www.bre.co.uk

Carrying Capacity in Recreational Settings  
B. Shelby, T.A. Heberlein,  
Oregon State University, 1997, ISBN 0870714260

Central Rocky Mountain Permaculture Institute  
Fax: +1 923 664 010  
Website: www.permaculture.net/Colorado/

F. Stitt  

Eco Architecture – Sustainable by Design  
Giradet  
Academy Editions, 2000, ISBN 0 47199 899 0

Environment Building News  
Website: www.ebuild.com/index.html

European Association of Renewable Energy Research  
Website: www.eurec.be/

Green Development: Integrating Ecology and Real Estate  
A. Wilson, J. L. Uncapher, L. A. McManigal, L. H. Lovins, M. Cureton, W. D. Browning  
Rocky Mountain Institute  
Fax: +1 (303) 9273420  
Website: www.rmi.org

Green Developments CD-ROM  
A companion to Green Development (above)  
Published by the Rocky Mountain Institute  
Fax: +1 (303) 9273420  
Website: www.rmi.org

Handbook on Sustainable Building  
D. Anink, C. Boonstra, J. Mak, Steering Committee on Social Housing, A. Morris  
Introduction of Environment Impact Assessment
J. Glason, Rick Therivel, A. Chadwick

Working Group on Developing Technology
Website: www.wot.utwente.nl

Photovoltaic Solar Energy – Best Practice Studies
Website: www.europa.eu.int/comm/dgs/energy_transport/index_en.html

What’s a Fuel Cell Fact Sheet
Website: www.ttcorp.com/fccg/fc_what4.htm

Long-term operation of combined heat and power in a hotel
Website: www.bre.co.uk

International Information on Renewable Energy Technologies
Website: www.caddet.co.uk

2020 Vision: The Engineering Challenges of Energy
Website: www.imechi.org.uk

WREN – World Renewable Energy Network
Website: www.wrenuk.co.uk

European Association of Renewable Network
Website: www.eurec.be

European Commission DGXVII Energy
Website: www.europa.eu.int/comm/dgs/energy_transport/index_en.html

CHPA – Combined Heat and Power Association
Website: www.chpa.co.uk

Solar Energy Industries Association (SEIA)
Website: www.seia.org

Alternative Technology Association (ATA), Melbourne
Website: www.ata.org.au

Australian and New Zealand Solar Energy Society (ANZSES)
Website: www.anzses.org
Website: www.eco-web.com

American Wind Energy Association
Website: windmail@awea.org

Florida Solar Energy Center
Website: www.fsec.ucf.edu
Geothermal Heat Pump Consortium, Washington, DC
Website: www.ghpc.org

Geothermal Energy Association Washington, DC
Website: www.geotherm.org

Brooklyn Union Gas Website, Products and Services
Website: www.bug.com/product/fuelcel.htm
Website: www.thinkenergy.com

U.S. Department of Energy, Office of Utility Technologies
Website: www.eren.doe.gov/utilities/hydrogen.html

US Department of Energy, Federal Energy Technology Center
“Fuel Cells Overview”
Website: www.fet.doe.gov

Website: www.igc.apc.org
Website: www.maho.org
Website: www.realgoods.com

Renewable Energy: Power for a Sustainable Future
Godfrey Boyle
Oxford University Press, 1996
ISBN 0 19856 451 1
Our natural ecologies today are in a state of crisis. Healthy economies and societies cannot continue to develop in a world with so much degradation of the environment and such large inequalities in the distribution of wealth and resources. Today, nations, businesses and humans worldwide need to respond to these complex and far-reaching challenges. An unprecedented challenge is posed – ensuring that economic development continues and expands, while at the same time dramatically reducing the environmental impact of that development.

In this context, the hospitality and tourism industries face a particular challenge. A clean and healthy environment is critical to their continued prosperity, and these industries have a leadership role to play in husbanding environmental resources and in recognising that environmental management is product stewardship. In fact, in order to really ensure that sustainable tourism development can be achieved, the need for good practice extends beyond natural heritage to include cultural heritage issues.

**Sowing the Seeds of Change**
– An Environmental Teaching Pack for the Hospitality Industry

has been developed in response to this challenge, when the partner organisations IH&RA, UNEP DTIE and EUHOFa identified a lack of information, expertise and practical teaching tools as the major concern when introducing environmental issues into the hospitality curricula.

This publication is a complete information pack for developing and expanding environment curricula in hotel schools. It enables hospitality education professionals to develop tailor-made environment curricula to suit the needs and objectives of each school and education system. The content is most suitable for developing syllabuses at the degree and postgraduate levels. This Pack can be used to develop stand-alone environment curricula or incorporate environmental information to existing subject areas such as front office and rooms, back office and administration, food and beverage, kitchen and tourism management. For students of hospitality management it will serve as an environment information and resource handbook. For hospitality professionals, it provides all necessary information for raising environment awareness and developing and implementing environment management systems.

The IH&RA, UNEP DTIE and EUHOFa are delighted to have joined together in producing this publication, and warmly thank the many sponsors that have made this initiative possible.

**Price**

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