Taking Care *of* BUSINESS

ENVIRONMENTALLY SUSTAINABLE TOURISM ACCOMMODATION

APEC TOURISM WORKING GROUP

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Environmentally Sustainable Tourism Acccommodation
APEC Tourism Working Group—Proceedings of a Seminar and Visits Program held in Cairns, Australia
12–15 April 1999

APEC#99-TO-01.2.

ISBN 0 642 72080 0

Design and typesetting by RTM, Canberra, Australia

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Foreword

It was my pleasure to welcome participants to the APEC Tourism Working Group Seminar and Visits Program on environmentally sustainable tourism accommodation, *Taking Care of Business,* in April 1999 in Cairns, Australia .

The forum brought together experts from around the Asia Pacific region to share and discuss their knowledge of and experience in providing sustainable tourist accommodation. It was a great success and the papers presented at the seminar have been brought together in this compact disk to promote sustainable development in the tourist accommodation sector even more widely.

We all want tourism to grow and prosper and we need to see this growth happen in a way that is both sensitive to, and compatible with, the environment. The long-term viability and prosperity of the tourism industry depends on our ability to make the most of the natural environment.

The global tourism industry is huge and forecasts from the World Tourism Organisation predict that between 1990 and 2010 tourist arrivals worldwide will increase at an average annual rate of 4.1 per cent. Like most countries, Australia is benefiting from this growth. In 1998 international tourism contributed over $16 billion to Australia's national revenue, making it our biggest export earner.

Such growth makes the challenge of sustainable tourism all the more important. Governments and decision-makers need to be more aware of environmental issues than ever before. It is important that tourism developments are carefully sited, designed and managed. By implementing sound environmental practices, it is also possible to make significant cost savings.

The environment is a key tourism resource and by developing and managing tourist facilities in a sensitive manner everybody wins—the environment, the tourism industry, the economy and, importantly, tourists.

Tourism development and the natural environment can exist side by side, and also benefit each other. This 'win–win' outcome is something that I am working hard for.

The APEC Seminar and Visits Program in Cairns was an opportunity to work to further these outcomes. I hope that you find the following papers useful in developing sustainable tourist accommodation in your region.

THE HON JACKIE KELLY MP

Australian Federal Minister for Sport and Tourism

Acronyms and abbreviations

AHA	Australian Hotels Association
APEC	Asia-Pacific Economic Cooperation
BPEM	Best Practice Environmental Management
CALM	Department of Conservation and Land Management, Western Australia
CAST	Caribbean Action for Sustainable Tourism
CERES	Coalition for Environmentally Responsible Economies
CHA	Caribbean Hotel Association
CPIP	Cleaner Production Implementation Plan
DEH	Queensland Department of Environment & Heritage
EIA	environmental impact assessment
EMIAA	Environment Management Industry Association of Australia
EMS	Environmental Management System
EPA	Environmental Protection Agency
ESD	ecologically sustainable development
EUHOFA	International Association of Hotel School Directors
FNQEB	Far North Queensland Electricity Board
GIR	Green Island Resort
IH&RA	International Hotel and Restaurant Association
IHEI	International Hotels Environment Initiative
ISR	Department of Industry, Science and Resources, Australia
NGOs	non-government organisations
OECD	Organization for Economic Cooperation and Development
RAPS	Remote Area Power System
TCA	Tourism Council Australia
TDS	Territory Development Strategy
UNCED	United Nations Conference on Environment and Development
UNEP	United Nations Environment Program
UNESCO	United Nations Programme for Education, Science and Culture
WTMA	Wet Tropics Management Agency
WTTC	World Travel and Tourism Council
WTTERC	World Travel & Tourism Environment Research Centre
WWFN	World Wide Fund for Nature

Introduction

The link between tourism and the environment is well established. Tourists appreciate clean air and waterways, unpolluted cities, and pollution-free natural and built attractions. The demand for nature-based tourism and ecotourism has also grown rapidly in recent years. Tourists concern about the impact of tourism on the natural environment is also increasing. The accommodation sector impacts on the natural environment in a range of ways, with energy and waste management practices high on the list. The adoption of cleaner production operations by tourist accommodation providers offers the opportunity to boost environmental performance and enjoy better business profitability.

Furthermore, recent research shows that consumers are seeking to stay in environmentally sensitive tourist accommodation—so a move towards environmentally sustainable tourist accommodation is a win for accommodation providers, tourists and the environment.

Governments and industry need up-to-date information on sustainable practices and technologies to be able to develop 'best practice' tourism and improve existing operations. In April 1999, the APEC Tourism Working Group held a Seminar and Visits Program on Environmentally Sustainable Tourism Accommodation in Cairns, Australia, to gather and share examples of Best Practice Environmental Initiatives in the area of tourist accommodation.

Taking Care of Business—Environmentally Sustainable Tourism Accommodation brought together industry and government representatives from around the region to discuss this information and help to give the tourist accommodation sector of APEC member economies a competitive edge in the international market.

The Seminar and Visits Program was run over four days—a two-day seminar which included presentations from industry experts and member economies and a two-day visits program.

The seminar informed participants of how to construct and operate sustainable tourist accommodation, and what standards and practices should be used in new facilities. Ways to modify existing facilities were also covered.

Presentations were wide ranging and covered areas such as the methods for conducting energy and waste audits and the implementation of internationally recognised environmental management systems.

Participants visited the Cairns Hilton which is part of an innovative industry–government partnership—the 'Greenhouse Challenge'—designed to lower greenhouse gas emissions by reducing energy consumption and waste generation.

The visits program complimented the seminar presentations, with participants visiting three award-winning tourist accommodation facilities in Australia's Wet Tropics region which is similar to the climate and environmental conditions found in the APEC region. The facilities were Daintree Wilderness Lodge, Coconut Beach Resort, Green Island Resort and Silky Oaks Lodge.

This CD is a record of the Seminar and Visits Program.

International Initiatives

Key Note Address

ANDREW N JONES
Director Asia Pacific Affairs
International Hotel and Restaurant Association

It is with great pleasure that I address you here today on a subject that is very close to my heart, not only as the Regional Director for the International Hotel and Restaurant Association (IH&RA), but also as a consultant and operator of sustainable tourism facilities.

For many years the IH&RA was perceived as a European organisation, and in fact it was. So before going any further, for those of you not familiar with our organisation, I thought I would briefly tell you a bit about our association and then some of the things we are doing internationally and regionally in our efforts to promote sustainable tourism.

The IH&RA works with the following organisations to promote environmental and sustainable tourism:

- World Travel & Tourism Council (WTTC);
- International Hotels Environment Initiative (IHEI);
- United Nations Environment Programme (UNEP IE);
- International Association of Hotel School Directors (EUHOFA); and
- United Nations Programme for Education, Science and Culture (UNESCO).

We are at the very moment working with WTTC, IHEI and others on a submission to the United Nations Commission on Sustainable Tourism to be presented in New York, April 19-21. This paper will outline the importance of tourism and sustainable development and, in fact, the global importance of tourism on the economy of the world as a whole.

Travel and tourism is the world's largest industry and creator of jobs across national and regional economies. WTTC/WEFA research shows that in the year 2000, travel and tourism will generate directly or indirectly, 11.7 per cent of GDP and nearly 200 million jobs in the global economy.

The 1992 United Nations Conference on Environment and Development (UNCED), the Rio Earth Summit, identified travel and tourism as one of the key sectors of the economy which would make a positive contribution to achieving sustainable tourism.

Over the years, we have engaged in joint initiatives with those organisations, some of which are described below.

With IHEI and UNEP

- The convening of an Asia Pacific Environment Forum, in Phuket, Thailand on 26-27 October 1995, with the aim of exploring potential collaboration between the hotel industry, national hotel associations, government and non-governmental organisations.
- The publication of an *Environmental Action Pack for Hotels*, a practical step-by-step guide to setting up an environmental program within a hotel. The manual has been translated into French and Spanish and customised by a number of hotel associations and chains. First published in 1995, it was updated in 1998.

With UNEP

- The joint publication of case studies from the IH&RA Environmental Award in *Environmental Good Practice in Hotels (1997)*. This publication offers practical examples of environmental policy, design, construction and purchasing, water and energy conservation, waste management, staff training and communication strategies. An update on the publication, including information from the 1998 awards, is programmed in 1999.
- UNEP has judged the IH&RA Environmental Award since 1995.

With UNEP and EUHOFA

- A survey was undertaken in 1996 of hospitality educational institutes to determine the extent to which they had implemented environmental courses into their curricula. Directors of the institutes identified the lack of information, expertise and practical teaching tools as the major concern in introducing the environment into curricula.
- Work is currently underway to produce an environmental training resource pack for hospitality educational centres. This will be available in early 1999.

With WTTC

- IH&RA is an industry partner in the WTTC's Green Globe initiative, an Agenda 21 based program dedicated to improving environmental practice.

With UNESCO

- H&RA has entered into a cooperation agreement to encourage hotel chains world wide to sponsor UNESCO cultural heritage sites and attract tourism to them via their marketing campaigns.

The IH&RA annual Environmental Award

Launched in 1990, the IH&RA Environmental Award, sponsored by American Express TRS, was one of the first award programs to promote environmental awareness among hotels and recognise the efforts being made to 'green' the industry from within. The many hoteliers who enter for the award every year demonstrate that hoteliers are being proactive in introducing environmental improvements.

Since 1995, the program has recognised the efforts of both independent and corporate hoteliers by nominating a 'Green Hotelier of the Year' from both categories. Entries are judged by representatives of UNEP. The winners are honoured at the IH&RA Congress and receive US$2,500, a trophy and worldwide media coverage.

Since formally including restaurants in its membership categories in 1996, the award has been extended to include 'Green Restaurateurs'.

IH&RA is impressed by the change witnessed in the quality of applications submitted for the Environmental Award over the past five years. Programs are much more developed and complete, and the level of entry now is such that award criteria have had to be reviewed each year to make them more challenging.

National Hospitality Association environmental programs

An increasing number of associations are launching environmental awareness programs. In addition to adapting the *International Hotel & Restaurant Association/IHEI/UNEP Environmental Action Pack,* some of national association members are now harnessing the different resources of other organisations and government bodies to underpin the development of their own program.

The Hotel Association of Canada has piloted an initiative to recognise hotels that have made improvements in their environmental performance by awarding a rating of one to five 'Green Leaves'.

As Julian Koziak, then Chairman of the Hotel association of Canada, pointed out, 'Once our members participate they will find significant savings in areas such as water conservation and energy efficiency. Hotels should look at this program not only as an opportunity to do the right thing but to improve both their fiscal and environmental bottom lines.'

Another notable example is CAST—Caribbean Action for Sustainable Tourism—a voluntary alliance for sustainable development bringing together the Caribbean Hotel Association (an IH&RA member), the Caribbean Tourism Organisation, Green Globe and IHEI. CAST has developed workshops, training courses and guidance material for its members on a wide range of environmental issues such as environmental management systems, energy efficiency, renewable energy and wastewater management. Those who become members and commit to a proactive work plan for ongoing improvement receive the full support of the organisation.

Other hospitality associations have launched programs to certify eco-friendly hotels. An example is Denmark's 'Green Key' Program. It is awarded to both hotels and youth hostels which satisfy a minimum of 55 criteria. HORESTA (Association of the Hotel, Restaurant and Leisure Industry in Denmark) has partnered with the Danish Energy Agency and the Danish gas and electricity companies to create energy savings. In addition, subsidies for energy savings have been made available to the industry.

Company initiatives

There are many champions and examples of initiatives taken by hotel companies and individual hotels around the world, too many to talk about in detail here, but outlined in the publications mentioned below.

Canadian Pacific Hotels, the largest hotel conglomerate in Canada, has developed an environmental program, which is recognised as the most comprehensive in the North American hotel industry. Based on the results of a survey, employee suggestions and the recommendations of a professional environmental consultant, Canadian Pacific Hotels developed a list of 16 goals to be attained by all hotels. In addition to individual property goals, all 26 hotels in the group were challenged to reduce the amount of waste sent to landfill by 50 per cent for the group by introducing a recycling program. Purchasing policies were also redesigned to ensure waste reduction at source, and ensure supplies in the hotels were nature friendly. Last year the group held an environmental conference attended by environmental 'champions' in each property. Canadian Pacific has also developed its own environmental management system to track the progress of the group based on an environmental review carried out in 1997 on best practices across Canada.

IH&RA environmental publications

- *Energy Savers: A Guide to Saving Energy in the Hotel Industry (1991)*
  Energy conservation ideas drawn from applications for the IH&RA Environmental Award, compiled by IH&RA and produced with the support of American Express TRS.
- *Environmental Action Pack for Hotels (1995 & 1998)*
  A practical step-by-step guide to setting up an environmental program within a hotel, produced jointly by IH&RA, IHEI and UNEP. It has been translated into French and Spanish and customised by a number of hotel associations and chains.

- *A Guide to Energy & Water Conservation in Hotels (1996)*
  A practical guide for management, employees and engineering staff, based on experiences gained from auditing hotels in Hong Kong. Prepared by Hong Kong Polytechnic University in collaboration with Hotel Nikko Hong Kong, winner of the IH&RA Corporate Environmental Award 1995.
- *Into the New Millennium—The International Hotel & Restaurant Association White Paper on the Global Hospitality Industry (1996)*
  Contains the IH&RA policy statement on sustainable tourism and an analysis of the key forces driving change in the hospitality industry.
- *Environmental Good Practice in Hotels: Case Studies from the IH&RA Environmental Award (1997)*
  Compiled by IH&RA with UNEP IE. Fifteen case studies of environmental programs in operation in hotels around the world, both independent & chain affiliated in developed and developing countries. Offers practical examples of environmental policy, design, construction and purchasing, water and energy conservation, waste management, staff training and communication strategies.

Infrastructure

As I go around this region one aspect of sustainable tourism keeps being mentioned whether it is in India or the Philippines, Thailand or the Indian Ocean region. I would like highlight it by relating it to a movie that I saw. This is actually a favourite movie of mine because I found it very inspirational. So I called this section of my talk today 'The Field of Dreams Syndrome'. Did anyone see this movie? It starred Kevin Costner and a few other well known actors. The story, and I'll condense this as the film was over an hour and my talk is supposed to be 45 minutes, is about a farmer in the mid-west who hears this, I'll say, spiritual voice and although nearly bankrupt, decides to build a baseball diamond in his fields. He goes through all sorts of trauma, but eventually, as in all the best films he overcomes the difficulties and builds his diamond where people can come and play and forget the hard times. The last footage is of hundreds of cars snaking their way along small country roads to reach his place.

I found it very inspiring; it still gives me goose bumps when I think about it. And then as I thought more about this scenario, my professional side clicked in and I started to think, so, where are they going to park all those cars? How will they feed that many people? What about toilets and garbage collection? In the movies they don't have to think about such things, but in real life we do!

One of the most commonly talked about shortcomings in many tourism destinations is the lack of infrastructure. And sensitive infrastructure at that!

Another aspect to consider when focusing on the impact of tourism on a local community is education.

Dissemination of information is also very important, because:

People don't know what they don't know and they don't know that they don't know.

By addressing the needs of the local people and tourists in a sensitive and environmentally friendly manner, it becomes a win–win situation for all.

I just came from the IOTO workshop on Coastal Zone Management. Someone asked whose fault it was for allowing mega projects to be undertaken in certain countries and regions, where they have detracted from the local culture and heritage. Is it the government, the developer, the management companies or the tourists themselves?

There was a feeling that it really does start with the government. After all they are the custodians of our communities. However I feel that it is everyone's responsibility.

Conclusion

So, what is this seminar all about?

I believe that such seminars are about good governance, community, integrity, responsibility, ethical decisions, building for our future generations and most importantly, how we can work together for the common good.

It starts here. Each and everyone of us in this room can commit to make a difference in the countries and communities where we live and work.

I would like to leave you with this thought. I don't know who wrote it but it is a saying that has come up in a number of our IH&RA workshops and it is an interesting thought that may give some people an impetus to change.

If you always do, what you always did, you'll always get, what you always got.

It is time to do things differently. To take those positive elements of our society, sense of community, culture and heritage, interwoven with communal effort, values of honesty, integrity and ethical behaviour and, enhanced with new technologies, provide clean, safe and environmentally friendly sustainable developments.

As we head into the new millennium, let's start to make that difference—NOW!

Environmental Management for the Travel and Tourism Industry

PROFESSOR RAY SPURR
Policy Adviser Asia/Pacific
World Travel & Tourism Council

What is Green Globe?

- An industry led environmental management program since 1994.
- Aims to improve environmental practices by raising awareness.
- Re-launched in 1999, entering into a Strategic Alliance with WTTC.
- Based on Agenda 21 principles.

Components of Green Globe

- Membership: for businesses world wide, with 500 members in 100 countries.
- Destinations.
- Certification.

Green Globe membership

- Members receive practical information, technical advice & support, & best practice examples on how to improve their environmental performance.
- Green Globe Achievement Awards for significant improvements, presented at ITB Berlin each year.

Priority areas for action

- Waste minimisation.
- Energy efficiency, conservation & management.
- Waste water management.
- Control of hazardous substances.
- Transport.
- Land use planning & management.
- Consultation with staff & local communities.
- Purchasing policies.
- Sustainable design.
- Partnerships for sustainable development.

Benefits of Green Globe

- Reduced operating costs through improved energy, water & waste management practices.
- Competitive advantage with 'green consumers'.
- Improved relations with all stakeholders.
- Globally recognised branding.

Green Globe destinations

- Recognise those tourist locations where there is concerted effort by all organisations involved in the local tourism industry to improve the quality of the environment.
- Process provides a framework to guide tourist locations towards achieving sustainable development based on Agenda 21 principles.

Destination process

- Tailor made to reflect local political, cultural, social, natural & human induced circumstances.
- Achievable, realistic & flexible.
- Facilitative process—development, training, funding, partnerships, delivery of targets, technical advice, research.

Destinations to date

- Jersey achieved Green Globe Destination status in 1997.
- Vilamoura in The Algarve, Portugal, due to achieve status in 1999.
- The Philippines—Ifugao Rice Terraces and Camiguin Island projects underway.

Philippines destination process

- Memorandum of Agreement signed in November 1997—full destination process estimated to take three years.
- Aim—to develop, through strategic planning with all stakeholders, an implementable action plan for sustainable tourism in the Philippines.

Ifugao Rice Terraces and Camiguin Island

Both met the following criteria:

- High quality natural or man-made land- or seascape worthy of protection or enhancement;
- Tourism sector where the environment plays a significant role in the product offered; and
- A receptive host community.

Local objectives

Local objectives include:

- Specific number of training workshops and recycling points implemented;
- Training module implemented for restaurateurs; and
- Specific number of training seminars attended and local businesses formed.

Green Globe certification

- A scheme to measure environmental performance, specific to the Travel and Tourism industry.
- Structured around an Environmental Management System (EMS) with key performance requirements.
- Will be *the* global standard for Travel and Tourism.

Why get certified?

- Increasing consumer (leisure traveller and tour operator) demand, very important for marketing.
- Maintain existing markets, develop new markets.
- Agenda 21 issues could become law.
- EMS improves efficiency.

Elements of certification

- Waste minimisation, reuse, recycling.
- Energy efficiency, conservation and management.
- Waste water management.
- Environmentally sensitive purchasing policy.
- Community partnerships.

Additional criteria

- Local criteria developed in consultation with key stakeholders.
- Local criteria are an appendix to the main standard.
- Issues such as design, handling of hazardous substances, land-use planning and management, noise control, protection of air quality and transport are addressed.

Process

- Registration (free with Green Globe membership, or US$200).
- SGS (world's leading inspection and verification organisation) prepare detailed costings which are dependent on the size of, and facilities at, a business (sliding scale).
- Statement of intent (valid for 12 months).
- Health check from Green Globe.
- Main assessment from EMS—detailed review.
- Certification—valid for 12 months and renewed annually through surveillance visit.

More information?

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Sustainable Tourism in the Caribbean and the Private Sector Perspective

ANDREW N JONES
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The Wider Caribbean encompasses an area which includes 12 continental countries bordering on the basin and 14 island nations, as well as several dependant territories. Within this region is found a variety of people, cultures and political systems representing countries with different types and stages of economic development. French, Dutch, English and Spanish are the common languages of the region.

There is high degree of diversity in the Caribbean, its living species and habitats. Fifteen per cent of the world's reef systems are found in the Caribbean Sea and the scientific community has long since raised concerns over the degradation of these fragile ecosystems.

As most of the countries found in the region are small island developing states, or coastal zone areas, the deterioration of the environment is increasing and there are greater stresses on already burdened systems.

Tourism facts

Generally speaking, the Caribbean is tourism dependant. Tourism is the largest single source of foreign exchange earnings in much of the Wider Caribbean. The past few years have witnessed an explosive growth in the region's tourism.

According to a recently released report of the World Travel and Tourism Council, tourism in the Caribbean:

- employs more than half a million people, which represents one in every four persons;
- generates 31 per cent of the GDP, making it the largest relative producer of travel and tourism in the world;
- earned $11.8 billion in foreign trade from overseas visitors in 1995; and
- provides 57 per cent of the scuba diving tours worldwide, which are forecast to gross $1.2 billion in scuba alone by the year 2005.

Furthermore, many governments whose primary economic activity had traditionally been agriculture or manufacturing, are now turning to tourism as a labour intensive industry and provider of high rates of foreign exchange. Many countries have embarked upon massive hotel construction programs. Tourism is expected to experience a 36 per cent increase in visitor arrivals over the next decade, which will:

- double the number of hotels in the region; and
- expand by 70 per cent, creating 2.2 million jobs by 2007.

The Caribbean tourism product

The predominant tourism product of the region is 'Sun, Sea and Sand'. That is to say, the tourism product depends heavily on the natural environment. It also implies that a majority of the facilities are located on delicate shores and in coastal zones.

Tourism impacts

Although tourism is generally accepted as one of the few alternatives for economic growth in the Caribbean, the social and environmental impacts of this activity are widely recognised by government and private industry leaders.

This recently published UNEP report *Coastal Tourism in the Wider Caribbean* identifies the environmental impacts of this economic activity on our marine resources and categorises them into three areas: construction, operational, and recreational.

These impacts result from or are exacerbated by:

- inadequate policy or design framework;
- ineffective planning and monitoring systems;
- inadequate institutional capacity; and
- low sensitivity to or awareness of the environment by the resource users.

Flawed development process

If thoughtfully advised, tourists will respect environmental controls and regulations. However, the primary danger to the environment comes not from tourists or established operations, but from the flawed development process, which is the responsibility of the region's governments and private industry to correct. The overwhelming bulk of tourism development takes place without environmental assessments. With thousands of rooms under construction, the pitfalls, as well as the opportunities, must be evaluated.

CAST and environmental preservation

The Caribbean Hotel Association (CHA) is a federation of 34 national tourism associations which encompass 1,200 individual hotel properties, 700 supplier organisations, and various governmental organisations. CHA is the pre-eminent private sector tourism organisation of the region.

A volunteer committee of the CHA, the Environmental Committee, helped the CHA to bring environmental issues into mainstream awareness. However, the Environmental Committee lacked the human and financial resources necessary to institutionalise its activities. It was therefore decided to seek support from within the industry itself. A call was made and an elite group of industry leaders banded together to create the Caribbean Action for Sustainable Tourism (CAST), a not-for-profit organisation which seeks to undertake collaborative activities within the hotel sector and promote the effective management of natural resources by providing access to expertise in the area of sustainable tourism. CAST was selected as the implementing organisation to carry the message of environmental preservation to private sector decision makers within the Caribbean region.

The CAST Governing Council contributes $200,000 yearly towards the operating budget of CAST.

CAST is the key link to the private sector in communicating challenges which impact on the sustainability of tourism in the Caribbean region. As such, we have been able to garner the support of the many existing scientific and environmental institutions in the region which see tourism as a vehicle by which they can achieve their own mandates. I might mention, that there are over 3,000 such institutions in the Caribbean region.

CAST provides a conduit for these groups to work with top decision makers in the region, as well as individual hotel groups.

Having created this framework by which to link environmental, scientific and industry organisations, the Environmental Network was well positioned to disseminate information to those most suited to guide the region towards sustainable use and development.

International affiliations

It was important from the inception of CAST to tie in the regional program with global activities. Alliances with two international bodies have paved the way for greater dissemination of information, collection of data and global recognition for work done locally.

Operational manuals

Several manuals were published specifically for hotel operations. They have included an *Environmental Management Toolkit*, which is an operational guide of recommended best practices for hoteliers. The toolkit is broken down into sections for easy implementation. It identifies actions which can be taken immediately, with short-term planning and long-term planning. The toolkit includes chapters on beach management, recreation and entertainment, and how to conduct an inventory of resources.

We found, however, that the toolkit does not reach its full potential as a stand-alone operational manual. Very few hoteliers are committed enough, or have enough time, to actually sit down and create a policy and procedures action plan for their hotel. We therefore complemented the manual with a one-day workshop dubbed, 'Greening Your Hotel'. The workshop has been delivered to over 20 islands and 300 hotels in the past two years.

It furthermore became evident that until a benchmark for recognition in the area of environmental stewardship was established, hoteliers would lose interest. It was also becoming difficult to monitor positive impact because geographical differences resulted in a myriad of programs and activities in different hotels. It was necessary, therefore, to establish a standard by which all hotels could be evaluated and to recognise those hotels that reached an operational level of excellence. It was decided also that the development of an eco-logo or label would be advantageous in recruiting more hotels into the program and, to further this idea, an evaluation of existing labelling or certification would be undertaken.

Additionally, a *Green Resource Technology Guide* was created to identify those technologies most appropriate for use in Caribbean hotels. Buying specifications for equipment such as wastewater treatment plants, environmentally friendly cleaners and detergents, laundry water re-use systems, drip irrigation systems and even solar panels are included in the guide. An annex to the guide lists regional suppliers of those technologies. The suppliers list generated $5,000 worth of advertising revenue. We expect such revenue to enable the guide to be a yearly, self-liquidating publication.

Furthermore, a second annex of environmental groups working in the region and a description of their areas of activities were included. The intention was to create relationships between the hotels and non-government organisations (NGOs) to develop monitoring and environmental education programs.

BROADcast and Green Hotelier

The magazine and newsletter distribution list links 250 entities within the region, which include Ministries of Health and Environment, Ministries of Tourism, NGOs, and hoteliers. The network is used to disseminate quarterly copies of *Green Hotelier* magazine and monthly issues of the *BROADcast* newsletter. The *Green Hotelier* magazine is an internationally published periodical in which the Caribbean and the Americas are featured in a four-page spread. Articles for publication in the regional report are solicited from the network, allowing various groups to put forth their research, programs or philosophies in a top quality publication. *BROADcast* is an in-house publication which focuses on best practice methodologies, case studies, resources for suppliers and consultants and technologies.

The network is supported by an electronic mailing list which highlights information relative to conservation and tourism. A website linking the various stakeholders has been mounted to facilitate the provision of information and the promotion of organisations. Hot links are provided to all those entities who have identified themselves as members of the Technical Advisory Committee.

Training

CAST provides training opportunities to hoteliers. Training has become a large, income-generating activity of CAST, generating $10,000 in the first six months of operation. Training manuals and materials are the property of CAST and trainers are hired on a contract basis.

Assistance programs

One of the unforeseen advantages of creating an environmental program under the auspices of the Hotel Association, has been access to international donor funds. Within two years of operation, CAST has accessed over $2 million worth of 'projects'. Project funds usually pay for the development of training materials, publication of manuals or for much needed research.

Caribbean Environmental Network Project

The purpose of this project was to reduce the negative environmental impacts of tourism on coastal and marine resources by promoting greater collaboration on and coordination of coastal resource management activities with the tourism industry, and to support corrective actions by various interest groups. The project resulted in a number of outcomes.

- A tourism industry environmental network, designed to disseminate information and provide leadership.
- A regional plan of action, outlining the proposed actions to be taken.
- A cadre of persons (planners, engineers, tourism industry and government representatives), trained to undertake coastal management.
- A report on the degradation of coastal and marine resources, including best practice methods and approaches to addressing the problem.

Lessons learned

In conclusion, through our efforts it became apparent that private industry is willing to support the conservation of their surrounding environment when they can identify tangible benefits for themselves. Benefits can include an improved corporate image, competitive marketing edge, reduced operating costs, compliance with environmental legislation, or products and services.

The marketing theme is undoubtedly the most attractive to hoteliers in particular, and awards programs or recognition schemes are well received.

The creation of CAST as a conduit for environmental activities within the hotel sector has been advantageous in that the industry is more receptive to what they perceive to be 'one of their own'.

A collaborative effort is essential. The scientific and environmental communities provide the technical input, but all publications are reviewed and discussed with a focus group of hoteliers before publication to ensure relevancy to operations and congruency of industry terms.

It is widely felt within the region and various groups that quantitative analysis of the financial implications of poor business and development practices on our marine resources is needed to provide further incentive to change traditional practices.

Future

We would like to see the delivery of the regional workshops on a national level with the produced manuals.

We would like to create a wastewater certification/licensing program for treatment plants and their operators.

Currently, UNEP, CAST and the Caribbean Tourism Organisation are considering the development of sustainable tourism indicators for the region. Indicators would include gauges to measure such items as:

- level of pollution in monitored areas;
- implementation of land use zoning restrictions;
- proportion of coast line which is developed;
- real prices of local fish;
- destination of sewage and its degree of treatment; and
- investment in wastewater management technologies and establishment of carry or density capacities.

Benchmarking

(BEST PRACTICE/INNOVATIVE TECHNOLOGY/DESIGN)

Being Green Keeps You Out of the Red

Insights from the Tourism Council Australia Environmental Best Practice Program for Tourism Accommodation

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Environment Consultant
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Background

During 1998, Tourism Council Australia (TCA), the national tourism industry association, undertook the first phase of an industry-wide best practice environmental management program (BPEM) focusing on accommodation properties.

The implementation of this best-practice program is an acknowledgment by the TCA that the tourism industry, by virtue of its size and its close relationship with Australia's natural attractions, has a special obligation to ensure the industry develops and operates in a sustainable manner.

To ensure the relevance of the program to all accommodation properties, irrespective of type or location, it was decided to cover only the environmental issues associated with 'operational' energy, water and materials consumption. The consideration of embodied energy was beyond the scope of this project.

Environmental assessments were undertaken at a diverse group of 25 accommodation properties around the nation in order to:

- determine the current status of environmental management within the industry;
- identify opportunities for cost-effective environmental improvements;
- identify examples of BPEM;
- determine gaps in operator information.

The information gathered during the site visits was utilised in the development of a practical environmental action guidebook for operators: *Being Green Keeps You Out of the Red* [1]. This paper contains a summary of key findings and some case studies from the guidebook.

Energy

Key findings

- Energy charges are a major operating cost for many accommodation businesses—up to 10 per cent of the room charge for low-tariff accommodation such as backpackers and caravan parks.
- A high proportion of total operational building energy consumption (and therefore greenhouse gas emission) is 'locked-in' by decisions made at the design stage.

1 *Being Green Keeps You Out of the Red*: A practical guide to environmental action for accommodation providers and tourist attractions; Tourism Council Australia/CRC Tourism 1998.

- The major energy end-uses in accommodation properties are:
  - space heating and cooling; and
  - water heating.

Together these typically account for at least 50 per cent of total consumption and cost.

- Integration of energy efficiency considerations into design briefs for all new buildings can markedly reduce life-cycle consumption and cost. In particular consideration must be given to:
  - thermal performance of the building envelope;
  - opportunities for natural ventilation;
  - solar water heating; and
  - energy efficient lighting.
- Opportunities for reducing total energy consumption by 20–60 per cent were identified in the sample of properties assessed during this study. This could be achieved by implementing simple cost-effective actions that do not affect the quality of service provided to guests.
- Work practices, particularly in catering areas, can have a significant impact on energy consumption.
- Guests *will* assist operators to reduce energy consumption (eg turning off appliances, lighting) if the environmental benefits are effectively promoted to them by management.
- Many operators continue to evaluate investments in energy (and water) efficiency on the basis of their 'pay-back period'; ie the time taken for the cost to be recouped by the savings. It is also common for investments with a pay-back period of longer than two or even one year to be rejected. This is understandable, but inappropriate.

Understandable, because:	*but inappropriate because:*
Managers are often having to decide whether to proceed with investments which must recoup their cost within a year (eg a directory listing) or even a week (eg newspaper advertisement).	The energy and water savings resulting from changes to equipment will last for many years, sometimes up to twenty years.
The high risk associated with some expenditure demands the prospect of a high return on investment; what if nobody answers the advertisement, what if the new product doesn't work or is beaten to market by a competitor?	The savings from improvements in energy and water efficiency can be calculated with a high degree of confidence: confidence in knowing that they will occur and in estimating their actual value.
The cost of improving environmental efficiency is seen as an expense.	It should be seen as an investment, because unlike a lot of business expenses, the value of the investment is often retained as a capital improvement. Lower running costs will increase profits which should be reflected in the capital value of the business.

Water

Key findings

- Until recently, there has been little financial incentive for most commercial properties to conserve water in Australia as charges have been fixed, regardless of consumption. This is now changing as water authorities move to user-pays pricing systems based on water consumption.
- Opportunities to markedly reduce water consumption through demand reduction (without affecting guests' quality of experience) were identified at all accommodation properties assessed during this project.
- Bathroom water use is generally unnecessarily excessive in all accommodation types.
- Reducing water flows in bathrooms to best-practice flow rates can lead to substantially reduced water and energy costs for operators. The following table shows typical savings achievable at a 100-room property.

Number of rooms	100	
Average number guests per room	1.5	
Average occupancy rate	70%	
Number of guest nights p.a.	38,325	
Water Use	**Conventional Shower**	**Water Efficient Shower**
Shower flow rate (litres/minute)	25	9
Average shower length (minutes)	7	7
Average number of showers/day/guest	1	1
Water use per guest	175	63
Water used each year (litres)	6,706,875	2,414,475
Total Water Cost (supply & disposal)	**$10,050** [2]	**$3,625**
Energy Cost	**$10,150** [3]	**$3,650**
Total Water and Cost Saving	**4,292,400 litres every year**	**$6,425 every year**
Total Energy and Cost Saving	**721,125 MJ every year**	**$6,500** [4] **every year**
Total (Water and Energy) Cost Saving		**$12,925 every year**

2 based on a combined supply and disposal charge of $1.50 per kilolitre

3 based on natural gas at 0.9 cents/MegaJoule and 75% heater efficiency. LPG energy costs would be 125% higher

4 for LPG the energy savings would be $14,550 and the total (water + energy) savings would be $21,050 every year.

- Training staff to change habits and work practices (eg sweeping rather than hosing hard outdoor surfaces) will reduce water wastage and charges without incurring capital expenses.
- Considering water consumption when planning the layout of grounds can markedly minimise life-cycle water consumption. (eg indigenous plant selection, water-efficient irrigation systems.
- Recycling and re-using grey water on site for other purposes such as flushing of toilets and urinals, or irrigating gardens and grounds is environmentally desirable. However, the cost of retrofitting existing properties with appropriate systems is generally prohibitive. While the financial feasibility will change as higher user-pays water charges are progressively introduced, wastewater recycling is something that should definitely be considered when refurbishing existing facilities or planning new developments.
- For properties with water features such as pools, ponds, dams and streams, water can often be re-used by recirculating water within the system, reducing the requirement for fresh water supply.

Materials

Key Findings

- A wide range of solid materials are used by all tourism facilities. Not only does producing these materials consume energy and resources but when they are discarded they contribute to the growing waste disposal problem, filling landfills and potentially adding to litter and pollution.
- Finding ways to reduce the consumption of raw materials which are used to perform common daily tasks is a very effective strategy for moving towards environmental sustainability. Reducing consumption is very important because it means that the environmental impact associated with producing goods is *avoided*, rather than just *managed* once it has occurred.
- Resource use can be minimised by:
  - eliminating unnecessary use (eg individual paper bags for glasses or cutlery in guestrooms);
  - purchasing items in bulk;
  - preferentially purchasing items with minimal packaging (this may be made easier by purchasing locally sourced goods or goods which by their nature *require* less packaging);
  - providing items in bulk versus individual portions (eg for food, drinks and cleaning materials); and
  - changing to less resource intensive methods of performing various tasks (eg replacing paper communications with email).
- Re-using goods and products helps to conserve raw materials and reduce the volume of garbage produced. Utilising single-use disposable items, such as cutlery, plates and cups, is *not* environmentally desirable and often not justified on financial grounds if the full life-cycle cost of providing these items is calculated.
- Recycling has many environmental benefits such as reducing demand for raw materials and energy, diverting garbage from landfill and reducing litter. On the other hand, energy and resources are consumed during collection and reprocessing of materials. Despite this, there is generally a significant net environmental benefit, particularly if recycled goods replace equivalent goods made from virgin materials.
- Collection systems for recyclables are highly visible and are often considered by guests to demonstrate the environmental commitment of operators. Guests are accustomed to recycling at home and are increasingly demanding that facilities be provided at commercial accommodation properties.

Success stories

Energy efficient design

Herons Rise Vineyard

Providing a high level of comfort for guests throughout the year in Tasmania's cool climate was a major challenge for Gerry and Sue White when they were contemplating building additional accommodation for guests at Herons Rise Vineyard south of Hobart. By considering energy efficiency at the design stage, they were able to achieve a level of comfort appreciated (and often commented upon) by guests, while minimising heating costs.

The studio cottage has been carefully oriented so that windows capture heat from the sun early in the day, warming the interior. The walls are extremely well insulated and are designed to act as a heat bank, storing heat during the day and releasing it internally at night. Double-glazed windows and doors minimise heat loss and are complemented by well-fitting curtains. As a result, even in the middle of winter, the cottage remains at a comfortable temperature inside, requiring only minimal additional heating.

J's Bay YHA Hostel

A few key design features have minimised energy costs and greenhouse emissions and have improved guest comfort at J's Bay YHA hostel in Byron Bay on NSW's north coast.

All rooms have been designed to maximise the amount of natural ventilation from the prevailing winds and external screens have been fitted to shade windows from direct sunlight. Ceilings are well insulated to minimise heat transfer into rooms.

In contrast to many other properties located in subtropical climates, no air-conditioning is required to cool the rooms. A single ceiling fan, which requires a fraction of the energy to operate, is sufficient to keep rooms comfortably cool throughout the year.

Reducing water demand

Melbourne Youth Hostel

A study carried out at Melbourne's 300 bed YHA hostel at Queensberry Hill indicated that gas and water consumption could be slashed by up to 50 per cent by a number of measures including improving the management of water flows in guest bathrooms.

At the time of the study, shower flow rates were found to be more than 25 litres per minute and handbasin flows and toilet flush volumes were also considered to be excessive. After carefully considering various options, management decided to install flow control valves throughout the building.

This measure alone is expected to more than halve gas consumption and reduce water use by an estimated 10 million litres per annum! The financial benefits are also expected to be considerable, with annual savings predicted to be in the range of $15,000–$20,000. The hostel expects to pay back the modest capital investment in less than two months, achieving a return on investment of over 500 per cent!

Campground Water Conservation

The amenity block at the Cotter Public Campground on the Murrumbidgee River on the outskirts of Canberra has been designed to minimise the amount of water used by visitors through the use of water conserving appliances.

All taps are spring loaded so that water is provided only on demand. Low flow showers are installed and shower times are restricted to a maximum of 3.5 minutes before automatically shutting off, and toilet flush volumes have been reduced to six litres per flush.

Based on one shower per day, average water use per guest from these measures is probably as low as 50 litres per day, about a quarter of average daily use.

Waste minimisation

Composting

At the Honey Room B & B in South Australia, a container is provided for guests so that kitchen food scraps can be collected separately and composted together with prunings from the garden. To ensure that the food scraps don't attract odour or flies, the container provided has a tightly sealing lid and is emptied daily. According to the owners, their guests are happy to separate out their food scraps.

As a result, organic matter is returned to the soil and the remaining garbage is less offensive and reduced in volume, minimising the number of trips that need to be made to the local tip.

Café Reduces Waste

The operators of the café at the National Aquarium and Wildlife Sanctuary in Canberra have been able to reduce the amount of waste dumped in landfill by 25 per cent with the assistance of staff and visitors.

To reduce costs and waste volume, customers are given a choice of plates and cups when ordering food and drink to minimise the amount of disposable items used in the café. In addition, recycling bins are available in the café and kitchen so that glass bottles, aluminium cans, plastics and paper/cardboard can be collected separately.

The remaining mixed waste is further reduced by feeding food scraps, such as lettuce leaves that are tossed away during food preparation, to rabbits in the wildlife sanctuary.

Benchmarking Energy Efficiency in the Hotel Industry

Energy use and greenhouse gas emissions

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In Australia, the end use of energy is dominated by the transport and industry sectors with the commercial sector, of which the hotel industry is a part, representing only 6 per cent of the total. However, energy use in the commercial sector is mostly in the form of electricity, which because of its predominantly coal fired origin has a very high related greenhouse gas intensity. As a result, while the commercial sector accounts for only 6 per cent of the energy end use, it is responsible for around 12 per cent of the total energy-related greenhouse gas emissions. It is one of the fastest growing sectors, including in energy consumption.

The accommodation and recreation component of the commercial sector is responsible for around 12 per cent of energy use and greenhouse gas emissions and it is one of the fastest growing parts of the sector. Energy efficiency in the hotel industry is therefore an important part of an overall greenhouse gas response.

Building energy performance

It is generally accepted that building energy performance follows something of a normal curve, with a few really bad performers, a few really good performers and most of the facilities having an energy efficiency performance somewhere in the middle.

After some reluctance, the building construction and management industry has accepted that there is a need to introduce some building code requirements to eliminate the worst practices that lead to the really bad building energy performance. This will be introduced through modification to the building code of Australia after due consultation with the relevant stakeholders in the process.

The industry, through the recently formed Australian Building Energy Council, has recommended that the improvement to the middle level performers would be best delivered through some form of voluntary program. Programs such as building rating and labelling, voluntary energy targets and information programs are among some of the proposals. Energy efficiency benchmarking is seen as a critically important component of an information program allowing owners and managers to make realistic comparisons of building performance and to get some idea of what is attainable from effective energy management systems. The role of these voluntary programs is to push the average performance towards that zone of really good performance which is taken to represent current best practice.

Standards and labelling

A related program that looks at the energy performance of components rather than the building system performance is the standards and labelling program.

This program seeks to set minimum energy performance standards for:

- electric motors;
- fluorescent ballasts;
- hot water services; and
- packaged air conditioning units.

It seeks to provide energy performance labelling of:

- white goods; and
- electric motors.

The minimum energy performance standards seek to eliminate the worst energy performers in the group by prohibiting their sale. This is done when, by any measure, the use of the poor performers is clearly not cost effective.

With the labelling program, appliances are labelled with one to five stars so that consumers can make an informed choice at the time of purchase. In some instances, a combination of minimum standards and labelling is appropriate.

Benchmarking

The following discussion on benchmarking draws heavily on an, as yet, unpublished paper by Dr Simon Barry of the Bureau of Rural Sciences. The paper reviews a benchmarking project in the health care sector.

Benchmarking provides a method of comparing performance between different facilities. If hotel A consumes twice the energy of hotel B and they are of similar size and operation, it would be reasonable to conclude that hotel B is twice as efficient as hotel A. But if A is twice the size of B, this conclusion would be invalid and the concept of normalised variables needs to be introduced.

Consider the situation of two graziers, A and B, running cattle farms. Both use best practice management techniques so that their costs of production are identical. If, however, farm A is further from the market, then that farmer will face higher costs to transport his cattle for sale and he will face higher total production costs. In benchmarking, it is important to eliminate variables which are beyond control and to benchmark only the managerial efficiency.

As an example, the energy consumption of a hotel might be represented by the following generalised function:

$$E = f(\text{floor area, aspect, climate, design, lighting control, insulation, air conditioning control, hot water flow control})$$

In this case one could expect that only the lighting, air conditioning and hot water flow would be under management control and statistical analysis techniques would be used to eliminate non-controllable variables.

However, if the benefits are significant, other variables may then be considered controllable. In a very hot climate, it may not be reasonable to accept that building insulation was determined at the time of construction and it may be economical to spend large sums of money to improve the performance. In an extreme case it may be possible to justify changing buildings. So the benchmarking process must be flexible enough to reintroduce variables that may previously have been eliminated.

Measuring energy efficiency

The real trick with benchmarking is to find a reasonable measure of energy efficiency. It is very easy to latch onto a measure that seems to provide a good relationship to energy consumption but which does not stand up to close examination.

Take for example the comparison of energy use against hotel capacity. This is probably a reasonably sustainable relationship based on a number of studies, including a recent one in New Zealand but the problem is how to measure capacity. A simple measure is the number of beds or bedrooms but this hardly holds true with hotels that have multiple functions rooms, bars, restaurants and even large gaming rooms. A major requirement of any benchmarking program is to try to derive a good measure of capacity and then to determine the shape of the relationship line that is unlikely to be a simple straight line.

Throughput, measured as number of room nights, is often taken as a principal non controllable variable that needs to be normalised out of the energy efficiency equation. And while this may be true, the normalisation process is unlikely to be as simple as it is often employed. A related variable to throughput is the occupancy, the ratio of actual rooms occupied and the total number of rooms available. Most likely, the relationship of occupancy to energy consumption is as shown on the chart. It shows virtually no change in

energy use for large changes in occupancy near the peak, dropping off a little with large changes but with energy consumption still being quite high even at low occupancies. This relationship is not dissimilar to the part load performance of an air-conditioning plant.

An easy mistake is to treat throughput as a surrogate for capacity and to try to compare the energy performance of a number of hotels on this basis alone. Then it becomes impossible to know if a hotel that is above the normal line is inefficient or just suffering from low occupancy.

On the other hand, if a good measure of capacity or size can be developed, then it is likely to provide a good measure of energy efficiency over a fairly wide occupancy range.

There are other issues to be addressed in the benchmarking project, including the extent to which individual end use functions have their energy use sub-metered. The data collection system must allow for this information to be collected because it allows a much deeper insight into energy flows within hotels. But at the same time, the system must also cater for hotels that have no such sub-metering. The current proposal is to use as much available information as possible to set up algorithms which will allow the energy use in hotels that have only bulk metering to be allocated by formula. It is hoped to use this detailed data to develop formulae for calculating hotel size and capacity, at least from the point of view of energy efficiency.

Along the way, an assessment will need to be made of how much data should be collected. It has to be a compromise between better capacity for analysis and not imposing too much of a burden on the people providing the data. It is planned to use an electronic reporting template similar to that used for collecting energy data for the Australian Government's own annual energy report, so there is really not much impact in terms of time managing the data once it has been collected, regardless of how complex it is. The real burden will be on the people who provide the data in the first place and that will mostly be the already hard-working hotel engineers.

A further issue is whether to pursue the magic bullet of a single variable benchmark or whether to consider adopting multiple variable benchmarks. The first has the advantage of simplicity and ease of understanding. The second has the advantage of being potentially more accurate.

The benchmarking program

The benchmarking program is a partnership arrangement between the Department of Industry, Science and Resources (ISR) and the Australian Hotels Association (AHA) with ISR, through the Energy Efficiency Best Practice Program providing the funds and the AHA providing the resources and the industry knowledge and contacts.

Work is underway, with the initial phase of the project due for completion in February 2000.

The project will build on previous work in the area, principally the POMEC Benchmarks project conducted by the Institute of Hotel Engineering in Perth, Western Australia a few years ago. While this project was limited to a few hotels in the Perth area and reported its benchmarks in terms of cost rather than energy units, its results are widely quoted and can be credited with raising the profile of energy benchmarking as a valuable tool in hotel engineering.

There is some published international data including from the International Hotel Environment Initiative and the recent New Zealand study referred to earlier. These reports will be used as a reference in developing the program and a valuable measuring stick against which to validate the conclusions drawn from this study.

The main idea is to draw out the large amount of data held by the various hotel chains around the country and to assemble it into a single national database of hotel energy efficiency. Many chains internally benchmark their hotels but their sample size is small and the hotels geographically widely spread. This program gives them the opportunity to benchmark on an anonymous basis with their competitors in similar hotels and locations.

The initial focus is on hotels that have joined up to the Greenhouse Challenge program. These hotels have already made a commitment to improve their energy efficiency and have an annual energy reporting requirement. For them the benchmarking program will require slightly more reporting but in a form that makes it easy to meet their Greenhouse Challenge requirements and that will provide them with the information to help reduce their energy use.

Energy performance indicators

The type of data to be collected includes the following:

- energy consumption and cost
  - by type (electricity, natural gas, LPG, fuel oil)
  - by consumption period (half hourly, weekly, monthly, annually)
  - by end use (HVAC, laundry, kitchens, domestic hot water)
  - converted to standard units (eg kWhr, litres to GJ);
- production units
  - no. guests
  - no. occupied rooms
  - no. meals served
  - no. conference attendees
  - kg laundry
  - domestic hot water usage; and
- physical properties
  - floor area
  - by end use
  - no. rooms
  - no. employees
  - building age
  - building location (weather).

Example

Take the energy performance of two hotels in Sydney over a number of years. The first hotel has an excellent energy management program that has shown a steady decline in energy intensity over the period. In the second, hotel energy has been less well controlled, with some quite wide fluctuations. However, in 1996, the energy intensity of the hotel with the excellent energy management program is still higher than the hotel without a good program. This serves to emphasise the need for good external benchmarking for managers to be able to compare their facilities with others in the industry rather than just with previous years performance, otherwise improvements may be realised off a very poor base and some significant opportunities missed. That having been said it must be admitted that the comparisons are single variable and with energy use compared with throughput so, on the basis of what has been said previously, must be treated with some caution.

Trends in energy management

I will conclude with an example of some recent trends in energy management coming out of the United Kingdom. It has been increasingly obvious that a major impediment to energy efficiency is lack of time and skills on the part of the people responsible for managing energy efficiency. So the TEAM software company has been developing an expert system that not only monitors energy use patterns but also identifies deviations from normal profiles and then suggests possible causes of the problem and possible remedies. The slides give an indication of how the system will work. Over time, as consumption peaks are addressed and the actual causes and responses are fed back into the system, the system becomes more accurate in its diagnoses and remedies.

The system runs over the Internet or an intranet so that users only need to have a web browser to access the full functionality of the system. It is proposed that additional assistance would also be available on specialist items like setting time clocks or adjusting temperature settings through interactive training programs that might include audio and video, as appropriate.

Cairns Hilton—Taking on the Greenhouse Challenge

About the Greenhouse Challenge

Announced in 1995, the Greenhouse Challenge is a cooperative effort of Australian industry and the Commonwealth Government to reduce greenhouse emissions through voluntary industry action. Participation in the Challenge is through 'cooperative agreements' between the Government and industry participants.

The objective of these agreements is to capture the capacity of industry to abate its greenhouse emissions, mainly by improving its efficiency in energy use and processing. A successful program will mean that Australia is developing sustainable strategies that respond effectively to climate change, while enhancing Australian industry competitiveness.

Australian industry accounts for about 45 per cent of Australia's national greenhouse gas emissions. Through Greenhouse Challenge, enterprises are encouraged to take a voluntary and self-regulatory approach to emissions reductions. This most commonly involves improvements in energy and process efficiency. Hundreds of Australian companies and industry associations are participants in the Greenhouse Challenge.

Greenhouse Challenge aims to achieve maximum greenhouse reductions, while at the same time enhancing the competitive advantage of business. It is a win for business and a win for the environment.

Global warming

Global warming is one of the major environmental challenges facing the world today. The greenhouse effect is a natural process. Greenhouse gases in the atmosphere trap the sun's warmth, raising the temperature on Earth. Without these greenhouse gases, the Earth would be much colder and inhospitable to plants and animals.

Human activities are increasing the concentration of the main greenhouse gases in the atmosphere and adding new gases. The levels of greenhouse gases have been increasing since the industrial revolution, exaggerating the natural greenhouse effect and causing an increase in the Earth's temperature. This is known as 'enhanced greenhouse effect'.

Climate change is particularly important to Australia as a major agricultural and resource based economy. Australia and other countries are obliged to take action to abate their greenhouse emissions. If Australia is to compete globally, Australian industry will have no choice but to continuously improve its performance, especially in energy efficiency.

Aims of Greenhouse Challenge

The Government has set up the Greenhouse Challenge as a 'One Stop Shop' to:

- support the development and implementation of the program;
- assist industry in the development of action plans to abate greenhouse gas emissions and to facilitate the development of a cooperative agreement which satisfies the requirements of both parties;
- seek to remove impediments to industry achieving improved greenhouse gas performance; and
- evaluate and report on the program's performance.

The Greenhouse Challenge offers support and publicity to industry partners who enter into cooperative agreements. A range of technical materials and workbooks has been produced by the Greenhouse Challenge to assist enterprises joining the program. Industry liaison officers help each enterprise through the process, and introductory workshops are held for companies, where all relevant company staff can learn about Greenhouse Challenge.

Further information on the **Greenhouse Challenge** can be found at:

http://www.greenhouse.gov.au/challenge/

Cairns Hilton—cooperative agreement for the Greenhouse Challenge

Company profile

The 265 room five-star Cairns Hilton opened its doors in 1987—one of the first international standard residential hotels to operate in Cairns. The hotel caters mainly for the leisure market, including both international and domestic visitors to the region. In addition, the hotel caters for conventions and meetings and operates two restaurants and two bars. The Cairns Hilton employs a total of 245 staff and contributes over $15 million per annum to the local economy.

Taking up the challenge

Prior to joining the Greenhouse Challenge, the Cairns Hilton was very much aware of the need to look after the environment. A number of environmental initiatives have been introduced in recent years, from changing work practices to accommodate waste management and recycling initiatives to reducing energy and water consumption.

The hotel has formed a Greenhouse Challenge Task Force Committee made up of senior management, with each member assigned particular duties and responsibilities in regard to preparing the Cooperative Agreement. This has ensured all areas of the hotel are fully committed to implementing its Greenhouse Challenge Action Plan.

Once the task force committee was formed, each department assessed its emission sources and areas of possible savings. A waste audit was carried out and the results assessed. All staff were involved in the audit, and a feeling of pride in doing something concrete and worthwhile was evident.

Emissions

The organisation identified three emission-producing activities: on-site electricity and natural gas use, and the disposal of waste to landfill. In total, these activities produced 7,493 tonnes of CO_2 equivalent in 1990 and an equivalent of 7,475 tonnes of CO_2 in 1997. Electricity use remains the single highest area of emission, and is expected to remain so through to the year 2000.

Action plans

In order to prioritise the action plan to incorporate achievable goals, the Cairns Hilton task force addressed the main areas of major emissions. As electricity consumption is the greatest producer of CO_2 emissions, the action plans address this issue in particular. In total there are six action plan initiatives.

Building management system

The hotel is due to install a building management system to control electrical and water consumption. The system will ensure that by the year 2000 CO_2 emissions will be reduced by 955 tonnes.

Bridge sensor lights

The Cairns Hilton is constructed in an oval shape with open atriums, with the seven guest floor levels exiting onto open internal landings. The hotel will install 'bridge' lights on the internal landings with daylight sensor switches. This will produce a saving of five tonnes CO_2 equivalent.

Laundry boiler change

The present laundry steam boiler is heated by electricity. In March 1999 the Cairns Hilton hotel will purchase and install a new gas steam boiler. Apart from a two-year return on investment, by installing the gas powered steam boiler, the hotel will enjoy a reduction in greenhouse emissions of 359 tonnes of CO_2 equivalent.

Guest room lights

The hotel will replace lighting in guestrooms by April 2000, reducing average consumption per room from 6kW to 3.2kW per day. This action will result in an emission saving of 207 tonnes of CO_2 equivalent.

Cooling towers upgrade

In August 2000 the hotel plans to upgrade the cooling towers to a much cleaner and technologically superior system. By doing so, a saving of 196 tonnes of CO_2 will be achieved.

Chip garden waste

Being a resort style hotel with substantial gardens and grounds, garden waste will be chipped and used as garden mulch. By adapting this action plan a reduction in greenhouse emissions of 37 tonnes of CO_2 equivalent will be achieved.

Forecast emissions and savings

The Cairns Hilton 'no further action' emission forecast by the year 2000 is estimated to be 7,743 tonnes CO_2 equivalent. Following the implementation of the action plan the projected savings are estimated to be 1,838 tonnes CO_2 equivalent, a 24 per cent reduction on 1997 levels.

Future vision

The Cairns Hilton will strive to become a benchmark hotel for others to follow, in the year 2000 and beyond. The hotel is conscious of its responsibility to protect the environment and preserve the wonders of this region's great natural and world heritage listed assets, the Great Barrier Reef and the Daintree Rainforest. Initiatives taken to reduce greenhouse emissions now will not only preserve the livelihood of our industry for the future but also provide enjoyment for many future generations to come.

Verbena Heights, Housing Development at Tseung Kwan O, Hong Kong

MABEL TSE
Director
Anthony Ng Architects Limited (Hong Kong)

Introduction

The award winning Verbena Heights project shows how a high-density, high-rise housing project for 3,000 households which is appropriate to the sub-tropical climate can be developed using environmental design concepts while setting a benchmark of sustainability in Hong Kong.

The project represents an attempt to address and respond to increasing environmental concerns in the urban living environment. Supported by extensive research studies parallel to the design process, environmental features such as use of solar energy, sun shading, enhanced natural cross-ventilation and natural lighting, water conservation, noise mitigation et cetera were incorporated into the design. The distinct architectural image is a direct result of such integration which, in turn, created the unique identity for this housing development.

Whilst this is not a tourism development, the environmental approach and techniques used in both design and construction could easily be translated to tourism facilities. This project is also a very successful demonstration of how modern as well as traditional low impact materials can be successfully combined to produce a healthy and aesthetically pleasing environment.

Environmental design strategies

The following are lists of environmental design strategies from the research studies, many of the 'Alternative Strategies' have been adopted and integrated into the design while some of the 'Advanced Strategies' have not been implemented due to budgetary constraints.

Energy

Alternative strategies	*Advanced strategies*	Natural ventilation
Building layout designed to harness ambient wind for space cooling.	Wind tunnel studies to optimise wind-driven ventilation for apartment units.	Solar shading/insulation
External shading device and roof shading/insulation to control heat gain.	Computer modelling analysis to optimise shading/daylighting design.	Harnessing of solar energy (active)
Provision designed for apartment units to incorporate solar water heating system.	Building integrated solar collector for water heating and photovoltaics for lighting, etc.	Harnessing of solar energy (passive)
Clothes drying space with good solar / wind exposure to encourage use.	Ventilation stack designed to utilise solar heating to drive air movement.	Minimisation of electric lighting
Light-shelves to optimise daylighting to depth of room; daylighting to lobbies and other communal areas.	Daylighting design integrated with intelligent control systems and photo/occupancy sensors.	

Materials

Alternative strategies	*Advanced strategies*	Tropical woods conservation	Alternative formwork materials
(eg steel, plastic, softwoods) to be used instead of unlabelled tropical woods.	Standardisation of design and efficient construction system (eg components prefabrication) to optimise use of formwork materials.	Woods conservation	
Alternative wood products to be specified (eg MDF board for cabinets; engineered wood for structure)	Certified wood materials / products from managed plantation source to be specified.	Materials reduction	
Materials of durability matching expected service life to be selected (eg terrazzo floor tiling, Chinese granite paving).	Space designed to have increased flexibility for the ease of future adaptations (eg convertible housing units).	Low embodied energy	
Materials with low embodied energy (eg some local products) to be specified where appropriate.	Life-cycle energy use (initial / recurring embodied energy and operating energy) in building to be assessed.	Recycled content / recyclability	
Products with recycled content to be used where appropriate (eg play equipment using recycled aluminum/plastics)	Building design to be targeted with increasing percentage of recycled materials and recyclable or reusable materials / components.		

Water

Alternative strategies

Advanced strategies	Flushing water use	Low flush water closet (eg 7.5L
per flush or less) for domestic and communal usage.	Domestic grey water to be appropriately treated and re-circulated for toilet flushing.	Potable water use
Low flow fittings (eg showers, faucets) to be specified to reduce potable water consumption.	Domestic waste water to be biologically treated on-site and recycled for landscape irrigation etc.	**Waste**

Alternative strategies

Advanced strategies	Household solid waste recovery	Space / facilities integrated in
building design to facilitate inorganic waste separation for recycling.	Space / facilities designed to facilitate organic waste separation for composting (on-or-off site).	Construction waste reduction
Disposable material for temporary works to be reduced where appropriate (eg hoarding of recyclable metal vs. hardwood).	Modular design with appropriate detailing to reduce material wastage (eg careful dimensioning of tiling works).	**Livability**

Alternative strategies

Advanced strategies	Noise mitigation	Block layout and noise barrier
walls designed to reduce flats exposed to excess traffic / mechanical noise	Acoustic model tests to develop facade-mounted noise mitigation device.	Wind effect on pedestrian
High- and low-rise blocks juxtaposed to reduce adverse wind impact on pedestrian area.	Wind tunnel modeling studies to optimise building design to safeguard pedestrian comfort and safety.	Indoor air quality
Typical floor lobbies / corridors and car parking space designed to be well ventilated naturally.	Paints of VOCs and other materials containing 'toxic' substances (eg adhesives) to be avoided for indoor application.	Urban greenery
Communal planting space extended to upper levels for increasing amount of urban greenery.	Integrated facade design (an environmental filter) adapted for planting, solar shading, noise mitigation etc.	The disposition and height of the residential blocks are designed to be responsive to the prevailing summer breeze and to optimise the harnessing of ambient wind

for passive cooling. Wind breaks and canopies are designed to enhance pedestrian level wind climate around the major external and entrance areas at the podium levels. Detailed tests were conducted using wind tunnel technology to maximise internal ventilation and resident comfort.

Natural lighting and ventilation have been successfully integrated into the layout of common lobbies for a healthier indoor common environment. In a large development of such a highly populated area, noise mitigation was a major issue. Landscape noise screens and canopies as well as the set-back of buildings from major roads were used to minimise traffic noise.

Conclusion

The Verbena Heights project was awarded the prestigious Hong Kong Institute of Architects Silver Medal Award in 1998 in recognition of its excellence in architecture. This large scale public housing development displays an innovative, minimal impact approach to design, construction and operation which is also applicable to tourism facilities, particularly in densely populated urban environments.

Government Frameworks

Strategic Assessment Toward Sustainability—A Case Study in Hong Kong

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Summary

According to Holmberg and Sandbrook (1992),[1] there are over 70 definitions for sustainable development. The most commonly used one is the Brundtland definition, namely 'development that meets the needs of the present without compromising the ability of future generations to meet their own needs'.[2] In more simple terms, sustainable development looks for a balance for the community's social, economic and environmental needs. In the context of Hong Kong, sustainability can be a style or mode of living and working that will ensure that that style or mode can continue to thrive for many generations to come. Moving along in the direction of sustainable development is a prudent step.

At the local level, sustainability should not be considered on a project by project basis; instead, it should be examined at a strategic level. Long-term planning in the territory, including that related to population capacity, placement of population and associated infrastructures, should be considered and tested against 'acceptable' social, economic and environmental criteria.

This paper gives an overview of the Strategic Environment Assessment mechanism in Hong Kong and how this is applied to achieve overall environmental sustainability. A case study on tourism developments on Lantau Island in Hong Kong will be presented at the latter part of the paper.

Introduction

Although the territory of Hong Kong stretches over an area of 1,076 sq. km, its 6.5 million people are concentrated in the urban areas, which have been developed around the shores of Victoria Harbour and in the new towns of the New Territories. The clustering of population has created a density of population that is unequalled in the world. Since the 1960s, Hong Kong has enjoyed a phenomenal period of development that has seen it grow from an entrepot port for trade with China into one of the world's most important business and financial centres. In the ten years from 1980 to 1990, Hong Kong's gross product increased by 100 per cent. Since then it has averaged 5.7 per cent per annum.[3]

1 Holmberg, J. and Sanbrook R., 'Sustainable Development: What is to be Done?' in J. Holmbert (ed.) *Policies for a Small Planet* (London: Earthscan, 1992), 19-38.

2 World Commission on Environment and Development, *Our Common Future* (Oxford University Press, 11987), 22-24.

3 Environmental Protection Department, *Hong Kong—The Environmental Challenge*: Environmental Protection Department 1986-1996 (Hong Kong Government Printer, 1997), 7-8

Economic growth usually outstrips the arrangements needed to deal with pollution generated by an expanding and increasing industrial and commercial activity. Like most of the modernised cities and industrial economies in the world, Hong Kong has been suffering from severe pollution problems in the past few decades. The pressure for continuous developments has been increasing, as has the demand for better living environment. For project based assessment, Hong Kong has developed an environmental impact assessment (EIA) system since the 1980s to address and mitigate potential environmental impacts through proper planning, design and derivation of appropriate measures. In early 1998, the EIA Ordinance successfully transformed the system from an administrative to a statutory framework. However, considerations at a more strategic level during policy formulation stage are essential to the overall town planning and to safeguard the quality of life we want for our future. In order to thrive in the twenty-first century, it is necessary to begin now to give more attention to the sustainability of our way of life.

Although the citizens of Hong Kong have been aware of their environmental problems for a long time, policies on environmental protection have evolved only in the past decade. In 1974, the government commissioned an overseas firm of consultants to review the territory's pollution problems. The study made a number of recommendations. Yet, the commitment to deal with the problem strategically was made only in 1989 in the government's policy statement in a White Paper entitled *Pollution in Hong Kong—A Time to Act*.[4] Subsequently, the policies were reviewed in 1991, 1993 and 1996. The fourth review will be issued in 1999. During the past decade, significant changes have taken place in terms of public perception, the involvement of green groups and the extent of influence by the legislature. In response to the changes taking place in society, the administration has also taken steps to review and modify policies to take account of the changing external environment.

Land use planning and environmental considerations

Hong Kong is a typical densely populated city with intense competition between development and environment. Virtually all kinds of projects will have, to various extents, a direct or indirect impact on the environment. Therefore, environmental considerations are an indispensable element in the land use planning process. The White Paper on environmental protection stipulated the framework for carrying out the environmental planning process. Like other policy areas, the strategic planning hierarchy starts from the policy objectives, which include development goals and social and economic needs. These policy objectives are then transformed and materialised through a serious of planning process; namely, the territory development strategies, subregional development strategies, district planning studies and project studies.

Territory Development Strategy

The Territory Development Strategy (TDS) is the highest tier in the hierarchy of plans in Hong Kong. It provides a broad framework for preparing subregional and district plans and for integrating government policies on land and infrastructure development. The TDS was completed in 1984 and recommended several major development projects (especially on new harbour reclamation). The TDS was subsequently updated in 1986 and 1988 to take account of demographic changes and to provide input to the Port and Airport Development Strategy and Metroplan.

In October 1989, important decisions were taken to relocate the airport to Chek Lap Kok (on Lantau Island) and to expand port facilities on North Lantau and in the Western Harbour area. Over time, the Pearl River Delta region has developed into an important outward processing area for Hong Kong's industries, helping to promote and underpin the role of the delta region as a major catalyst for China's open door policy. Under such changing conditions, the TDS needed to be reviewed. This review took place in 1996. The primary goal of the TDS Review was 'to establish a broad, long term land use-transport-environmental planning framework within which the necessary land and infrastructure can be provided, having regard to resource availability, to enable Hong Kong to continue to grow as a regional and an international city and become a better place in which to live and work'. [5]

4 Hong Kong Government, *White Paper: Pollution in Hong Kong—A Time to Act* (Hong Kong: Government Printer, 1989), 1-2

5 Planning Department, *Territory Development Strategy Review–Development Options* (Hong Kong Government Printer, 1996), 3

Strategic Environmental Assessment

One of the principal objectives of the TDS Review was to enhance and protect the quality of the environment, having regard to air and water quality, noise levels, solid waste disposal and potentially hazardous installations by minimising net environmental impacts to the community and maximising opportunities to improve existing environmental problems. The strategic environmental assessment conducted as part of the TDS Review sought to identify environmental thresholds for individual areas and districts and to determine whether carrying capacities would be compromised as a result of the proposed developments and, if so, to propose remedial measures, as far as possible within the limits of available resources. At a strategic level, the assessments compared various development options.

A critical component of the overall evaluation process was the capacity to assess the impact of proposed developments if they were to be undertaken within variable timeframes. For example, individual developments or components of those developments could be made more environmentally acceptable by being brought on stream at different times.

Strategic environmental assessments can be implemented at two different stages. The first stage assesses development strategies for their environmental impact on water quality, sewage treatment, air quality, noise, waste management, hazards and ecology. The second stage assesses the combined development components and strategies (including the effects on industrial and employment distribution, transportation, housing and strategic growth areas) in order to identify mitigation measures to address potential environmental impacts or to recommend areas for further studies.

The strategic environmental assessments also form part of the comprehensive study on planning, transportation, finance and economic assessments. For instance, land use and employment distribution will dictate the form and size of transportation infrastructure, which will in turn affect air quality. The need to address environmental impacts will also directly influence the economic benefits of development projects. With balanced assessments using those parameters, development strategies can then be modified and improved.

Subregional planning assessments

Under the TDS, we have subdivided the territory into five subregions: the Metropolitan Area, North-Eastern New Territories, South-Eastern New Territories, North-Western New Territories and South-Western New Territories. Through a series of studies at a greater level than the TDS, the subregional planning assessments have established a set of development plans that form the basis for district planning process.

In analysing the development opportunities and constraints within each subregion, the primary environmental thresholds, including ecological environment, visual quality and sewerage infrastructures, will be examined and considered. Potential development options will be derived and initial assessments conducted to shortlist the preferred options.

District planning assessments

Following up on the development options as identified in the subregional studies, the detailed land use layout planning in each local district will be examined in district planning assessments. The assessments will be more focused on the interface problems between different types of developments within the same district (eg the interface between residential and industrial developments). The level of detail would cover more local aspects with a view to formulate a sustainable local entity. The output of the district planning assessments is usually in the form of a statutory outline zoning plan which would specify the land use arrangements.

Project environmental impact assessment studies

An environmental impact assessment study will usually be conducted to provide environmental input and to devise necessary mitigation measures when the design and construction phases of major development projects are commenced. This detailed level of study of the project enables environmental impacts to be accurately predicted. The EIA study will formulate recommendations on the project design, mitigation measures and monitoring requirements during both construction and operational stages.

The EIA process was given statutory power in early 1998 when the EIA Ordinance was implemented. The ordinance requires major development projects (designated projects) to comply with the EIA requirements and to obtain environmental permits for their construction, operation and decommission.

Case study for tourism development on Lantau Island

Lantau Island, located at the south western part of the territory, is the largest island in Hong Kong (about 170 sq. km). Lantau has been Hong Kong's largest untouched land bank because early developments in Hong Kong were clustered around Victoria Harbour and there was no road or rail transport to the island. However, with the relocation of the new airport to Chek Lap Kok (an artificial island north of Lantau) and the associated infrastructure developments (railway, highways, sewerage etc), the northern part of the island has been under great development pressure.

The TDS Review has identified the major components required to sustain the economic, social and environmental needs of the island. These components include the strategic development areas for population growth (expected to accommodate an additional population of 1.8 million by 2011), transport links, port related facilities and industrial and other commercial developments. The TDS Review has taken into account the opportunities and constraints of the new airport and associated infrastructures in the island's residential, port, recreation and tourism developments. The review also included strategic environmental assessments of the impact of projects on water quality, sewage disposal, air quality, noise, waste disposal, hazards and ecology. Project components or development strategies were evaluated and components requiring mitigation measures or detailed study were identified.

Although the concept of sustainability and the TDS Review appear to be mutually exclusive, it is pertinent to examine the principal articles of Agenda 21 and review these in the context of the TDS. A particular point to note in connection with the preferred options, especially in terms of sustainability, is that the environmental footprint for Hong Kong extends much further than its boundaries. The environmental criteria have, therefore, been assessed in the wider context of regional developments. The strategic environmental assessments in the TDS have included environmental sustainability when formulating strategic development scenarios.

Following up on the recommendations (in terms of strategic development direction) of the TDS Review, the subregional study on Lantau island was considered in the South-Western New Territory Strategic Development Strategy Review study. The SWNT SDR aims to generate a comprehensive, robust and flexible strategy guiding the long-term development of the SWNT subregion in a sustainable way. The study, while recognising the advantages of the airport and transport links for future developments, also highlighted the conservation value of the district. The subregional study refined the broad-brush development directions generated in the TDS Review and set out more concrete guidelines for future development plans.

Subsequently, two district planning studies have been carried out for (a) the residential developments along the railway/highway corridor and (b) the housing/port/tourism development in northeast Lantau. For the latter study, a number of development options were generated and examined. The environmental implications of each option were analysed and compared. With more details available on individual developments, the district level studies were able to provide more information on the compatibility of land use within the district and on how developments will impact on environmental/social/economic aspects of the entire territory. The outcome of the district planning study reinforces the recommendations in the SWNT subregional planning study that Lantau can be developed into a recreation/tourism centre so as to minimise the potential impacts of other industrial/residential developments. Other issues associated with tourism development, including impacts on transport links, the sewerage system and local ecology, have also been listed and assessed.

The district planning studies on Lantau Island are yet to be completed, but it could be traced back to the TDS on how the region was designed for tourism development. In the project EIA study stage, the components of tourism developments would then undergo more vigorous assessment to ensure that the environmental quality standards can be met. This would include the exact layout and elements within the tourism developments as well as the necessary mitigation measures to address environmental issues.

Conclusion

Since the 1992 Earth Summit, Hong Kong has been proactively responding to Agenda 21. A territory-wide strategic environmental assessment of the TDS Review was conducted as a step toward achieving sustainable development. The consideration of environmental impacts of new developments follows from subregional assessments and project based detailed EIAs. The entire planning and assessment process provides for sustainable development while achieving social and economic needs.

Introducing strategic environmental assessment at the early policy formulation stage would ensure that there was appropriate environmental consideration and would maintain the balance of the three key elements for sustainable development: society, economy and environment. Yet, efforts to define indicators that measure the sustainability of developments are continuing. The study on Sustainability and Development for the twenty-first century (SUSDEV 21) was initiated in 1997 with a view to developing sustainable principles, an implementation framework, and indicators for Hong Kong.

From a wider perspective, the sustainable development concept will eventually encompass the study on global sustainability, as we are all sharing the same natural resources. Hence, communication and cooperation among different countries are crucial to maintaining a sustainable future for our next generations.

References

1. Holmberg, J. and Sanbrook R., 'Sustainable Development: What is to be Done?' in J. Holmbert (ed.) *Policies for a Small Planet* (London: Earthscan, 1992)
2. World Commission on Environment and Development, *Our Common Future* (Oxford University Press, 11987)
3. Environmental Protection Department, *Hong Kong–The Environmental Challenge: Environmental Protection Department 1986-1996* (Hong Kong Government Printer, 1997)
4. Hong Kong Government, *White Paper: Pollution in Hong Kong–A Time to Act* (Hong Kong: Government Printer, 1989)
5. Planning Department, T*erritory Development Strategy Review–Development Options* (Hong Kong Government Printer, 1996)
6. Environmental Protection Department, *A Review of Selected Countries' Experiences on Sustainable Development*
7. Ho, S.C. and Au, Elvis, *In Search of a Path Towards Environmental Sustainability in a City Like Hong Kong*
8. Planning Department, *South West New Territories Development Strategy Review– The Recommended Strategy*

Examples of Environmentally Sustainable Tourism Accommodation in Taiwan

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Introduction

The impact of the Asian financial turmoil on Asian tourism was severe, and Taiwan was not immune to the effects. International visitor arrivals in 1998 totalled 2.3 million, a downturn of 3 per cent on the previous year. The outbound travel market experienced a 4 per cent decline to 5.9 million (equal to about 28 per cent of the total population). The situation was different in the domestic travel market which defied the trends in other sectors to grow by 3.6 per cent on figures for 1996. This pleasing result was due to a range of initiatives, including the implementation of a two-day weekend every other week program beginning in January 1998, the vigorous promotion of domestic travel by tourism and tourism-related organisations, and measures taken to stimulate domestic demand. According to statistics from 110 major tourist sites in Taiwan, the number of visitors totalled 66.8 million in 1998, compared with 64.4 million visitors in the previous year.

Tourism's context in Taiwan has drastically changed in recent years. The Executive Yuan established a Tourism Development and Promotion Committee in November 1996, with a minister without portfolio assigned as convenor. The instigation of two-day weekends on alternate weeks beginning in January 1998 gave the population more leisure time, which affected travel patterns. The encouragement of private sector participation in major tourism and recreation development projects through the BOO (build-operate-own) and BOT (build-operate-transfer) methods, in line with the stipulations of the Statute for Encouragement of Private Participation in Transportation Infrastructure Projects, provides good opportunities to develop Taiwan's tourism industry, particularly the domestic sector.

Tourism accommodation

Tourism accommodation in Taiwan falls into three categories: international tourist hotels, tourist hotels and ordinary hotels. In 1998 there were 53 international tourist hotels licensed by the Tourism Bureau, with a total of 16,557 rooms; and 23 tourist hotels licensed by the Taiwan Tourism Administration, with 2,653 rooms. The average occupancy rate for the year was 62.50 per cent for international tourist hotels and 59.78 per cent for tourist hotels. About 60 per cent of room guests in these hotels are foreign visitors. City or county governments administer the 3,432 ordinary hotels, with 115,359 rooms. These mostly provide accommodation for domestic travel.

Accommodation facilities are increasing and being upgraded. At least 30 new international tourist hotels with 7,890 rooms are scheduled to open by 2004. Most of these are deluxe business hotels in urban areas

and resort hotels at key tourist destinations. Many of the existing hotels have technical cooperation, management, or franchise agreements with major international hotel chains.

Policies, regulations and measures

In 1992 an article of amendment was inserted into the Constitution. It states that environmental and ecological protection shall be given equal consideration in regard to economic and technological development. For tourism, this means that the planning, construction and operation of tourist accommodation must comply with a range of regulations and standards of environmental protection, including the Environmental Impact Assessment Act. Other legislation and regulations for zoning, architecture design et cetera also contain reference to environmental requirements. At the same time, government provides various incentives and assistance to help the industry to implement environmentally friendly practices. Major measures undertaken are described below.

Regulations governing tourist hotels

To upgrade the level of accommodation, architectural and facilities, standards for international tourist hotels and tourist hotels are set out in the 'Regulation of Tourist Hotel Administration'. These standards are classified into:

- location and environment;
- architectural; and
- mandatory facilities.

Some standards meet environment concerns, for example:

- if the international tourist hotel is located in a residential area, the whole building is limited to international tourist hotel use only; and
- tightly closed garbage boxes are used for collecting dry garbage and closed type garbage storage rooms equipped with refrigeration system and water cleaning facilities are used for collecting wet garbage.

In addition to those standards, the architectural design, structure and facilities of a hotel must conform to the relevant zoning, architectural, sanitation, environmental protection, labour safety and security, fire prevention and other laws and regulations.

Treating wastewater in tourist hotels

Since 1988, standards for the discharge of effluent by tourist hotels have been governed by the Water Pollution Control Act. The act stipulates that wastewater must conform to certain standards before discharge. Because most hotels were unable to meet the standards at first, the Tourism Bureau provided the following assistance:

- organised a task force to provide tourist hotels with technical information and remedies for pollution control;
- commissioned a study on wastewater characteristics and methods of wastewater treatment in tourist hotels by the Department of Environmental Engineering, National Taiwan University;
- trained professional wastewater treatment personnel in cooperation with the Environment Protection Administration; and
- published the *Handbook for wastewater treatment in tourist hotels* to provide techniques for wastewater treatment and information on reducing water use and water resource recycling and reuse for the tourist hotel industry.

In accordance with Effluent Standards introduced on 1 January 1998, the limits on effluents are as follows: BOD<50mg/l, COD<150m/l, SS<50mg/l, Coliform groups<3000/ml. Some tourist hotels make use of treated effluent to reduce water use. The Caesar Park Hotel spends NT$1 million annually to operate its wastewater treatment facilities. The hotel's gardens are irrigated with treated effluent, thus reducing water use by 300 tons and providing savings of NT$432,900 annually.

Publishing an energy saving manual for hotels

Hotels always increase energy consumption in order to upgrade service quality. In order to promote energy saving practices and technologies in hotels, the Energy Commission, Ministry of Economic Affairs, published the *Energy saving manual for the hotel industry.*

Providing economic incentive

The Statute for Upgrading Industries provides tax incentives to encourage tourist hotels to install machinery and equipment for pollution control, energy conservation and resource reclamation. A number of tourist hotels, including the Grand Formosa Regent Hotel, receive this benefit.

Case studies

The Far Eastern Plaza Hotel, Taipei

Completed in early 1994, the twin towers of the Taipei Metro Complex are an imposing addition to Taipei's eastern business and financial district. Covering more than 10,000 square metres, this precision-built structure features the Far Eastern Plaza Hotel, the Mall retail complex, and a full-service office tower. It is the city's first multi-purpose designed building. The 422-room Far Eastern Plaza Hotel of the North Tower is managed by Shangri-La Hotels and Resorts, a founding member of the Asia Pacific Council of the International Hotels Environment Initiative (IHEI), which plays a leading environmental role.

In accordance with the Group's Environmental Policy, all Shangri-La and Traders hotels implement Green Programs to identify ways to reduce waste, to eradicate practices that might damage the environment, and to promote environmental awareness. The hotels operate a wide range of environmentally friendly practices, ranging from the eradication of plastics for laundry to participation in local community work with organisations. The Far Eastern Plaza Hotel received an Eco-office award from the Environment Protection Administration in 1998, the only hotel in the country to be so honoured.

Some of the hotel's environmental initiatives include the following.

Staff awareness and education

- Establishment of a environmental committee to review environment-protection and energy-saving measures on a monthly basis.
- Implementation of a Environmental Vision Statement.
- Inclusion of environmental awareness issues in all job descriptions.
- Installation of an environmental information board in the 'back of house' area.
- Awareness training/seminars for employees.
- Performance of energy check list by security overnight staff.

Guest rooms

- Guest option to reuse bed linen and towels advertised in the notice Protect our Environment and Working Toward a Better Environment.
- Use of green products, including reusable cloth laundry bags for guest use.
- Return of guest laundry in rattan baskets.
- Use of energy-saving light bulbs in standing lamps.
- Provision of reusable shopping bags (retail item).
- Use of water restricter.
- Recycling and refilling bottles for amenities, use of recycled paper for guest manuals, use of green battery and green fridge.
- Adoption of poster energy-conservation signage on master light switches.
- Collection of newspapers for recycling.
- Avoidance of plastics in returning guest laundry items.

Office

- Recycling of paper.
- Adoption of doubled-sided photocopying.
- Implementation of re-use envelope program (internal).
- Use of recycled paper for all collateral items/guest stationery etc.
- Use of ceramic mugs/cups for coffee/tea (no Styrofoam or paper cups).
- Use of living plants for decorative purposes (instead of artificial plants).

Engineering

- Use of condensed water recovered from AHU (Air Handling Unit) as cooling water for chillers. The cost of installing this facility is recouped in about four or five months.
- Condensation of steam from laundry recycled as water for boiler use.
- Installation of infrared motion light sensors at back of house staff notice boards, housekeeping floor pantries and selected public telephone booth areas.
- Roof swimming pool water supply reused and transferred to cooling tower.

Miscellaneous

- Implementation of food waste collection program (recycled to local pig farms).
- Use of energy-saving light bulbs (compact fluorescent).
- Posting of waste saving signage in kitchen areas (wash-up area).
- Special additional insulation for dryers and pressers in laundry.
- Canvas cover for Jacuzzi in roof swimming pool to save energy.

Adoptive programs

The hotel sponsors a green belt nearby in Tun-Hwa S. Road and a tree planting program on one acre of land in Yangmingshan, with the hotel staff taking turns to fertilise and weed the area at fixed intervals.

Other cases

Alternative energy use

Solar energy use in mountain shelters, Tarogo National Park

Tarogo National Park is the second-largest national park in Taiwan, and two thirds of its area, about 92,000 hectares, is covered by mountains. There is no supply of electricity except along two main roads. In order to facilitate service and safety for mountain climbers, the park's administration utilises solar energy to overcome problems with lighting and communication. Since 1991 the administration has cooperated with the Energy Commission, Ministry of Economic Affairs, which provides solar panel and relevant facilities for experimental stations. Solar energy is used for room lighting of about 15W in four mountain shelters, for lights in tunnels, for indicator lamps outside mountain shelters, and for a wireless communication system covering the whole area.

Geothermal energy use in Hotel Royal Chihpen spa

The Hotel Royal Chihpen, with 183 rooms, is located in the scenic area of eastern Taiwan and is the first international tourist hotel in Taiwan with a hot-spring resort. The Chihpen area is abundant in hot-spring resources. The hotel utilises the high temperature of the hot springs (at 93˚F), which is processed by a heat exchanger (which costs NT$10 million) to yield daily 200 tons of heated water at 50˚F for use in guest rooms, other hotel facilities and the swimming pool in winter. This measure saves NT$250,000 in fuel costs per month.

Waste recycling and reduction at Evergreen Laurel Hotel, Taichung

The 354-room Evergreen Laurel Hotel is situated on Taichung's main thoroughfare. It received an Environmentally Friendly Industry award from the Environment Protection Administration in 1996. Some of its environmentally friendly practices are described below.

- About 200 kg used packing boxes and containers are sold to trash collectors every week, with proceeds going into the employee welfare fund.
- Worn sheets, towels, table cloths etc are collected and returned to the uniform room to be made into all kinds of cleaning cloths by the hotel and related enterprises. The volume of reused materials is about 500 pieces per year, representing a saving of NT$160,000.
- About 600 kg waste food is collected by a pig farm, resulting in saving of NT$250,000 on waste disposal bills.
- Used motor oil is collected and burned as boiler fuel, reducing oil pollution by 35 gallons annually.
- Steam from boilers in the kitchen, jacuzzi and laundry is recycled and the condensed water (about 70–90˚F) is reheated for use in guest rooms, saving 35 kilolitres of fuel oil.
- Doubled-sided copying and re-use of paper results in significant paper savings annually.
- Installation of acoustics-isolated wall outside the ventilation room for noise reduction.

Management of water and energy conservation at Grand Hyatt Hotel, Taipei

- The 870-room Grand Hyatt Hotel is part of the Taipei World Trade Center complex. It has installed electricity and water submeters to control and assess the potential for financial savings.
- The Grand Hyatt uses a key-control system in which the insertion of the room key switches on power to the room and air-conditioner, and removal of the key switches off the whole system. This application is very popular.
- Photo sensors are installed in public areas and elevator landing areas. Two thousand incandescent light bulbs were replaced with energy-saving fluorescent light bulbs, saving 453,330 kWh of energy annually.
- Waste heat recovery using laundry condensate return to pre-heat kitchen and laundry, saving large amounts of fuel.
- Increase staff awareness of water and energy conservation issues. The hotel provided one-and-a-half hour's training on energy and water conservation to staff serving food and beverages and handling housekeeping duties. This program has resulted in monthly savings of NT$200,000.
- Water from the swimming pool is available for connection to the fire-fighting system. Cooling tower drainage is reused as water for washing boiler flue.

Prospects

The World Travel & Tourism Environment Research Centre (WTTERC) recognises that the tourism industry has the most powerful incentive to insure a clean and healthy environment. As it enters the twenty-first century, the tourism industry of Taiwan is guided and self-regulated in adopting environmentally friendly practices and committed to learning from international best practice. This guidance and learning is used to attain the goal of Green Tourism.

Greening Tourism—Governments' Role in Promoting Sustainability

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Summary

For the tourism industry to become sustainable, the environment must not be seen as a cost, but as an opportunity. An opportunity to provide better services, at lower environmental and economic cost. Several techniques, such as 'cleaner production' and 'eco-efficiency' demonstrate that protecting the environment not only makes environmental sense, but also business sense.

This paper examines why business does not adopt cleaner production and eco-efficiency and considers the role of government, at all levels, in encouraging industry to embrace environmental issues and in the process become more sustainable.

Introduction

There is significant evidence to show that if industry and business become more efficient in their production processes, they will not only be more profitable but also reduce their impact on the environment. Despite compelling evidence, industry by and large (but with some notable exceptions), does not automatically seek to identify and implement efficiency changes.

This paper examines why firms, particularly those in the tourism industry, do not automatically seek to maximise their profits by becoming more eco-efficient. Some actions that governments and others can take to encourage moves towards industrial sustainability are suggested.

Throughout this paper, I refer to two concepts relating to improving the sustainability of industry—'cleaner production' and 'eco-efficiency'. Both terms have a similar meaning: improving the environmental efficiency of the production of goods and services and thereby reducing the environmental impact of the production process. In practice, this means increasing the efficiency of resource use, whilst reducing waste and emissions. 'Cleaner production', which is more fully defined later in the paper, is a term coined by the United Nations Environment Program in 1990, whilst 'eco-efficiency' had its genesis in 1992 in work undertaken by the World Business Council for Sustainable Development. Both terms are used interchangeably in this paper.

An 'ideal' sustainable eco-tourism resort

By postulating an 'ideal' resort, it is possible to determine how far we have to progress to ensure that resorts are truly environmentally sustainable. It is quite simple to visualise an ideal sustainable tourism resort, but far harder to construct one. Such a resort would have no long term environmental impacts, and would provide for increased economic prosperity and increased social well-being within the community it operates, as well as both regionally and internationally.

The 'ideal' sustainable resort would produce no waste products, or at the very least, no waste products that could not be broken down by natural systems at the same rate that the waste was produced. The resort would consume natural resources at the same rate that they are 'produced' by nature. Energy would be consumed at the rate that solar or other renewable processes produce it on the site.

No water would leave the resort in any greater amount than would have landed on it by precipitation. No water would be consumed by the resort at a greater rate than it would evaporate from the land area taken up by the resort. Any carbon dioxide produced by the process would be sequestered by the growth of organic material.

The roof of the resort would grow organic material, and hence not destroy the land around it. Indeed, the construction of the resort would need to avoid consuming non-renewable energy, non-renewable building materials, and non-renewable factory fittings. And as for transport for the employees to the site! It is clear that at our level of technology and knowledge such a resort is a fantasy, and will probably remain so for many years. However, this does not mean that the *goal* of achieving a sustainable tourism industry is not worth striving for—indeed, it is a necessity that we do so.

Sustainable industry, a societal necessity

Human environmental impacts are caused by the volume of production and consumption undertaken in society, and by the environmental pressure created per unit produced and consumed. It is often easier to focus on industry, in an attempt to reduce the environmental pressure caused by consumption and production, than it is to change individual consumer behaviour.

Indeed, it is necessary that we attempt to attain the goal of sustainable industry. Even if the doomsayers are only half-right in their predictions, action is required to mitigate future dramatic environmental degradation caused by human activities.

It is estimated that because of such activities, between 20 and 50 species become extinct *per day* [1]. People in one third of the earth's cities are exposed to lead concentrations greater than the World Health Organization's permitted levels.[2] In 1982, 8 per cent of Europe's forests were damaged by acid rain. By 1988, this figure had increased to 52 per cent.[3] In Sydney, Australia, from 1970 to 1990 there was a 30 per cent increase in waste output per head.[4] The impacts of tourism can be particularly severe. For example, in 1989 in order to meet the demands of the tourism industry in the Mediterranean (one of the world's most popular tourist destinations) 25,000 hectares of land were utilised for facilities and 40,000,000m^3 of potable water were consumed. Tourists produced 144,000 tonnes of solid waste and 24,000,000m^3 of sewage.[5]

Such trends are alarming, and unless they are reversed, ecological sustainability will remain an unachievable goal. Eventually, the survival of all earth's organisms, including us, will be at risk.

1 Ernst Weizacker et al, *Factor 4—Doubling Wealth, Halving Resource Use*, Allen & Unwin, Sydney, 1997, p231

2 OECD, *Towards Sustainable Transportation—the Vancouver Conference*, OECD Publications, Paris, 1997, p25

3 John Elkington, *Cannibals with Forks—the triple bottom line of 21st Century business*, Capstone Publishing, Oxford, 1997, p54

4 State of Environment Advisory Council, *State of Environment Australia 1996, Executive Summary*, CSIRO Publishing, Melbourne, 1996, p20

5 Agenda MED FORUM 2000, Programme of the Mediterranean NGOs for Sustainable Development
Draft version directed by Paolo Bifani and coordinated by Rafael Madueño
http://www.pangea.org/MEDForum/a2000_en.htm

Achieving sustainability is an imperative for all members of society. Consumers must take into account the environmental and social impacts of their behaviour. Industry must strive to reduce the material intensity of their production, and governments must ensure that the regulatory, economic and social settings promote, rather than dissuade sustainable production and consumption.

Before considering the role of government in promoting sustainable production, it is necessary to consider why industry, the profit beneficiary of environmental exploitation, does not naturally attempt to reduce its environmental impacts.

Cleaner production and the myth of the profit-maximising firm

Open any first year economics textbook, and under the heading 'theory of the firm', a bold claim will be made—'by their very nature, firms, through the operation of supply, demand, average cost and marginal cost, will act to maximise their profits'.

As is often the case, reality does not bear this out. During 1996–97, Environment Australia funded a program aimed at demonstrating the economic benefits industry would gain by adopting cleaner production techniques.

Cleaner production means the continuous application of an integrated preventative environmental strategy to processes, products and services, to increase efficiency and reduce risks to humans and the environment.

- For production processes: cleaner production includes conserving raw materials and energy, eliminating toxic raw materials, and reducing the quantity and toxicity of all emissions and wastes before they leave a process.
- For products: the strategy focuses on reducing impacts along the entire life cycle of the product, from raw materials extraction, to ultimate disposal of the product.
- For services: cleaner production reduces the environmental impact of a service provided over the entire life cycle, from system design and use, to the consumption of resources required to provide the service.

Cleaner production requires applying know-how, improving technology, and changing attitudes.[6]

Environment Australia's Cleaner Production Demonstration Program proved, like many other similar programs around the world, that firms do not maximise profit. A few examples illustrate this point. [7]

Hotel Kurrajong

Hotel Kurrajong, a four and a half star, 26-room, boutique hotel in Canberra, Australia, joined the Environment Australia Cleaner Production Demonstration Program. Whilst the hotel did not implement all the cleaner production changes identified during the environmental audit (owing to cash flow problems), it undertook major activities in solid waste reduction and water conservation. The water conservation activities saved the hotel $2,250 per annum, whilst the solid waste changes saved $4,500 per annum.

CSR Timber Products

CSR implemented a cleaner production program at its Weathertex factory in Raymond Terrace, NSW. The program cut the reject rate of product, found profitable uses for by-products which previously went to landfill and better managed their water consumption. For a one-off cost of $155,000 for some new plant equipment CSR saved $1.35 million a year. The environmental savings consisted of a reduction in raw material consumption of 900 tonnes of wood, 37 tonnes of wax, 22,000 litres of paint, 200,000 kWh of electricity, 9.5 ML of water, 450 tonnes of coal and 194 tonnes of greenhouse gasses.[8]

6 United Nations Environment Programme, Industry & Environment, *Cleaner Production World Wide v2*, Sales No: 94-III-D.14, Paris, 1995, p1

7 See http://www.environet.gov.au/net/environet.htm for an additional 100 examples.

8 Environment Australia, *Cleaner Production Demonstration Project: CSR Timber Products*, Canberra, 1997, p6-11

Moore Business Systems

Moore produces coated paper forms. It discovered that by altering the set up for their printing presses and changing the temperature of their dryer, they saved over $350,000 a year. No costs were incurred in implementing these changes. The environmental benefits were savings of over 600 km of paper (which was previously landfilled), a decrease in energy usage and a reduction in the production of greenhouse gasses.[9]

These examples pose the obvious question—why was a government program necessary to encourage firms to increase their profits? Surely, if the firm behaves in the theoretical manner postulated by economists, such low-hanging profitable fruit would have been picked long ago, and the only potential profit-making changes remaining would have been very small. Moreover, these profit changes were not small. In the CSR case, if the factory had not made the cleaner production changes, the factory would have been closed.

Why firms don't pluck the low hanging fruit

If moving towards more sustainable production increases the efficiency and hence competitiveness of the firm, it appears economically irrational that the adoption of cleaner production is so limited. In 1997, the Australia and New Zealand Environment and Conservation Council[10] commenced a report, *Towards Sustainability—Achieving Cleaner Production in Australia,* which would identify why firms were not moving towards sustainability and what governments could do to encourage more sustainable industry.

The findings of the report[11] provide rational reasons for why firms are economically irrational. The reasons can be divided into internal barriers to cleaner production adoption, that is, barriers caused by the firm, and external barriers. Among the key internal barriers are:

- A lack of information and expertise—firms are unaware of the concepts of sustainability. Often the managers have a low understanding of their production processes and do not have the expertise to modify the processes. For example, hotel managers do not know about the existence of energy saving light-globes, movement sensors, water saving nozzles, recycled toilet paper etc. Or if they do, are fearful that such changes to their operation will lead to a less satisfying experience for guests.
- Inadequate accounting systems—many firms use simple accounting systems that do not measure all inputs and outputs of the firm, preferring instead to treat many variable costs as 'fixed costs' and lumping them under the term 'overhead'. By doing this, no attempt is made to reduce the variable costs, because they are perceived by managers as a fixed function of production.
- A lack of time—many managers, particularly in SMEs, are so busy managing their 'day-to-day' activities that they are unable to focus on changing processes, even if the changes are financially costless, because they still consume valuable time in implementation.
- A focus on short term profits—the increasing pressure for managers to perform through the use of performance based employment contracts has meant that before changes will be made in a firm, the payback period must be very short. This reduces the scope for many longer term efficiency improvements. The result of this can often be seen in the high turnover of managers in hotels. The owners give managers short term goals to achieve, and if not fulfilled, the manager is dismissed.
- A lack of communication in firms—many firms maintain hierarchical structures that not only compartmentalise decision making vertically, but also restrict communication horizontally. For example, the accounting department is often quite separate from the engineering department and the environment department. For cleaner production to be adopted, all three groups need to work together.
- Inadequate finance—although the majority of cleaner production improvements that can be made by firms require little funding, some improvements do require new technology for the development of new management processes. For SMEs, purchasing such technology may be difficult, as financial institutions do not readily lend funds to SMEs for new technologies that may be perceived as 'risky'.

9 Environment Australia, *Cleaner Production Demonstration Project: Moore Business Systems*, Canberra, 1997, p12.

10 A ministerial council consisting of all State, Territory and Commonwealth Environment Ministers.

11 ANZECC, *Towards Sustainability—Achieving Cleaner Production in Australia,* Unpublished. The document will be published in early 1999.

The external barriers to cleaner production adoption are varied. The main ones are as follows.

- The lack of performance based regulation—until recently, most environmental regulation has prescribed emission standards and technologies. Such prescriptive legislation stifles innovation and does not encourage firms to go 'beyond compliance.' Firms that do not attempt to go beyond compliance often miss out on many of the greater financial, social and competitive advantages that 'beyond compliance' entails.
- The existence of perverse economic incentives—some goods and services provided by governments or taxed by governments reduce the incentive for cleaner production adoption. For example, in Australia, the Industry Commission found[12] that few local governments include rehabilitation and closure costs in setting charges for waste dumping in landfills. Because of this, waste disposal is subsidised by the community, rather than being a cost on those producing the waste.
- Lack of consumer demand—some production processes (as opposed to the actual good or service provided) are driven by consumer demand. Examples include, organic food, eco-tourism, sustainably produced timber and 'green power'. Once consumers gain an understanding of sustainability issues, AND, the products and services produced more sustainably are not significantly more expensive, demand for sustainably produced products will increase. Hotels have recently seen a change in consumer demand for 'clean towels daily'. Because of a concerted education program within the hotel industry aimed at consumers, many hotels report that up to 30 per cent of customers do not require their towels to be laundered daily.

The role of government

Whilst it is clear from the above analysis that many of the impediments to improved sustainability occur at the firm level and are internal to the firm, governments at all levels are able to assist firms in overcoming these barriers. Indeed, governments, both internationally and in Australia have been active in promoting more sustainable industry.

Internationally, a range of quasi-government multilateral organisations are promoting the concepts of cleaner production and eco-efficiency. Some of the more prominent organisations and activities are listed below.

- The Industry and Environment Program of the United Nations Environment Program (UNEP) has established a range of support measures for cleaner production, including setting up national cleaner production centres in a range of developing countries, and running demonstration programs. UNEP also produces a range of publications on cleaner production, undertakes research on policy instruments and promotes the concept through its website.
- The United Nations Industrial Development Organisation is the lead agency for industrial development in the UN System. It works closely with UNEP to ensure that its promotion of industrial development fits with cleaner production principles.
- The Organization for Economic Cooperation and Development (OECD), through its Working Party on Pollution Prevention Control, has been developing analytical tools for measuring environmental performance of industry, so that OECD members can establish whether policy measures developed by members for increasing sustainability are successful.
- Asia-Pacific Economic Cooperation (APEC) has developed an APEC-wide Strategy for Cleaner Production which establishes information sharing networks for data on cleaner production methodologies and environmental technologies.

Most international work at the government level is necessarily in the area of developing analytical tools, researching policy mechanisms, and developing information and awareness packages. It is at the domestic level where it is apparent that more specific programs aimed at industry can take place.

Towards Sustainability—Achieving cleaner production in Australia divides government action into four distinct areas.

12 Industry Commission, *Report on Recycling*, vol 1, No 6, AGPS, 1990, p45–8.

Information and awareness

A crucial barrier to cleaner production is the lack of awareness amongst industry, particularly small enterprise, about what the term 'cleaner production' means in practice, and the significant environmental and financial benefits it provides. Industry is often unsure where to seek technical assistance or information on cleaner production, and is naturally reluctant to invest in a concept of which they have limited knowledge. Education and training are the initial steps towards overcoming this barrier.

Governments have a role through tertiary education systems to ensure that cleaner production and eco-efficiency principles are incorporated in industry training courses. Governments are also able to prepare training materials, support demonstration programs, and disseminate information through industry associations, as well as directly to industry.[13]

Developing tools to support sustainability

A range of analytical tools and techniques can be used to support industry in its quest for sustainability. Many of those tools are relatively new, and some require government support to be fully developed and promoted to industry. *Towards Sustainability* identifies nine 'tools' that provide industry with assistance in becoming sustainable.

1. Environment management systems (including ISO14000); [14]
2. Environment accounting;
3. Public environment reporting; [15]
4. Environmental labelling;
5. Life cycle assessment;
6. Cleaner production training;
7. Cleaner production indicators;
8. Performance based contracting; and
9. Design for the environment.

Each one of these tools falls into one of two categories: providing support to the firm to increase its eco-efficiency; or providing consumers with the knowledge to choose to purchase from firms that are increasing the sustainability of their production process or product. Working in tandem, the tools encourage change through both 'supply push' and 'demand pull'. A more direct way of changing both consumer and industry behaviour is through regulatory measures. These are discussed below.

Regulation and self-regulation

Regulation

Regulation is a major means by which governments can ensure strong environmental performance from industry. It is seen by some as the only 'fail-safe' mechanism for environment protection. Regulation is a powerful industry motivator, and provides legal recourse for government and the community against polluting industries. However, regulation should be carefully formulated to ensure that it doesn't inadvertently discourage continuous environmental improvement or industrial innovation.

Regulation has a number of costs. It can have a high cost to government (and thus, the taxpayer) through the resources required to draft, pass and enforce regulatory legislation. The drafting process can be protracted due to the need and desire to consult all key stakeholders. Attempting to satisfy all stakeholders can, in a worst-case scenario, lead to 'lowest common denominator' standards and the very nature of a

13 *Towards Sustainability—Achieving Cleaner Production in Australia* identifies 15 measures for government to increase the awareness of cleaner production to industry.

14 ISO14000 has the potential to provide a very strong driver for industry to change its production behaviour. Some large international companies have started requiring their suppliers to establish ISO14000 certified management systems—those who do not, are unable to supply the company. This 'domino' effect will drive many firms to start looking at their environmental impacts.

15 Also known by some as 'Corporate Environment Reporting' or simply 'Environment Reporting'.

regulatory approach can create in some cases an adversarial relationship between government and private enterprise.

Further, the considerable resources required to monitor regulatory compliance means that it is possible for smaller businesses to slip through. Large corporations are obvious targets for monitoring, as their larger outputs make it likely that they will both use more resources and create greater emissions. A review of the Victorian EPA's Industrial Waste Strategy found that approximately 50 per cent of prescribed industrial waste generated in Victoria in 1995 was generated by only 30 companies.[16] Yet the combined effects of many smaller businesses with smaller emissions can have an equivalent environmental impact, which may not be as well regulated because of a lack of government resources.

Self-regulation

Many governments, recognising the problems inherent in relying solely on regulation, are also encouraging companies to play a more participative and responsible role in protecting the environment, through voluntary self-regulation agreements. A strong *internal* industry commitment to environmental best practice is likely to provide better environmental outcomes than if industry is driven solely by external government forces to meet minimum environmental standards. Thus, best practice regulation should always be complemented by a range of non-regulatory tools that encourage this voluntary participation.

While self-regulation does not necessarily automatically deliver 'beyond compliance' improvements to the environment, it does create this opportunity. For this opportunity to be realised, any self-regulatory approach needs to have the aim of continuous improvement, ensure there is a mechanism for covering all participants in the industry and that there is an open and honest reporting system set up on compliance. Regulators should work with industry and other stakeholders to achieve these ends, thereby creating an environment of trust between all stakeholders. In this way voluntary approaches to environment improvement will move industry 'beyond compliance'. While regulatory back up will still be required to ensure minimum standards are met, self-regulatory approaches that continuously improve environmental performance and are transparent will achieve governments' aims and the economic bottom-line for industry.[17]

Whilst self-regulation can promote industry to perform beyond compliance, the 'safety net' of regulation, can also drive industrial change. For example, the US State of Massachusetts required firms to reduce toxic waste generation by 50 per cent by 1997 (base year 1987) and establish toxic use reduction as preferred means for achieving compliance. A review of the program undertaken after six years of operation, showed total use of toxic chemicals had dropped by 24 per cent. By-products produced had fallen by 34 per cent and total releases of toxic materials had fallen by 73 per cent. In the process, firms reduced their costs by US$91 million.

Specific areas for government action in the regulatory field, include:

- requiring environmental planning in EISs;
- establishing zoning plans to encourage symbiotic industries;
- regulating for cleaner production in works approvals; and
- developing performance based licensing schemes.

Economic signals

Another significant area for government involvement is in ensuring that the pricing signals provided to industry by the market and the tax system provide an incentive to industry to be more sustainable.

Sustainability can be dramatically effected by pricing signals in markets. For example, in Australia it is estimated that waste going to landfill is subsidised by taxpayers at a rate of $5.50 per tonne.[18] Such a

16 ANZECC, *Towards Sustainability—Achieving Cleaner Production in Australia*, Unpublished, p57. The document will be published in early 1999.

17 http://www.magnet.state.ma.us/dep/pao/files/tura3.htm

18 Department of Environment Sport and Territories, *Subsidies to the use of Natural Resources*, Environmental Economics Research Paper No2, AGPS, 1996, p87.
Also available on the internet at: http://www.environment.gov.au/portfolio/dest/eeu/eeu_home.html#Publication

subsidy distorts the economics of recycling by making it relatively cheaper to throw out material, rather than recycling it. Governments (particularly local) can remove this subsidy by charging for dumping at landfills. Similarly, the introduction of the price differential on unleaded fuel in 1994 provided an incentive for a change in consumption behaviour by making the more damaging leaded fuel more expensive. This change was estimated to persuade over 500,000 motorists to switch to unleaded fuel, practically overnight.[19]

Governments are also able, via grant programs and taxation measures, to alter the pricing signals given to firms. Several State Governments in Australia run cleaner production grant programs for small and medium enterprises, in an attempt to overcome the problems of accessing finance.

Conclusion

Governments have a significant role in encouraging industry to become more sustainable. However, it must be stressed that achieving sustainability is not solely a function of government. The community must become more aware of sustainability issues. It must be willing to alter its consumption behaviour to ensure that more sustainable methods of production are adopted by industry. Finally, industry itself must become more open to new and innovative ideas, and become more sceptical of the maxim that the 'environment costs', instead adopting a new maxim that 'protecting the environment is good for business'.

19 http://www.environment.gov.au/portfolio/epg/fact_sheets/leadswitch.html

Cleaner Production Demonstration Project for the Tourism Industry

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Summary

The Queensland Department of Environmental Protection Agency is working closely with a major tourism company in the far north Queensland region to develop a cleaner production demonstration project for the regional tourism industry.

The principal motivating force behind the project has come from the Far North Queensland 2010 Regional Planning Project (FNQ 2010) which identified waste, water and energy as key regional issues. The rapid increase in population and per capita waste generation, energy demand and water consumption has increased competition for and pressure on public infrastructure services. The increasing level of regulation and unique nature of the region's environment are factors limiting the landfill as a future waste management option. Energy demand management initiatives may provide significant cost and resource benefits by reducing demand and delaying the need for service upgrades. Demand management initiatives may contribute to a reduction in water consumption and assist in the preservation of existing water supply resources.

Data from waste energy and water audits from facilities operated by Daikyo (North Queensland) Pty Ltd will be used to develop a Cleaner Production Implementation Plan (CPIP) and best practice manuals for use by the industry. Annual visitor numbers to the region are around two million persons, with a projected growth in numbers from between three million to four million within the next 20 years. By taking an industry approach to cleaner production, the potential outcomes of the implementation of a demonstration project on a regional level are likely to be significant.

Introduction

It has been demonstrated that the hotel industry can potentially achieve cost-effective environmental outcomes from cleaner production auditing and planning. The purpose of this project is to develop a Cleaner Production Demonstration Project within the Far Northern Region to provide the regional tourism industry with practical information about cost-effective environmental outcomes achievable through a cleaner production program. The major tasks to be undertaken in order to achieve an outcome on a regional level are as follows.

1. Work with Daikyo to review existing data and collect additional data where shortfalls have been identified.
2. Evaluate cleaner production technologies in terms of:
   – applicability of technology to the industry; and
   – performance outcomes achievable through implementation of technology;
3. Prepare a CPIP and best practice manuals for the industry;
4. Apply the CPIP and best practice manuals to Daikyo facilities;
5. Examine options for the adoption of the CPIP and best practice manuals by the regional tourism industry; and
6. Monitor and evaluate progress in achieving waste and emission reduction goals.

Background

Daikyo became interested in participating in the project following discussions with Ingrid Minnesma, their environmental officer. In order to facilitate the proposal, Daikyo has made available Ingrid, as well as key staff members of the following facilities.

Table 1: Daikyo group facilities

4&5 Star Hotels	*Island Resorts*	*Other*
Cairns International Hotel	Green Island Resort	Moore Reef Pontoon
Matson Plaza Hotel	Fitzroy Resort	4 Great Adventures Vessels Paradise Palms Golf Course

Two of the facilities operated by Daikyo Pty Ltd were listed in Queensland's top 25 largest hotels (ranked by number of guestrooms). As a single company with such a wide ranging interest in tourism both in terms of activities and accommodation Daikyo is the ideal partner in a project which is primarily aimed at demonstrating cleaner production on an industry level.

As well as employing a full time environmental officer, Daikyo have developed environmental committees made up of staff and managers at most of their hotel and resort facilities operated within the Cairns region. Daikyo has demonstrated a strong commitment to best practice environmental management for their facilities, and Green Island Resort is already recognised for achievements in cleaner production.

Tourism—a regional issue

The principal motivating force behind the project has come from the FNQ 2010 Regional Planning Project, which identified waste, water and energy as key regional issues.

Annual visitor numbers to the region are around two million persons with a projected growth in numbers from between three to four million within the next 20 years. Six of the top 25 hotels (ranked by number of guestrooms) in Queensland are located in the Cairns/Port Douglas area. By taking an industry approach to cleaner production, a demonstration project on a regional level is likely to have significant outcomes.

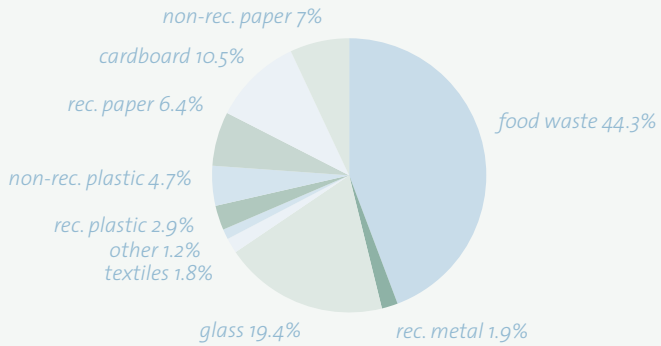
The waste component

The FNQ 2010 has identified waste management as a critical issue in improving the region's environment. The report recognised that the region's waste management can be improved through the development of industry specific waste management strategies.

Daikyo, with advice and technical direction from officers of the Environmental Protection Agency (EPA), has now completed an audit of all Daikyo facilities listed in Table 1.

A typical composition of the waste streams found during the audit is shown in Figure 1. The waste audit results show that 35-64 per cent of total waste stream is organic/putrescible waste. Approximately 21-45 per cent of total waste stream is recyclable, with most properties already recycling approximately 15-27 per cent of the total waste stream. These results indicate that approximately 80 per cent of total waste stream is divertible from landfill.

Figure 1: Typical waste stream composition (Matson Plaza Hotel)



The energy components

Far Northern Qld Electricity Board (FNQEB) became interested in participating in the project following discussions with John Peeters, their regional environmental officer.

FNQEB are keen to work with the QLD Environmental Protection Agency through a partnership agreement. FNQEB has been involved with energy audits in the past and are keen to continue the practice. As a result of the high infrastructure costs associated with upgrading power lines to meet the demand of a rapidly growing city, FNQEB does not consider provision of services to reduce demand for electricity as necessarily incompatible with its role as electricity provider.

In 1992 Daikyo commissioned energy audits of both the Matson Plaza Hotel and Cairns International Hotel. FNQEB are in the process of assessing these reports to determine the suitability and relevance of the information to current operation. It is anticipated that FNQEB will audit those areas where a shortfall of information has been identified in the reports. They will also provide benchmark data on efficiencies and savings resulting from the implementation of recommendations made in the early reports.

The water component

It is recognised that a water usage component is an essential ingredient when considering all environmental outputs. Discussions with Cairns City Council, with a view to accessing their water usage model, which is based on data generated by regular meter readings, are considered important. Although this information will be useful, it is unlikely to provide the detail required. It may be necessary to call on specialists in the field to provide the initial data.

Over the past four years Green Island Resort has been implementing measures to reduce water demand. The consumption rates presented in Table 2 demonstrate a net reduction in water demand of 23 per cent over this period. Reductions in water demand have been achieved through reuse of grey water for toilet flushing and as cooling water. Low pressure shower heads and flow control taps have also been installed through the resort. Given water is barged to the island from the mainland, this reduction in water demand represents considerable cost savings to the company.

Table 2: Water Consumption Rates (Green Island)

Year	Persons on Island	Consumption	Litres per person per day
1995–1996	284184	21049000	74.06
1996–1997	278720	15386000	55.2
1997–1998	220814	14491000	65.65
1998–1999	219639	13325000	56.11

Evaluation of cleaner production technologies and processes

Before an evaluation of cleaner production technologies can be undertaken it is necessary to identify cleaner production technologies and processes applicable to the industry and to benchmark their measured performance. Fortunately much work has been undertaken on cleaner production projects for individual hotel facilities throughout Australia, some of which have been audited against anticipated performance indicators.

It is proposed to develop methods to assist individual companies to identify the most appropriate cleaner production technologies applicable to their facility as well as to assess the likely outcome of introducing such technologies at the subject facility. Currently we are looking at adapting the method developed in the US EPA Report to Congress—*Minimisation Hazardous Wastes* to assess the opportunities for waste reduction from cleaner production processes and technologies. This is a qualitative rating system which has the advantage that benchmarking data can be used to rate the effectiveness of a technology and take into account the extent of current use of a technology and the potential for future application. Qualitative estimates of waste reduction based on current practices and the potential for future reduction through the introduction of cleaner production technologies and processes can be calculated by using this method.

Further discussions are being undertaken with FNQEB to investigate the potential of adapting this method or developing a new method of rating energy based cleaner production technologies.

It is believed that this type of approach is more compatible with continuous improvement. As new technologies and benchmark data of existing process become available facility staff will be able to assess the value of adding new technologies or replacing old technologies over time to achieve higher more cost-effective environmental outcomes. The estimates of waste, water and energy reduction will form the basis of the waste and emission reduction goals to be described in the CPIP.

Development of a Cleaner Production Implementation Plan and Best Practice Manual

From the data generated from waste, energy and waste audits and decisions made on the type of cleaner production applicable to facilities operated by Daikyo will be developed into a CPIP and best practice manuals to be adapted for use by the tourism industry in Far North Queensland.

The CPIP will contain specific waste and emission reduction goals with definite timetables for achieving these goals. The technical and best practice manual will describe how the goals specified in the CPIP can be achieved, identify barriers to the implementation of the Cleaner Production Plan and offer options to overcoming such barriers.

A full audit will be conducted routinely, but not less often than once per year, to monitor and evaluate progress in implementing the cleaner production program and to determine the performance of technologies and processes in achieving waste and emission reduction goals. This information will become benchmark data available for use by other facilities within the region. A regular review of the implementation program and performance data is also required to identify new challenges as they arise.

Applying the concept on a regional level

It is proposed to ultimately provide the Far North Queensland tourism industry with a cleaner production package which will consist of data sheets, procedures and protocols for conducting waste, energy and water audits. Although it is anticipated that specialists in the field of water and energy audits may be required to establish initial benchmark data, it is envisaged that once measures etc are established, auditing of performance can be routinely carried out using this information.

The information provided in the package should enable individual facilities to generate other core information relevant to the cleaner production program internally and therefore keep set up costs to a minimum and ensure ownership of the project remains with the facility.

Information on new technologies and benchmark data of exiting process will be made available through the EPA Internet home page. It is envisaged that a free and fair information exchange will take place where results of audits of cleaner production technologies and procedure against anticipated performance indicators will be regularly added to the database and therefore increase the quality of information available to decision makers.

Explanatory notes, procedures and spreadsheets to be used by decision makers to calculate estimated potential future waste and emission reductions achievable though the use of selected cleaner production technologies and processes will also be included.

The package will include a generic CPIP and corresponding best practice manuals developed directly as a result of the demonstration project undertaken by the Daikyo group of companies. It is envisaged that this CPIP will serve as a working example and that audits of technologies and procedure selected by the different groups of facilities against anticipated performance indicators will be made available through the Internet home page.

Finally, it is envisaged that companies will be able to market cleaner production achievements though either an award sponsored by the EPA for cleaner production achievements or though an existing tourism based award system. At the time of going to print the details of such are still rather speculative, although opportunities in this are have been identified.

References

1 Cleaner production case studies (www.Environment.gov.au)
Hotels:
Parkroyal
The Regent Sydney
Hotel Kurrajong
Hotel Inter Continental Sydney
Conrad Jupiters Hotel and Casino
Green Island Resort

2 Draft national strategy for Cleaner production – Australian and New Zealand Environment and Conservation Council, March 1998 – pg 22, chapter 3 – The Australian Experience, Part A – Working with Industry, Section (I) Demonstration Projects.

3 An Awareness Publication on Cleaner Production – QLD Department of Environment December 1997, pg 25, Section 1.5.2

4 FNQ 2010 Regional Planning Project ' Strategic Directions and Regional Priorities for Far North Queensland' (Draft for Consultation) March 1998

5 Victorian Environmental Protection Authority 'Waste Minimisation Technologies' (Draft Report) September 1988

Case Studies

Sukau Rainforest Lodge, Sukau, Sabah, Malaysia

ALBERT TEO
Owner/Manager
Sakau Rainforest Lodge
Sabah, Malaysia

Location

Sukau Rainforest Lodge opened for business in May 1995. It is built and managed by Borneo Eco Tours which specialises in ecotourism in Borneo.

The lodge is located 15 minutes upstream from Sukau village on the Kinabatangan River. The lodge is 135 kms from Sandakan which is served by Malaysia Airlines which operates six daily flights between Kota Kinabalu and Sandakan.

At 560 kms long, Kinabatangan River is Sabah's longest and Malaysia's second longest river. Much of the lower Kinabatangan River is gazetted under the Kinabatangan Wildlife Sanctuary. It meanders through a flood plain creating numerous ox-bow lakes and an ideal environment for some of the best wildlife and birdlife found in Malaysia.

History

Due to its vast hinterland of jungle and limestone caves, the Kinabatangan floodplain has for centuries assumed strategic economic importance as a source for edible birds' nests, bees' wax, rattan and ivory. Many believe that as China and Borneo has trade links as far back as AD 631, the origin of the name 'Kinabatangan' was derived from Kina (China) and Batang (large river). Moreover, based on Chinese records, there existed a Chinese settlement in the area most probably around Sukau.

Also in the fifteenth Century, a Chinese princess from the Kinabatangan married the first Sultan of Brunei. Between 1791–1808, the Sultan of Sulu even put his son as governor of this area and later in 1881, the British North Borneo Chartered Company took over control of this area and paid US$5,000 per year to the Sultan of Sulu.

People

The inhabitants of the Kinabatangan region are mostly Orang Sungai of mixed ancestry including Tambanua, Idahan, Dusun, Suluk, Bugis, Brunei, Bajaus and Chinese.

Wildlife

Kinabatangan Wildlife Sanctuary is one of two known places in the world to be inhabited by ten primates with four of these endemic to Borneo. It is also one of two places in the world where four colonies inhabit the same place—namely proboscis monkey, silvered langur, maroon langur and Hose's or grey langur. It has the highest concentration of proboscis monkeys and orang outangs in Malaysia.

Other wildlife include long-tailed macaque, pig-tailed macaque, Bornean gibbon, two nocturnal primates namely western tarsier and slow loris and other mammals including Asian elephant and Sumatran rhinoceros.

Hoofed mammals which are mainly active at night include wild cattle or Tembadau, bearded pig and four species of deer namely sambar, greater mouse-deer, barking deer and lesser mouse-deer, which is also the world's smallest hoofed mammal.

Carnivores include the Malayan sun bear, the world's smallest bear, four species of wildcat, namely, clouded leopard, which is the largest wild cat in Borneo, the leopard cat, marbled cat and flat-headed cat. Other small mammals include hairy-nosed otter, oriental small-clawed otter, smooth otter, Malay civet, common palm, small toothed palm, banded palm and moon rat.

Reptiles include tortoise, freshwater terrapin, monitor lizard and crocodile.

Birdlife

Among the 200 species found in the region are eight species of hornbill (rhinoceros, helmeted, black, pied, wreathed, wrinkled, white crowned and bushy crested), oriental darter, several species of egret, Storm's stork, Sunda ground cuckoo, kingfisher, brahminy kite, crested serpent eagle, greater coucal, red-crowned barbet, black and yellow broadbill, white-rumped shama, white-chested babbler, heron, hawk, osprey, falcon, pheasant, parakeet, buffy fish owl, frogmouth, nightjar, trogon, bee eater, roller, woodpecker, pitta, swallow, bulbul, forktail, warbler, flycatcher, flowerpecker, spiderhunter, drongo, oriole and crow.

Some 27 species of bats or an estimated 2 million bats, mostly wrinkled-lipped bats roost in Gomantong Caves. Among the famous inhabitants are four species of swiftlets namely white-nest swiftlet, black-nest swiftlet, mossy-nest swiftlet and white-bellied swiftlet. However only the first two species produce the coveted edible nests, which are made out of their saliva. A top grade white nest can fetch as much as US$4,000 / kg in Hong Kong.

Sukau Rainforest Lodge

Due to its potential as an ecotourism destination, Borneo Eco Tours in 1995 decided to set up the 20 rooms Sukau Rainforest Lodge outside the Kinabatangan Wildlife Sanctuary which offers accommodation facility for up to 40 visitors.

To ensure minimum negative impact on the local population, Sukau Rainforest Lodge was built 15 minutes upstream by boat from Sukau village.

Objectives

The objectives for building the lodge were threefold.

- To build a jungle lodge that is eco-friendly and blends in with the local environment so that tourists will be encouraged to visit Sukau to view wildlife in their natural habitat and experience the beauty of the rainforest.
- To create alternative source of employment in Sukau where the locals are being retrenched from the logging industry as most of the surrounding land will be gazetted by the government in 1997 for Kinabatangan Wildlife Sanctuary to protect the wildlife.
- To develop Sukau Rainforest Lodge as a model for sustainable tourism development.

Design and development concept

The lodge is built 100 ft from the river separated by a buffer zone of trees to prevent soil erosion. It is built on stilts five ft above the ground and has a 10 foot high ceiling to maximise air circulation and cooling. The lounge and restaurant are open to provide for unimpeded air circulation.

Built in traditional Malaysian architecture and on stilts using Borneo ironwood to improve air circulation and mitigate river flooding, the lodge is constructed with hardwood species including Belian, Merbau, Nyatoh, Selangan Batu and tropical cane.

All 20 twin-bed rooms have a solar powered ceiling fan, mosquito netting and attached tiled bathroom with solar heated hot water. Guest facilities include an open dining area, lounge area with tropical can and bamboo sofas, a hanging garden and an open sun deck for outdoor candle-light dining at night.

Recreation

River tours for wildlife viewing are operated by qualified guides using wooden boats built by local craftsmen and powered by electric motor using solar charged battery to minimise noise and air pollution. (Proboscis monkeys can best be viewed by taking a river cruise using electric motor in late afternoon when they congregate on treetops along river banks.)

Arrangement can also be made to visit the home of local Orang Sungai, or a night cruise for spotting crocodile and nocturnal animals. At the lodge fishing can be done at the jetty and jungle walk or night walk can be conducted when weather permits. Two tree platforms at a height of 28ft and 52ft are also accessible for the more adventurous.

Power, lighting and water supply

To maintain the ambience of the rainforest, 20 units of state of the art environmentally friendly Siemens Solar photo-voltaic modules were installed together with 4 GNB longlife batteries and a 3KW Trace Pure Sinewave Power Inverter to provide a continuous 24-hours electricity supply at 240V AC at 50 HZ. This is supplemented by a 15KVA generator during rainy days and heavy load period. Energy saving appliances are used where possible.

At night electricity is supplied solely by solar battery to avoid noise disturbance to wildlife. To minimise energy usage and noise, lighting at night is also supplemented by oil lamps using recycled cooking oil.

Rainwater is collected in eight 400 gallon tanks and one 10,000 gallon liner tank, and filtered before use. In the dry season this is supplemented by river water, which is treated, and sand filtered before use. Hot water is supplied by two units of Solarhart 300JK solar heating systems with a capacity of 132 gallons.

Waste disposal

All sewage waste from the toilets is piped to the septic tanks for treatment while nothing is discharged. Biodegradable waste is composted while cans and bottles are separated for removal to Sandakan for recycling.

Environmental projects

At Sukau Rainforest Lodge issues of the environment are viewed beyond that of the lodge to cover the local environment and community.

In 1996 Sukau Rainforest Lodge set aside 1,000 room nights for volunteers to clear the weeds, Salvinia molesta, in a nearby Kelenanap ox-bow lake. The weeds have completely covered the lake thus affecting the wildlife, birdlife and also the local fishing. Five groups of 20 volunteers, two of them from schools in England, participated in the project.

From 1997 the company with the support of the wildlife department started a rehabilitation program whereby buffy fish owl and hornbills were released back into the wild.

Environmental communication

Files with green policies and guidelines on energy and water usage are placed in all of our rooms. A slide presentation by the naturalist is conducted every night to explain the concept of the lodge development and how it has benefited the local population, and minimised the impact on the wildlife and environment.

Many press releases with photographs were sent overseas to the travel magazines both on the unique products, green environmental policies, environment project.

Local community participation

To ensure that the local community benefited from the project they were recruited as boatmen, gardeners, housekeeping, waiters and assistant cooks. All the boats were built by local fishermen while the building of wooden plankwalks, river jetty, wooden benches and tables were subcontracted to the local craftsmen. Fuel is purchased locally while fish and prawns are bought whenever available.

For the four years between 1995-1999, the lodge injected US$120,000 into the local economy in the form of salary, food and fuels, contracts, among others.

Sukau water tank project

In the 1997–98 period, the company organised an environmental community project to raise US$4,000 to supply sixteen water tanks to sixteen families in Sukau who have no fresh drinking water.

Many villagers living outside Sukau village, particularly those who live on the other side of the river, have been depending on water from Kinabatangan River for their daily needs. Besides they also use the river for bathing, washing and disposal of human wastes. As a result, many suffer from water-borne diseases such as cholera and typhoid.

With the implementation of this project the families will benefit from the following.

- The use of water tanks which would have cost much more if ordered separately and delivered individually from Kota Kinabalu to Sukau.
- Clean rainwater for drinking purposes.
- Improved health conditions with the drinking of cleaner water.
- Participation in the social and economic development program of the government more effectively with better living and health conditions.
- Participation in our future home visitation and home-stay program in which we will bring tourists to have afternoon tea with the participating families and to stay overnight in those homes which have a clean water supply.

Sixteen families in Kg. Sukau were identified as having no water tank. A fund raising campaign was initiated in 1997 with donations coming from both overseas and local sponsors. These were:

	Recipient Name	*Donor Name*
1.	Tilka Binti Tambong	Shangri-la's Rasa Ria Resort / Malaysia
2.	Chita Binti Saal	Biosfera Turismo s.r.l./ Italy
3.	Zomah Binti Itin	Jeannie Chin / Malaysia
4.	Bakri Bin Sakil	Holiday Tours / Sweden
5.	Bakar Bin Saipudin	Passport Travel Management Group / USA
6.	Khalid Bin Damit	Hauser Exkursionen International, GmbH
7.	Hamzah Bin Empok	Bali & Orient Holidays /Canada
8.	Harun Bin Arsah	Safari Centre Int. Inc./ USA
9.	Hassan Bin Arsah	Roland Fasel / Malaysia
10.	Kari Bin Ungong	Deep Discoveries / Canada
11.	Hj. Aniu Bin Hj. Harun	Intens Travel / Switzerland
12.	Magi Bin Darawi	Beringgis Beach Resort / Malaysia
13.	Jutra Binti Itinmalapi	Promenade Hotel / Malaysia
14.	Ghani Bin Manggang	Basel Christian Church of Malaysia / Penampang Cell /KK
15.	Asrah Bin Edris	Piebe & Alie Bylsma / Holland
16.	Jawita Binti Yusof	Canadian & New Yorker Friends

In 1997 the company started to offer tourists the opportunity to visit the homes of the local Orang Sungai for afternoon tea so that they can earn some extra income. Previously some local people did not receive the tourists who visited the local village too well. To avoid such problems the company arranged for them to visit local homes instead. In the future, when the water tanks are installed, a home-stay program will be introduced.

Capacity building

To upgrade skills, the cook was initially sent to a Chinese restaurant in Sandakan town for training. Training in English language, guiding and waiter service was conducted at night. Slide shows were also conducted for the staff to help them upgrade their interpretation skill, and to understand the conservation policies of the government and the needs of the tourists.

Since 1995 Sukau Rainforest Lodge has been able to bring in tourism students from the UK, Holland, Sweden, Japan on placement to train the local staff, to speak English and to understand foreign cultures.

Sukau Ecotourism Research & Development Centre

In 1999 Borneo Eco Tours set up Sukau Ecotourism Research & Development Centre or SERDC.

The setting up of SERDC has been prompted by several factors.

- The success of Sukau Rainforest Lodge in winning several international ecotourism awards for its environmental management programs.
- The success in the implementation of its environmental and communities projects.
- The increasing threat to the biodiversity of the lower Kinabatangan region from illegal logging and clearing of forested areas for commercial agriculture particularly large scale oil palm plantations.
- The increasing threat to the wildlife in the lower Kinabatangan region resulting from the reduction in the natural habitat and the increasing incidence of encroachment of elephants into plantations.
- The increasing popularity of ecotourism and number of tourists to the area with its potential negative impact on the local communities, wildlife and the environment.

Sukau Ecotourism Research & Development Centre or SERDC will provide the following assistance.

- To expedite the gazetting of the proposed Kinabatangan Wildlife Sanctuary as soon as possible to prevent further loss of land to the plantation at the expense of the wildlife. At the same time the last remaining population of exotic wildlife in Borneo including the unique proboscis monkeys will be given greater protection.
- To develop and apply the principles of ecotourism in the local community thus giving them an alternative source of employment and income in addition to fishing, harvesting and hunting to ensure the success of nature tourism industry and the economic viability of the hotel industry in Sabah.
- To provide students and teachers an avenue to learn about the concepts and practice of ecotourism as one possible solution to eradicating poverty in the rural community.
- To test and apply modern technologies and environmental management policies in a local and remote setting and to provide an economic model for sustainable development principles.
- To act as a catalyst to develop a Code of Practice on ecotourism for lodge operators in Sukau.
- To explore areas of cooperation and common interest among the various stakeholders in the Kinabatangan region, including plantations, tourism lodges, tour operators, local community, and government departments, including the Wildlife department, Forestry department, and Sabah Tourism together with the NGOs including Partners for Wetlands, WWF and University of Malaysia Sabah (UMS).

Since 1996 the lodge has been used as a case study on ecotourism at George Washington University, Washington DC, USA. In 1996 the lodge also received the Green Globe Commendation award which was organised by World Travel and Tourism Council (WTTC).

In 1998 Sukau Rainforest Lodge was chosen as the winner of the Pacific region for the British Airways Tourism for Tomorrow award 1997 and one of the 1998 Green Globe Commendation awards for the second time.

In April 1999 Borneo Eco Tours was awarded the Best Tour Operator for the Travelasia Breakthrough Eco-Award 1999.

Summary

- Borneo Eco Tours has successfully built and managed a unique jungle lodge using local materials while incorporating modern technology to generate power and hot water supply and conduct river tours with a minimum of noise and air pollution and create maximum comfort in a unique jungle experience.
- Borneo Eco Tours has created a unique environment for education and environmental awareness for both the locals, staff and tourists alike by the way it built and manages the lodge, conducts the river tours and slide show and carries out environmental projects.
- Borneo Eco Tours has managed to create fifteen full time and part time jobs for local youth and injected US$120,000/RM500,000.00 in the last three years into the local economy

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Good Examples of Sustainable Accommodation in Japan

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Introduction

In this paper, 'sustainability' in tourism accommodation will be discussed from a different perspective, that is from a cultural and local community point of view, rather than from a technical and physical design aspect. Sustainability will be dealt with in a low profile, based on low-tech and traditional activities in order to retain authenticity and integrity of the whole environment as a cultural and natural heritage, as well as a tourist destination.

The three examples covered are Yufuin, Tsumago and Shirakawa-go.

Yufuin Spa, Oita Prefecture

Yufuin is an old spa resort dating from medieval times. During the 1960s, there were just over 30 'ryokans' (Japanese-style traditional hotels) in Yufuin, and approximately 300,000 visitors. Since then, the local people, headed by leading hoteliers, have made significant efforts to prevent the spa from suffering degradation, such as casino and golf course development, which damages local farming.

They introduced several events such as the Beef Eating Festival (1975), Music Festival (1975) and Theatre Movie Festival (1976) which have centred national attention on the town.

These efforts have resulted in the spa becoming very popular. In 1990, the number of visitors reached 3 million and the number of operating ryokans grew to 102 in 1996. Tamanoyu is one of the leading ryokans in Yufuin. It is vigorously promoting locally produced food and the setting of the ryokan is one of the best examples of environmentally friendly tourist accommodation.

Tsumago, Nagano Prefecture

Established in the early seventeenth century, Tsumago used to be one of the post towns between Kyoto and Edo (formerly Tokyo). In the 1960s, it had to cope with severe population decline due to economic difficulties experienced in such remote villages.

The countermeasures decided upon were historic and environmental conservation as a tourist attraction. Tsumago was designated as a conservation area in 1975 by the central government. The facade of each building is preserved and, at the same time the interiors are renovated to accommodate the modern way of life. Many of the houses are now run as 'minshukus'—a Japanese-style bed and breakfast establishment.

The integrity of the local community is strongly retained; for example, all souvenirs are required to be made locally and the alteration of building materials or building facades requires the local community's consent, prior to seeking local government permission.

In addition, up to 1,200 hectares of the surrounding mountain area is included in a conservation area in order to protect the landscape.

These conservation efforts have proved to be successful. Tsumago now receives up to 700,000 visitors annually and has become a symbol of sustainable tourism, as well as a symbol of the conservation movement in Japan.

Shirakawa-go, Gifu Prefecture

Shirakawa-go is one of nine World Heritage sites in Japan. It is famous for its large thatched roof structures. These are unique to this region and used to house an extended family. Traditionally these houses used to be protected and maintained by the local community, a declining trend in modern society.

A water gun system has been introduced for fire fighting as a substitute to the traditional communal support and young urban volunteers have begun to help the community in rethatching roofs. These activities sustain the local community and its integrity for the future.

Conclusion

These three examples of sustainable accommodation in Japan demonstrate the various activities that can be implemented to retain the sustainability of local heritage, local communities and the integrity of the locality.

This leads us to the redefinition of sustainability. Yufuin demonstrates the wide spectrum of sustainability and the activities to retain it. Tsumago illustrates the redefinition of the locality. Shirakawa-go illustrates the regeneration of the community through the various efforts of local community. All these suggest that accommodation is a crucial part of these efforts.

Green Island

Overview

Green Island is one of the few coral cays within close proximity of the mainland. Situated on Australia's Great Barrier Reef, 27 kilometres north-east of Cairns. Green Island is a 15 hectare coral cay, the majority of which is national park. It was formed by nature and is up to 6,000 years old. It is 650m long by 300m wide with a circumference of 1.6 km and a maximum height of 3.3m above sea level.

Green Island is situated in a tropical cyclone area with a tropical climate, hot wet summers (25 to 32° C) and dry warm winters (16 to 25° C), and has an average annual rainfall of 2018 mm.

Approximately 70 different types of coral are found along its fringing reefs, it has a closed littoral vine forest with approximately 126 different types of native plant species, plus a variety of native and introduced bird life, a colony of Spectacled fruit bats and also small reptiles.

The island has only one resort, the Green Island Resort (GIR) which is owned and operated by Reef Management Pty Ltd, a Daikyo Group company. This property opened in 1994, and replaced an earlier resort (The Green Island Reef Resort) which was demolished to make way for its construction.

Recreation area

In March 1990 the public areas around Green Island and reef were declared a Recreation Area under the *Recreation Area Management Act 1988*. The Green Island Reef Management Plan was reviewed.

The island is managed by the Green Island Reef Management Advisory Committee, which was established with representatives of major stakeholder Daikyo, the Queensland Department of Environmental and Heritage, Cairns City Council, the Great Barrier Reef Marine Park Authority, Cairns Port Authority and Traditional Owners.

Project development

When Daikyo purchased the resort in 1990 numerous environmental problems existed. For example, the small powerhouse on the island was not designed to minimise noise levels and generators were not fuel efficient. Further, the resort's septic tank was built into the ground and raw sewage seeped from it onto the reef flat surrounding the island. Some waste, specifically cardboard and paper, was not taken to the mainland for recycling but was instead incinerated on site.

Daikyo's redevelopment of the island was undertaken over a two year period, with the five-star Green Island Resort officially opening its doors in April 1994.

Prior to beginning the redevelopment, the Daikyo Group relinquished 1.3 hectares of the area contained within its lease to the National Park, leaving an area of 1.8 hectares.

The planning process

A team of design consultants was employed who worked in conjunction with various local and state government officials. The objective of the project was to allow the island's natural qualities to dominate, with the buildings and infrastructure playing a secondary role. This would ensure that both day visitors and overnight guests would enjoy a nature based experience. The project was to have two integrated components:

1. a resort hotel comprising forty-six accommodation units, of which ten are suites and the remainder are deluxe guest rooms; and
2. a public day use visitor area adjacent to the main beach.

Cleaner production became part of the management strategy for the island for the following reasons:

- limited supply of water on the island;
- high cost of importing water from the mainland (two barges of water are required each week to satisfy the island's water needs; occasionally a third trip is required);
- disposal of waste on the island is prohibited (all material must be taken back to the mainland for disposal);
- high cost of taking waste and affluent back to the mainland by barge;
- sensitivity of the environment; and
- need to adhere to strict regulations imposed by the Great Barrier Reef Marine Park, Cairns City Council and the Queensland Department of Environment.

Daikyo expressed its commitment to responsible environmental management and actively participated in the development of the Green Island Management Plan.

The Green Island Management Plan set out how this development was to take place in such a fragile reef environment. In essence it discussed:

- how the island was to be managed
- who was going to manage it
- how the natural character and ecology was to be protected
- the provision of recreational opportunities and facilities
- continued monitoring and evaluation.

The Management Plan also established a carrying capacity for the island:

- 1400 guests maximum at any one time;
- 1900 guests maximum on any day;
- 90 overnight guests maximum, supported by 40 overnight staff; and
- transportation to the island controlled by restricting the number of operators and type of vessel.

The plan sought to minimise the impact of the built environment by setting guidelines for siting and design issues, including:

- the location of machinery and signage;
- siting, appearance and finishes of buildings;
- types of walkways;
- use of natural vegetation for screening; and
- noise control.

In addition to the above items, the Management Plan stipulated that all existing and future users must have easy access to the island facilities and the reef in general.

Local government building approval for any development on Green Island rests with the Cairns City Council. The council's policy plan for the island addressed the following issues.

- Only sustainable native plant species (indigenous to the island) would be allowed to be used as part of the landscape works. Existing exotic species were to be identified for removal during the construction process.

- Development of a new centralised island infrastructure complex to serve the whole island (ie to also service public and private users outside the lease area). This would include:
  - storage for potable water;
  - generation of electrical power;
  - tertiary treatment and recycling of effluent;
  - removal of all solid wastes;
  - no collection of rain water or extraction of ground water; and
  - eventual shutting down and removal of the existing sewerage system.
- Limitations were placed on the type of vehicles permitted on the island after redevelopment had been completed.
- The effective removal of existing artificial beach stabilisation walls and provision of a natural buffer zone.
- Building architecture and its components in terms of:
  - approved use of building materials and methods suitable for the island
  - recognition of a North Queensland vernacular style and traditional architecture
  - climatically responsive building design
  - minimising building impact in terms of building forms, mass and bulking, plus limitations on building height, floor areas and colour.

Other significant elements in the management plan included a consultative design process, building and infrastructure design, landscape strategy, irrigation, tree removal, planting design, construction process and post design evaluation.

Special environmental features

The redevelopment of Green Island has involved the use of various special environmental considerations.

Environment Committee

Apart from the Green Island Reef Management Advisory Committee the Environment Committee meets monthly to discuss environmental concerns and ideas staff may have for improving or protecting Green Island's environment.

Suggestions from the Environment Committee have included:

- waste segregation for recycling purposes in the public area of the resort;
- growing hydroponic herbs on the island instead of buying them in from the mainland; and
- appropriate storage and segregation of chemicals.

Staff training

The staff induction program, which all new staff members must attend, has given the staff a better understanding of environmental matters on the island. This induction program also helps to overcome the problems associated with a workforce that has a high turnover.

Cleaner production has been easier and more effective on the island as a result of staff commitment and the fact that many of the initiatives have been in place from the commencement of the resort's operation.

Construction process

The project development involved construction of the following interrelated elements:

- infrastructure development;
- jetty services upgrade;
- day visitor facilities;
- private guest accommodation;

- staff accommodation;
- general amenities buildings;
- revetment wall; and
- helipad.

Building design

The Architectural Design Statement for the development called for all buildings to be kept to a human scale, both in height and in bulk, so that they blend with their heavily forested surroundings. Two-story structures remain below the forest canopy, and simple shade structures maintain low scale at ground level. The building mass was broken up into separate elements to reduce visual impact.

The general design style for the development can be referred to as Queensland vernacular and, as such, features include:

- wide verandahs;
- large roof overhangs;
- louvered openings;
- lattice screens;
- pedestrian roof awnings; and
- above-ground construction.

All the resorts, public buildings are raised above the ground on precast concrete piles to withstand possible tidal inundation. This allows for the majority of the surface of the resort's lease to remain undisturbed.

Building materials

Materials used in construction were chosen for their strength as well as their capacity to blend into the surrounding environment. For example, masonry, with an applied sand colour textured finish, was used for the resort's walls. Timber used was limited to Australian timbers, specifically spotted gum, Tasmanian oak and silky oak.

Energy efficiency

Power is generated by 3 diesel MTU generator sets producing 460kva/650hp and 1 diesel MTU generator set on standby which produces 460kva/650hp. Hot water supply is supplemented by heat exchangers fitted to the generators.

Waste minimisation

Waste disposal on Green Island is prohibited. All waste must be barged back to the mainland for disposal. Reuse of materials where possible is strongly recommended.

Recycling on Green Island has been in place since the resort began operation in 1994. Cardboard, paper, aluminium, glass, engine oil and cooking oil are separated from the waste stream and collected free of charge by contractors for recycling on the mainland.

All cleaning products used on site are biodegradable and nitrate free.

Water conservation

All drinking water is barged to Green Island. Rainwater cannot be collected from the roofs and must be shed onto the ground to replenish the freshwater lens beneath the Cay. This is essential to nourish the rainforest.

The cost of the barged water is $1.27/kL. Showering and bathing account for the largest usage of fresh water. Installation of spring sealing taps in the toilets for day visitors and flow restricting shower roses throughout the resort reduce water use by approximately 20 litres per visitor per day.

Table 1: Water consumption figures

Year	Persons on Island	Consumption	Litres Per Person Per Day
1995–96	284 184	21 049 000 litres	74.06 litres
1996–97	278 720	15 386 000 litres	55.20 litres

Water consumption in 1996–97 fell by 5.6 ML compared with water consumption in 1995–96, resulting in major cost savings, particularly in barge fees. Initially, a third barge trip was required every second week or around 20 times a year. The number of extra trips has been reduced to 10, saving around $2,000 a trip or $20,000 per year.

The new tertiary sewage treatment plant, designed by GHD and built with joint partners Thiess Contractors, allows reuse of both grey water and effluent. The plant was completed in November 1992 and cost $5.3 million. The system is an activated sludge process with aerobic and anaerobic stage.

Treated effluent is reused on the island for flushing toilets, fire service and for irrigation. Irrigation is strictly monitored to prevent contamination of the island's groundwater supply. Effluent reuse accounts for approximately 40 per cent of the total water usage on the island. Without this the effluent discharge to the ocean would increase by nearly 50 per cent. Effluent water is also 90 per cent cheaper than potable water barged from the mainland.

Sludge residue from the treatment plant is pumped onto a barge approximately once every month and transported to the mainland for processing in the Cairns City Council treatment plant.

Education of guests

A range of interpretive tours of the island is available to guests and day visitors. The tours cover the island's history, ecology and wildlife.

Guests are exposed to the activities of the World Wide Fund for Nature (WWFN) through displays of newsletters and books. Guests are given a gift certificate for $10, which they can redeem as a donation to the WWFN or as a part payment of membership of the fund.

Involvement with the community and the tourism industry

When planning the development, the Daikyo Group liaised extensively with a number of government agencies, including the Great Barrier Reef Marine Park Authority and the Queensland Department of Environmental and Heritage. This was done to ensure the development process, and the resort's operations, would have minimal impact upon the island and the natural environment of the surrounding reef.

A code of environmental practice was also developed by Daikyo in consultation with the construction company Thiess Contractors. A system of environmental bonds was also implemented to ensure that contractors adhered to the code as well as to general environmental practices.

Eco Beach Retreat, Cape Villaret, Western Australia

KARL PLUNKETT
Managing Director
Eco Beach Retreat
Broome

Overview

Eco Beach is an isolated retreat on Western Australia's Kimberley coast. It is situated south of Broome at Cape Villaret, the southern most point of Roebuck Bay. To travel from Broome by road is a journey of 130km. By sea however, the retreat is only 27 kilometres from Broome, and the town lights can be seen across the bay at night. Transfers by boat are available.

Broome (population approximately 10,000) is one of the main towns of the Kimberley. It is a remote settlement on the northern tip of Roebuck Bay, 2,353 kms north of Perth, Western Australia's capital city and main population centre. The major domestic airlines provide a daily return flight between Broome and Perth.

Accommodation at Eco Beach is in simple but adequately furnished chalets. There are forty small timber chalets and two large open public buildings on site. The staff quarters is a larger version of the guests' timber chalets. The conference or meeting facility, known as the Frank Sebastian (Gudjai) Meeting Place, is named after the present traditional custodian of the area. The Meeting Place seats 100, and has its own bar. Each night as the sun sets, guests gather here for pre-dinner drinks. The other large building, Jack's Bar and Restaurant, houses office facilities, the kitchen, a bar and the main open dining area.

All buildings are linked by a network of raised wooden boardwalks. A dirt road used for management purposes encircles the retreat. Access to the beach is protected by two timber walkways.

The Managing Director of Eco Beach, Mr Karl Plunkett, chose to build a low environmental impact development, not only because of his conservation ethic, but because it makes sound economic sense. The careful design of the retreat has minimised capital expenditure and operating costs.

Biophysical features

The Kimberley is an extensive and sparsely settled region in tropical north-west Western Australia. The statistical division of Kimberley is three times as large as England, with a population of 29,613. The geology consists of a large plateau of Precambrian sandstone, interspersed with old volcanic rocks. The plateau has been tilted to the north-west, drowning river valleys and forming a rugged coastline, with many offshore islands and archipelagos. The highest point on the Kimberley Plateau is Mount Hann (779 metres).

At latitude 18 degrees south, Eco Beach experiences a tropical climate with maximum temperatures ranging from 28 to 35 degrees Celsius throughout the year. Most rain falls from December to April during the monsoonal wet season, while the rest of the year is dry and sunny. There is a daily average of 10 hours sunshine.

The spectacular coastline of Roebuck Bay stretches for 60 kms north from Eco Beach towards Broome. Cape Villaret's striking pink sandstone cliffs are over 100 million years old and have been shaped by the wind and waves into striated columns and caves which resemble a miniature Purnululu (Bungle Bungle) Range.

The coastal dunes are fragile and susceptible to erosion. The rich red soil of the Kimberley, known as pindan, supports a type of vegetation also known as pindan. Pindan is an Aboriginal word meaning 'wild, arid, waterless country'. The pindan is a grassland with a middle layer consisting of mainly wattles and a thin upper layer of mainly eucalypts. Both pindan and dune vegetation are well established at the retreat site. Common species include Cable Beach wattle (acacia bivenosa), Kimberley bauhinia (lysiphyllum cunninghamii), beach or jack bean (canavalia rosea) parrot pea or Kimberley birdflower (crotalaria cunninghamii), helicopter tree or stinkwood (gyocarpus americanus), yellow ball flower (mallotus nesophilus), crab's eye bean (abrus precatoius) and snowball bush (flueggea virosa). Eco Beach has labelled many of the plants adjacent to the boardwalk and provides a pamphlet describing the local flora.

The Broome area hosts more than 270 species of birds, which is one third of Australia's total bird species. Roebuck Bay is protected as a wetland of international importance under the Ramsar convention. About 800,000 shorebirds migrate to the Broome area annually. Nearly a quarter of the world's migratory waders spend the Australian summer in Roebuck Bay before returning to their breeding grounds in central and north-east Asia, including Siberia. The Broome Bird Observatory is well known among both amateur bird watchers and expert ornithologists. It is one of the best places in the world for viewing waders because of its unique combination of accessibility, and high species diversity and density.

The warm waters of the Indian Ocean are rich in fish and other marine life. Southern Right and Humpback whales migrate along the coast, dolphins and manta rays are common, and sea turtles come ashore to lay eggs. An abundance of sail fish and black marlin is giving the area a reputation for tag and release sport fishing. Recreational anglers find mangrove jack, salmon, barramundi and mud crabs in the local creeks.

Land based fauna of the area include the green tree frog, bilby and bungarrow. Night walks are offered if there is the demand by guests and booklets and information is available on the local Kimberley fauna and the marine life of the region.

Operational features

Although it is possible to self-drive, Eco Beach prefers guests to transfer from Broome on the company bus, which runs once a day, or more often on demand. Transfers by boat can be arranged. Access into the property is by dirt road through an extensive grazing lease. Providing guests with transport is not only convenient for those without cars, but also reduces traffic on the dirt road. This minimises disturbance to the graziers as well as cutting down on road maintenance. Helicopter transfers are also available.

Guests who drive their own cars to Eco Beach are asked to leave the car at a parking area about 200m from the retreat. The noise and dust associated with the dirt road is therefore left at some distance to the retreat. Walking into the retreat from the car park, one is struck by the peaceful, sleepy atmosphere, punctuated only by numerous bird calls.

At capacity, Eco Beach sleeps 100 people in forty chalets. Chalets sleep two, three or four adults. Furnishing is simple: wrought iron single or double beds with mosquito nets, deck chairs, a fan, three small lights, two small benches and a mirror. An esky is provided to keep cool guests' drinks. Guests are supplied with linen, including a bath towel and biodegradable soap.

The majority of the chalets do not have ensuite bathrooms. Instead, an outdoor shower is provided adjacent to each chalet, and an ablutions building is within a minute's walk of each chalet. There are currently only two chalets with en-suites.

On checking-in, guests are provided with a rechargeable torch and a map of the retreat to assist them in finding their way. At night, there is a low but adequate level of lighting on the boardwalk. Altogether, Eco Beach has 1.2 km of raised walkways.

Accommodation costs range from $120 per night for ocean-front chalets to $100 per night for other cabins. Prices are based on twin-share arrangements and additional guests, to a maximum of four per chalet, can be accommodated for an extra $10 per person. The two en-suite chalets are the most expensive at $150 per night. The peak season for Eco Beach is between April and October, with the tropical summer season ranging from November to March. The majority of guests are from Australia's Eastern states, mainly Victoria and New South Wales, with the average stay of two to three nights.

Guests are offered a range of activities, including swimming, snorkelling, mud crabbing, sunset cruises, sailing, bush walking, beach and charter boat fishing and massage. Guests are asked to catch only enough fish for eating, and are given guidelines on legal sizes and protected species. The restaurant is happy to cook the anglers' catches.

All meals are served buffet style in Jack's Bar and restaurant. Meals are generous and wholesome, with an emphasis on locally grown produce. Table service is not provided, so guests clear their own tables and place food scraps into a container, ready for composting. Meals cost from $10 to $20 and are additional to room costs. However, packages that include accommodation, meals and transfers are available. Picnic hampers will be provided if the kitchen is given sufficient notice.

Fourteen staff work full-time at Eco Beach, including office, garden and maintenance, and kitchen staff. Many staff live on site. The Aboriginal custodian of the local area works for the retreat, taking guests on guided bushwalks.

Operating at some distance from local government services gives Eco Beach an economic and ecological imperative for its environmentally conscious purchasing policy, which includes: purchasing in bulk (including keg beer and post-mix soft drinks), avoiding over packaged or disposable goods, using low phosphorus and biodegradable cleaning agents, and buying locally grown produce.

Planning and approval process

An environmental management plan was prepared by the Melbourne based environmental consultant, Jan Talacko, prior to any development at the site. The plan integrated the complete anticipated range of activities at the retreat, from construction through to operation. Elements of the plan included an environmental code of conduct for construction, guidelines for environmentally responsible design, waste and energy minimisation plans, planning of guest interpretive activities, an environmentally conscious purchasing policy, a land management program, assessments of impacts and the role of on-site research. The development application was approved by Broome Council within two months. The consultant worked on site during the construction phase to assist with the implementation of the environmental management plan.

Design concepts and construction techniques

The idea from the start was that the retreat would not offer conventional luxuries such as air-conditioning, bar fridges or room service, but would instead offer a comfortable setting where guests could unwind and enjoy more simple pleasures.

Building design

All buildings were designed using passive solar design features to eliminate reliance on electrical air-conditioning and ventilation. The chalets are all oriented north-west to take full advantage of the sea view, so undesirable solar gains had to be managed in a number of ways.

The chalets' roofs are pitched at an angle of 45 degrees, thereby reducing the surface area exposed to the midday sun. Long eaves shade the hut walls. There is no window glazing, leaving about a one-metre gap between the hut wall and the steeply pitched roof with its overhanging eaves. This allows air to flow naturally through the hut, cooling the internal space. Heavy tarpaulins can be drawn across the window spaces for shelter during inclement weather.

There is a wide balcony from the mezzanine level which shades the doorways of the lower level. A hatch opening onto the mezzanine balcony improves air convection and serves as an extra outlet for hot air. The huts have no ceilings in order to ensure that the ventilation works effectively. This has also eliminated the need for materials and labour to manufacture and fit ceilings. Zincalume custom orb roofing was used, with reflective insulation to minimise heat conduction.

The huts are raised from 1.5 to 2 metres off the ground, allowing air to flow underneath, eliminating any need for concrete slab foundations, and associated heat gains from the warm earth. The height of the huts,

combined with the raised boardwalks, allows unimpeded access for the local fauna around the retreat, and permits the native vegetation to grow more or less unchecked.

The height and positioning of each hut takes maximum advantage of natural ventilation, while providing all guests with unobstructed views of the ocean and bush surroundings.

Building materials

All building supports were made to measure off site, and the flooring of the main buildings and staff quarters was factory built and bolted together on site. Excavation was required only to pour the concrete footings of each pole upon which the buildings sit. To further minimise disturbance, the steel frame of each cabin was assembled off site. Galvanised steel was used to withstand the corrosive seaside conditions. The building supports, flooring and frames were built and assembled in Perth and on site.

Extensive use was made of recycled building materials. More than 100 tonnes of timber was bought from Perth salvage yards, and from the former Pearl Coast Zoo. Some of the recycled materials included:

- 10 km of batu timber and 4.5 km of coppers logs, as well as thousands of galvanised screws, nuts and bolts for the raised walkway;
- 1400 railway sleepers for a walkway through the sand dunes and for road kerbing;
- denailed and redressed tongue and grooved flooring for the huts originally from Tasmanian oak; and
- 25 tonnes of telegraph poles for Jack's Restaurant and Bar.

The site

Local soil was used to render earth for the amenities buildings. Six-inch, insulated 'thermalite' bricks are used in the showers, coolroom and pump house. The thermalite bricks are mixed with pindan - the red soil of the Kimberley.

One road was built during construction, and this is still in use for access into the property, and around the perimeter of the retreat for operational purposes. Construction staff, suppliers and contractors were requested to follow a code of practice limiting vehicular and pedestrian movements across the site.

All areas affected by construction were revegetated using seeds collected from the site prior to disturbance. The retreat was given considerable assistance in seed collection and propagation by the Department of Conservation and Land Management.

The techniques employed to minimise disturbance, and the subsequent revegetation program have been very successful. Construction was completed in April 1997 and, six months later, it is difficult to see where disturbance occurred.

Energy conservation

The retreat was designed to operate with minimal reliance on electricity. A diesel generator and a solar inverter with battery bank were chosen to power the retreat, because the technology is proven, is relatively inexpensive and is easy to use and maintain. The generator and the solar inverter are used alone and at different times. This required the installation of two separate electrical systems (including dual cabling) at considerable expense. Other design features are described below. This attention to detail in design was a good investment, as the savings from turning off the generator for eight hours each day are estimated to be $16,000 per annum.

From 6 am to 10 pm every day, the diesel generator supplies the retreat with power. The generator costs $10/hour to run, to a total cost of about $40,000 per annum. The majority of the 35 kVa power supplied is used by the water bore pump, cool rooms, bar fridges and icemaker. From 10 pm to 6 am, these appliances are switched off, and the retreat runs from the 10 kVa solar inverter and batteries. The solar inverter and battery system was bought from WA Solar Supplies at a cost of $32,000.

The design of the retreat had to take into account the need for crucial appliances to stay cooled overnight without power. For example, the cool rooms are insulated with special bricks and are built into the very centre of the largest buildings to minimise hear transfer.

The need for electricity in all buildings has been minimised through clever design. The use of natural ventilation has eliminated air-conditioning, saving an estimated $30,000 per annum for the guests' accommodation alone (based on a modest 50 per cent occupancy of the 40 chalets). In addition, the cost of materials was considerably less than if each hut had required glazing, window framing and insulation to optimise an air-conditioning system. The savings from passive solar design have been immediate, as the initial costs, including designers' fees, were only about $5000.

The open walls, doors and open floor plans of all buildings take maximum advantage of natural lighting. Lighting in each chalet is augmented by three 8-watt fluorescent lights. The huts also have a 30-watt fan to assist ventilation during the summer months. A central icemaker in Jack's Restaurant and Bar, and an esky in each hut does away with the need to supply enough power to operate forty individual bar fridges.

The power supplied to each hut allows only the lights and fan to be operated. Each chalet has its own cut-off switch, so that one hut's supply can be easily disrupted and reset without affecting the other huts. If a high voltage appliance such as a hair drier is used, the power supply to the hut will be overloaded. This system makes it impossible to use electricity wastefully and therefore the retreat can operate by night on the solar batteries alone.

Guests are advised prior to their arrival that they will be unable to operate such appliances as hair dryers, travel irons or portable fridges for the duration of their stay.

Gas is used to power kitchen appliances and to heat water. Fortunately, for all but the three winter months, it is not necessary to heat water for showers. Throughout the year, the water pipes are warmed by the sun and heated by the ground, providing showers with pre-warmed water, so that extra hot water is rarely required. The retreat estimates that it uses one gas bottle per fortnight through most of the year, except for winter when up to five bottles may be used per week. At $80 per gas bottle, the tropical weather allows generous savings. The 45 kg gas bottles are brought in from Broome and returned for refilling.

Water conservation and treatment

The retreat's water supply is pumped from an underground source—water having been found at a shallow depth only 1 km off site. Water is therefore relatively plentiful. This was a major factor in site selection. Wastewater is treated on site. Black water is treated through a three tank system and grey water is treated and absorbed on site.

After consultation with the Western Australian Department of Conservation and Land Management (CALM) several measures were put in place to restrict water supply and demand in the retreat's daily operations. Even though there is no restriction on the amount of bore water available, guests are encouraged to use water wisely.

Plumbing to each chalet is limited to an outdoor cold shower and tap. Guests are encouraged to use these only to quickly wash off sand before entering the chalets. There are several ablutions buildings around the retreat, providing bathroom facilities for all guests. Showers and flush toilets are available, but no baths. Guests are supplied with phosphorus-free, biodegradable soap, and are requested to leave at home any non-biodegradable soaps and shampoos. Phosphorus-free, biodegradable liquid soap dispensers are placed above vanity basins.

Laundry is minimised by changing guests' linen every three days, rather than daily. Laundry is done on site in a conventional top-loading washing machine. Guests are discouraged from using the conventional laundry facilities, but a hand powered, water efficient washing machine is available for free.

The retreat is trialling one composting toilet, which has a tendency to become too dry due to the warm climate. To keep it moist, staff throw in vegetable scraps and the occasional bucket of water. The toilet has been met with mixed reactions from guests. From an environmental perspective, it is disappointing that composting toilets are not used throughout the site. This would have been best achieved before plumbing and a flush system were installed. Composting toilets are successfully used by tourism operations in all areas of Australia, from the hot, dry central desert regions to cold, wet alpine Tasmania. A sophisticated approach to toilet function and guest education has been shown to overcome the difficulties of climate and acceptability. It would be good to trial more composting toilets in any future expansion of Eco Beach.

A small pond has been created for a readily available source of water to fight fires. Although underground water is available, the bore has a maximum capacity of only 6,000 litres per hour, while the pond holds half a million litres. The height of the buildings and their steel structure would minimise damage in the case of a bush fire. The pond is popular with the local bird life and with guests, with hammocks and shade structures provided for the latter.

Waste minimisation and recycling

Food waste is minimised by bulk purchasing. The kitchen provides all food in large, refillable containers, and guests serve themselves. There are no individually packaged serves. Kitchen scraps are composted on site. The retreat is currently trialling a worm farm to manufacture compost in man-made compost bins. There is some smell associated with the compost bins. This is being monitored.

The potential of the bar facilities to generate waste has been sensibly limited by using keg beer and post mix soft drinks. A small variety of beer is also available in bottles and aluminium cans, but it is sold at a premium to keg beer.

Waste plastic, glass and metals are separated and taken back to Broome for disposal. The Broome municipal system only recycles aluminium. By melting the retreat's empty wine bottles, a local artisan creates cheeseboards which he sells to guests as a unique souvenir.

Energy efficient equipment and recycled paper are used for all business applications in the office. All brochures and interpretive leaflets are printed on recycled paper, except for one brochure, which uses high quality paper to reproduce photographs.

Community relations/interaction

Where possible, all supplies are purchased within the region, and local produce is served in the restaurant.

The retreat uses the services of a local charter boat operator for fishing trips, which are very popular with guests, and on request, boat transfers to and from Broome.

The company's employees are all local people. The company established a close working relationship with the CALM during the development phase of the retreat, when the department supervised plant propagation and revegetation.

Eco Beach and CALM are cooperating in ongoing projects such as the bilby rehabilitation program. Eco Beach have requested one male and one female bilby to breed, monitor and release them back into the Peron Peninsula. The retreat has also applied to CALM to be a wildlife caring station for injured animals such as wallabies.

The Broome TAFE college has also been involved in seed collection and propagation at Eco Beach.

Education/interpretation

Eco Beach offers guided bush walks for a small fee, where guests are introduced to the history and 'ways' of the land from an Aboriginal perspective, by the local Aboriginal custodian of the area. They also have available for free several pamphlets, for self-guided bushwalks, for bird watching and for the flora visible from the raised boardwalk.

Guests are asked to fill in a short questionnaire prior to leaving, which is used by the retreat to gather information on guests' satisfaction with their experience. Guests can nominate to receive the retreat's quarterly newsletter, which includes information on the local flora and fauna, as well as informing the travel industry and guests of the facilities and activities available at Eco Beach.

Results form a recent analysis of the guest questionnaire indicated that interestingly, 90 per cent of guests are opposed to adding private bathrooms on to the cabins. From an environmental perspective, guests seem to like the cabins the way they are and do not mind a short stroll to the ablution blocks.

Eco Beach offers a simple holiday experience where guests can't help but relax and unwind from the pressures of modern life. The retreat is set amongst a stunning natural landscape and there is a strong feeling of being close to the earth, with the outdoors coming indoors in the form of warm sea breezes, small geckos, and the unflappable green tree frog.

The Visitors Book documents guests' experiences.

- Eco Beach has it all beauty, isolation, privacy, with great food, drink and company.
- Fond memories to help survive the winter blues.
- Exquisite Coastal Outpost Believable Exceptional Accommodation Courteous Hosts.

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Mowbray Falls Enviropark

HILARY AND GEOFFREY KUHN
Mowbray Falls Enviropark
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Overview

Mowbray Falls Enviropark is being developed as a model of ecologically sustainable development (ESD) in tourism. The facilities will incorporate accommodation lodges, a Wet Tropics interpretation centre, restaurant and research centre.

The Enviropark site is situated 90 kms north of Cairns adjacent to the Wet Tropics World Heritage area. The proposed site is 400 metres above sea level with spectacular views across the coastal flats to the Coral Sea and the Great Barrier Reef in the distance.

The property comprises 26 hectares of undulating landscape with a steep rise at Red Hill that offers 360 degree views of the 1987 declared Wet Tropics World Heritage area. Surrounded by dense bushland, numerous creeks from the area flow into the Mowbray River that plummets 400 metres into the Mowbray Gorge.

The owners of the property and proponents of the project are Hilary and Geoffrey Kuhn, who have over ten years experience in the tourism industry and ecotourism consulting.

Goals and core values of the park

The Enviropark's business plan states the primary goal of the project is to create a commercially viable model of ecologically sustainable development in tourism with export potential. In other words, the project aims to integrate low environmental impact technology in the design and construction, with education and scientific research in a tourism facility that will demonstrate international best practice in ecotourism.

The long-term aim of the Enviropark is to be at the forefront of ecologically sustainable development in tourism and provide benchmarks for environmental management practices for the tourism industry at large. A specific goal is that by the year 2020 the expected 120,000 visitors per year to the Enviropark will not have a detrimental impact on the Mowbray Falls environment.

The following core values apply to all decisions regarding the Enviropark development:

- take environmental responsibility seriously;
- use innovative technology in order to achieve the goals of ESD;
- champion best practice in ecotourism as ecologically sustainable development in tourism;
- deliver high quality service to visitors in all areas of the development;
- provide an educational focus that highlights the ESD principles;
- conduct scientific research that enhances the visitor experience, and management operations;
- provide high quality interpretation to visitors that encourages an understanding of ecology and ESD;
- build trust based relationships that engender team spirit in staff;
- be financially viable and profitable without expense to the environment;
- act responsibly with all the stakeholders such as shareholders, staff, creditors, debtors, regional community and economy; and

- adhere to the environmental principles by becoming signatories to the Valdez Principles of the Coalition for Environmentally Responsible Economies (CERES). For further information on the Valdez Principles and CERES please see Appendix 1.

Biophysical features

The proposed site is located in the Black Mountain corridor region adjacent to the recently declared Wet Tropics World Heritage area. The Black Mountain corridor extends in a thin band from the town of Kuranda in the south to the mountain granite massifs of the Mt Lewis tablelands in the Main Coast Range west of the town of Mossman. This approximately 45 kilometre section of corridor incorporates the narrowest bank of rainforest in the Wet Tropics World Heritage area. The corridor is widely accepted by the scientific community as a demarcation zone separating some elements of the unique fauna and flora of the Daintree area from the southern flora and fauna more commonly represented in rainforest systems.

Climate

The climatic conditions of the tropical uplands involve temperatures from 14-23° C in the winter months or the dry season and 20-30° C in summer or the wet season. The most distinguishing feature of the seasons is the start and finish of the wet season, which commences in November/December and lasts until February/March. The two times of the year create spectacular waterfalls in the nearby Mowbray Gorge. Flowering plants are prolific and the largest migrations of birds can be seen in the wet season. This is also the breeding time for fauna such as the cassowaries, which can be observed locally.

The rainfall in the region ranges from 2200 mm to 3048 mm per year with most rain falling during the wet season. Cyclones occasionally approach the coastal regions during the wet season, but rarely cause damage in the uplands. However, during a cyclone the yearly average rainfall can sometimes fall in five days. The region of the Enviropark site has a lower cyclone risk rating than the coast due to the elevation. Most of the time though, there is a steady prevailing wind from the coast which provides the site with ideal conditions for wind generated power.

Vegetation and topography

The Mowbray Falls Enviropark site and some of the adjacent area were cleared previously for dairy farming. The Queensland National Park Service manage these areas with patch burning after the wet season to maintain the open forest and its biodiversity from domination by the flora of the rainforest. The rainforest has been re-establishing fast after the logging and clearing, however the maturing process takes a long time.

The topography of the site is undulating on the lower section leading to a steep rise at Red Hill with an elevation of 400 metres above sea level. The region primarily consists of an elevated valley plateau with gentle slopes and a very steep escarpment from the catchment of Kauri creek to the Mowbray river valley. The majority of the soil coverage is characterised by yellow and red clay subsoil with shallow topsoil providing good conditions for a number of forest types representative of the Wet Tropics rainforest.

Weeds on the property, such as lantana are managed by regular slashing. However, the owners recognise its value as it attracts Ulysses and Birdwing butterflies and acts as a nitrogen fixer for soils. Therefore, the intention is not to eradicate the lantana but to keep it under control. As the site was previously degraded, the regrowth now consists mainly of wattle.

Wildlife

Botanical and zoological surveys of the property revealed that the property is situated at a critical juncture along the Black Mountain Corridor, which links the two major centres of biodiversity, namely the Atherton Uplands and the Carbine/Windsor Uplands. This is particularly important to the region for the movement of wildlife and their genetic material and gives the area a high conservation significance. Hence, the owners explain their idea and primary purpose for the Enviropark, was to find a land use for their property which had the least impact on the environment.

The zoological surveys found some 14 species of mammals on the site, which represents a moderate species diversity. The site supports some tropical endemic species such as the Lumholtz's Tree-Kangaroo, the Musky Rat-Kangaroo, the Green Ringtail Possum and the Cape York Rat. One of the surprising results was the discovery of the most northern distribution of the swamp rat in Australia. An ornithological survey also identified 164 species of birds.

Vegetation survey

A vegetation assessment found that the patterns of vegetation distribution and the species composition of the area have been heavily influenced by the activities of Europeans in the recent past and human activity has had a marked impact on the forest structure. The forest types represented in the area include mesophyll vine forest, wet sclerophyll forests and open low to medium woodlands with each forest type having its own unique characteristics of soil, drainage, aspect and topographical conditions. The mesophyll vine forest is the dominant vegetation type with plank buttresses, large vines and trunk epiphytes. Within the wet sclerophyll forests the Eucalyptus pellta, Acacia auclocaocarpa and Eucalyptus torelliana are the most common species. The open low to medium woodlands are represented on Red Hill and the eastern escarpment area and are comprised primarily of eucalypts in the canopy with grass dominating the understorey.

A total of eight rare and threatened species were identified in the vegetation survey. These include the endemic species of Onion Wood, Fragrant Boxwood, Cassowary Satinash and the Julatten Tamarind, which is considered a very rare species. The owners have been supplied with a list of rainforest species suitable for the revegetation program, which will be administered by the Scientific Research Centre.

Aboriginal heritage

The Aboriginal heritage of the area is potentially diverse as the Mowbray River gorge represents the junction of three aboriginal countries. The Kuku Yalanji, Djabuguay and Irukandji countries have story lines about this area and the Enviropark owners will seek permission from elders to use these in their interpretative tours lead by Aboriginal guides. The Djabuguay story line tells of the rainbow serpent that travels along the Mowbray River and down the falls along the Four Mile Beach in Port Douglas. It resides in the rocky headland called Island Point at the end of the beach and should not be disturbed or otherwise it will bring misfortune. There is also anecdotal evidence of corroborees at the Mowbray Falls, however these details still need to be confirmed by a study of the region's Aboriginal sites and heritage.

The Enviropark site is in Kuku-Yalanji country and the traditional language describes five seasons rather than two. Those seasons are described as the 'Proper Wet Time' from December to March; the 'Under water time' from April to May; the 'Cold time' from June to September'; the 'Hot time' from October to November and the 'Storm time' from November to mid-December.

Operational features

Mowbray Falls Enviropark plans to use a range of facilities to cater for day and longer stay visitors. The planned bed capacity is set at 44 for the first year of operation, increasing to 100 beds by the fifth year. Table 1 identifies the facilities and visitors' access to them:

Table 1: Facilities and visitor access

Facilities	Day Visitors	Long-term Visitors	School excursions
Bar	*	*	
Restaurant (bush tucker cuisine)	*	*	*
Arts and crafts gallery	*	*	*
Interpretive centre	*	*	*
Canopy walkway	*	*	*
Walking trails	*	*	*
Permaculture swimming pool	*	*	*
Amphitheatre	*	*	*
Water gardens	*	*	*
Accommodation (units and villas)		*	*
Swimming pool		*	*
Tennis courts		*	*
Conference and functions venue		*	*
Scientific research centre incl. wet and dry laboratory		*	*
Herbarium		*	*
School excursion classrooms			*

Some of the activities offered to longer stay visitors will include spotlighting tours at night, excursions to the adjacent World Heritage areas, horseriding, massage, natural therapies, dancing, tennis, monitoring of daily energy consumption, library facilities, videos, CD ROMs containing flora and fauna information, Internet access, seminars and slide shows with scientific staff.

Visitors

The expected average occupancy for Mowbray Falls Enviropark is 65 per cent, which equates to approximately 10,000 overnight guests in the first year of operation and 23,700 guests in year five. The projected annual increase of approximately 2.4 per cent is supported by research undertaken by the proponents of the project. These figures are based on data from the Queensland Travel and Tourism Corporation and supported by the feasibility study prepared for Enviropark. The average expected length of stay is two nights per visitor, with a high proportion of return visitors. Overnight guests are expected to comprise 25 per cent of the total visitation, with 75 per cent being day visitors.

The majority of return visits are expected to come from day visitors who then decide to return to the Enviropark for an overnight stay. The main target market will be ecotourists including a high percentage of backpackers. The expected market penetration of the regional tourism market is set around 3.3 per cent. It is also the aim of the Enviropark to attract the boutique conference market and school groups for overnight and day visits as well as university field study groups.

Staff

Initially, 42 permanent staff will be employed and 38 indirect jobs created in the first year of operation rising to 131 permanent and indirect jobs in year five. Consistent with the philosophy of the project, staff recruitment will concentrate on the availability of skills from the local and regional area. Local Aboriginal staff will be recruited in positions.

The staff's understanding of the natural environment in this area will be enhanced through an ongoing development program delivered by the resident biologist and Scientific Research Centre. Similarly, a detailed understanding of the renewable energy base, ecologically sustainable principles and the environmentally friendly technology will be achieved through staff training sessions.

Staff will be trained in programs relating to recycling, energy and water conservation in areas such as the kitchen, restaurant, bar, laundry, office and guest rooms. While staff will have clear guidelines on these programs they will also be responsible for the monitoring of the success of these initiatives. Guests are also encouraged to monitor their own energy and water consumption using laptop computers provided in their rooms.

Environmental purchasing policy

The development of an environmental purchasing policy is currently in progress with life cycle analysis being identified for products and services to be purchased by Enviropark. It is intended to purchase most of the supplies locally provided that they meet best practice purchasing guidelines.

Planning and approval process

Three quarters of the original property (200 hectares) bought by Hilary and Geoffrey Kuhn were sold to the Queensland Department of Environment and Heritage in 1992. The remaining 50 hectares were divided into two lots of 25 hectares, one of which is the private residence of the owners and the other the proposed site for Mowbray Falls Enviropark.

The purpose of the land sale was to protect the continuous rainforest in the Black Mountain corridor from power line constructions. The Wet Tropics Management Authority considered this property to be of a high priority for environmental protection and the owners agreed to sell the land to National Parks. In April 1998, it was announced that the land had been gazetted as national park with the plan to make the land part of the Wet Tropics World Heritage Area. Hilary and Geoffrey Kuhn have been waiting for this to occur to apply for permits for commercial access to the park.

Since purchasing the land in 1974, the interim years have been occupied with the preparation of feasibility studies and business plans, including a report on the options for renewable energy sources. As ecotourism consultants, the owners identified the need for a working model of integrated ecologically sustainable development in tourism that was designed, planned and operated using the ESD principles.

A baseline study was completed in 1995 to determine the limits of acceptable change to the environment of the property and the region. These studies were not required by the local council as part of the development approval process but by the owners as part of the commitment to an ESD planning process. The only requirements by the council related to road access and construction and water supply. This resulted in the incorporation of a bore, which was not originally intended, into the water supply planning.

Neighbours who will be affected by increased traffic from the Enviropark were extensively consulted. As a result of that consultation, they are very supportive of the project, continue to be involved, and are updated regularly on progress. The Wet Tropics Management Authority was also consulted to ensure that the plans would not cause any visual disturbance when viewing the Mowbray Falls area from lookout points within the World Heritage Area. After these steps had been taken, the council approved the project without any hesitation or objection.

One of the most difficult phases during the planning and design process identified by the owners seemed to be that the traditional concepts of architecture and engineering did not embrace the development of a concept such as Enviropark easily. Considerable discussion with the architectural and engineering consultants was required to convince them that an integrated model was possible.

Building is expected to commence in mid-1998 after a second stage business plan which outlines construction methods, building materials and design in full detail has been completed.

The project is accessing ethical investment funds from Australia and overseas. The proponents intend that this model of design, planning, construction and operations will become an export model for the Pacific Rim, particularly given the park's tropical location and Remote Area Power System (RAPS).

Design concepts and planned construction techniques

The following practices were developed at the planning stage to reduce the environmental impact of construction work.

- all site preparation will involve minimum disturbance to soil and vegetation;
- existing vegetation adjacent to building construction will be fenced and marked as a protective measure; and
- local materials will to be used where practical, and all timber and other products will be from recycled or plantation sources.

Site development and construction methods with the least environmental impact will be adopted and non-toxic or minimum toxicity preparations will be used during site construction unless alternatives are not available. Only native plant species or exotics that bear food or provide a useful function will be used for landscaping.

It is envisaged that renewable energy will be used during construction, with a gas-powered generator as backup. The completed site will be entirely powered by wind and solar power as well as methane gas from the dry composting toilets. The owners are members of the Environment Management Industry Association of Australia (EMIAA) and draw heavily on the expertise and up-to-date knowledge of its members regarding the latest technologies in environmental management.

Code of conduct and ethics

The construction workers will be given an environmental code of conduct to observe during construction. Prior to commencing construction they will be briefed on the natural and cultural values of the area and advised on the measures necessary for environmental protection. These measures include raising boardwalks to minimise soil disturbance for some sites and special stormwater drainage for other sites to minimise the water run off during construction.

In line with Coalition for Environmentally Responsible Economies (CERES) principles, an ethical audit committee will be appointed on an annual retainer basis to report on the compliance of Mowbray Falls Enviropark management and operations with the stated objectives. During construction this independent committee will also report to the directors on measures and compliance with ESD principles.

Building design

The building design incorporates features such as natural ventilation, thermal mass, insulation and passive solar design. Other design considerations include sensitivity to the ecosystem and cultural context, enhancement of the appreciation of the environment and designing to minimise fire risk.

The building sites were chosen in areas which had been already cleared years ago for dairy cattle. While most of the building materials will be assembled on site the construction company will be required to dispose of any construction waste in an ESD manner and recycle as many of the materials as possible. The aim is to achieve minimum wastage in all areas.

Access to all buildings and most of the amenities (even the canopy walk) for people with a disability, will be available via ramps and rails. The only areas with difficult access will be the walking trail between the interpretive centre and the water gardens, however, internal transport will also be provided wherever possible for people with a disability.

The most common materials in the buildings will include slate, timber, glass and bamboo. The slate is sourced on-site and locally for floors, chimneys, and in as many areas as possible because it is a termite proof material.

While every effort will be made to use recycled timber the supply available in the region is very limited. Timbers from plantation cypress pine and eucalypt hardwoods therefore will also be used in most buildings. Glass will be minimised to reduce the cleaning, however, recycled glass will be used wherever possible. Bamboo from local bamboo plantations will be used for scaffolding and interior furnishings such as blinds and shutters. Other proposed building materials include shingles or solar tiles for roofing. Solarch, a Sydney based solar research institution, has developed solar tiles for roofing which can be incorporated into the solar power generation system. Research by the owners into recycled building materials showed that they often have to be brought in from interstate or even overseas, making their use expensive and energy intensive in terms of transportation.

Energy conservation

A feasibility study was conducted to estimate how much electricity will be used by Mowbray Falls Enviropark. The areas identified with the highest use were the kitchen, with 23 per cent consumption of total energy use, the laundry with 16 per cent, the Envirovillas, with 16 per cent, and the Longhouse accommodation units with 12 per cent. Some of the areas with the lowest use of energy will be the car parks and paths with 0.7 per cent and the gallery with 2.5 per cent of the total energy consumption.

Most services at the Enviropark will be based on renewable resources such as wind, solar and methane gas. LPG gas is planned for the use of cooking appliances, clothes dryers and some refrigeration, with an expected usage of three tonnes of gas per year.

Approach to technology

An important requirement of the project is that the technology must be visible so that it becomes a source of education and interpretation for visitors to learn about and appreciate their impact on energy consumption. Overnight guests will be able to monitor their own energy usage via the use of laptop computers which will be installed in all guest rooms.

A planned heat exchange system which uses heat from the refrigeration for a drying room adjacent to the kitchen will be a valuable inclusion. The tropical climate causes mould to settle quickly. The drying room will provide a space for storage of films, videos, discs and other items susceptible to mould.

The interior fitout will feature compact fluorescent lights to reduce energy consumption. Sensors will be installed around pathways to reduce energy use to times when light is actually required.

A common question regarding the compact fluorescent lights relates to their effect on ambience. The compact fluorescents will be used in combination with halogen lights and low wattage lighting so ambience should be of high quality. Unoccupied areas such as the car park and paths will be lit only when required.

Building design

The 'Queenslander' style buildings will allow the air to enter the buildings through wooden louvers at the bottom of the wall and be drawn out through louvers on the roof line of the ceiling. Ceiling fans and tubular vents in the roof will help to draw the hot air out of rooms.

Accommodation in the longhouse rooms comprises a sleeping area, veranda and ensuite with dry composting toilet and shower. Low flow shower heads will be installed to reduce the amount of water used. Guests will also be encouraged to resist using hair dryers and other high energy devices. No televisions are provided in the longhouse rooms which is an additional energy saver. The energy required for the longhouse accommodation is provided by solar panels on the roof.

The envirovillas offer two or three bedrooms with verandas, laundry and bathrooms and feature energy efficient appliances such as fridges and washing machines. It is envisaged each villa or cluster of villas will

have its own renewable energy source. This will allow the villa to be isolated from the rest of the Enviropark and able to 'buy ' or 'sell' electricity to the pool of energy generated by the various systems of the Enviropark.

Similarly, the reception area will have its own wind generator capable of supplying almost all energy needs if normal wind conditions prevail. A weather station will be set up to monitor wind direction to be able to better plan for high and low energy consumption times.

Cooler times of the year mean that heating is required for visitor comfort. Open fireplaces will be used and the villas will feature pot belly stoves. Fire wood will be supplied. Cost for firewood have yet to be estimated. Heating requirements will be reassessed following 12 months use. An alternative fuel supply for the pot belly stoves may have to be considered, possibly paper bricks made from recycled paper or other innovative sources.

Energy costs

The expected annual cost for energy consumption is estimated at $3,000 for gas, of which three tonnes are anticipated during the first year of operation. The electricity consumption is estimated at 21 megawatt hours per year, with no cost to Mowbray Falls Enviropark due to the renewable energy systems.

Estimates for installation of the hardware for the solar and wind power generation with a capacity of 86 kilowatt hours per day have been calculated at $280,000. A further $70,000 is estimated for the back-up gas generator, $56,000 for monitoring devices and a further $15,000 for miscellaneous costs.

Energy efficient appliances will be selected for all facilities. However, the owners have found that the energy efficient star ratings on appliances do not necessarily represent the best choice for solar powered energy systems that operate on direct current (DC). This is because direct current usually needs to be converted into alternating current (AC) by an inverter, so that the power is available to run standard electric appliances. However, there are appliances available that run on DC and more information can be obtained from the Murdoch University Energy Research Institute in Western Australia.

Water conservation and treatment

Water for the Enviropark will be supplied from four sources which are readily available at the site. Table 2 below outlines the sources and uses for the entire project.

Table 2: Sources, percentage of water supply and uses of water for Enviropark

Source	*% of total water supply*	*Major Uses*
Rainwater	20%	Drinking, cooking
Creek water	20%	Showering, cleaning and washing machines
Bore water	20%	Swimming pool, showering, cleaning and washing
Recycled greywater	40%	Irrigation

Groundwater extraction will be monitored regularly to ensure an adequate reserve is maintained. Rainwater will be collected via gutters and held in underground storage tanks.

Greywater will be collected from showering and washing for recycling through the permaculture pool and used in the irrigation of gardens. Biodegradable/phosphate free detergents and other cleaning agents will be selected to be compatible with the wastewater and effluent treatment.

Water saving devices installed throughout the Enviropark will include low flow shower heads, composting toilets, tap aerators, small sinks, automatic turn off taps and low flush toilets. The low flush toilets are intended to be linked to the greywater recycling; however, this depends on the technology available.

As part of the Visitors Code of Environmental Conduct to be developed, guests will be encouraged to use the same towels and linen for the length of their stay, although within reason. Laundry items will be washed on site and dried on cloth lines during the dry season and in the gas powered dryer during the wet season.

Waste minimisation and recycling

The Enviropark's Environmental Management Plan proposes a policy for purchasing recycled and unbleached paper products, recycled plastic and glass products wherever possible. Food and other supplies will be purchased in bulk from regional suppliers in Port Douglas, Mossman, Mareeba, Julatten and Cairns.

There will be a detailed environmental management operations plan and maintenance manual to train staff and use as an ongoing resource.

On site waste will be kept to a minimum by avoiding the purchase of overpackaged items and by using dispensers for shampoo and food items such as coffee and sugar. Catering practices will include the choice of foods in season. Disposable crockery and cutlery will not be used and non-returnable drink containers will be avoided.

All waste will be composted on site or sorted and recycled through local and regional services at an estimated cost of $200 per year. The recyclables will be taken to Mareeba and non recyclable waste will be disposed of at regional landfill sites. A recycling program for the entire Enviropark will include paper, glass, aluminium and plastic products. All facilities and people on the site will be involved in the recycling program, including guests and day visitors.

Community relations/interaction

The local community of Enviropark comprises about 1,000 people living in a 15 km radius around Enviropark, in Julatten and Mareeba. Neighbours and the broader community have been involved in the project planning issues such as increased traffic and road access. The overall aim is to create a remote tourist facility which is still closely connected to, and accepted by, the local community.

Partnerships with the Australian Trust for Conservation Volunteers and the Travelling Organic Farmers are being considered to provide opportunities for volunteers to contribute to the ongoing success of the Enviropark and be able to learn about its technologies and management practices. Other initiatives such as Waterwatch, a community based initiative to monitor streams and water ways, are being considered to give school groups the opportunity to test and monitor the streams on the property for heavy metals and other toxins.

Many socioeconomic benefits are expected to flow from the development of the Enviropark to the area, including job creation which has fallen on hard times since the decline of the dairy industry. Employment opportunities for local residents at the Mowbray Falls Enviropark and the demand for goods and services are hoped to stimulate the local economy. Local staff will be employed and trained as soon as building construction is completed.

The owners are currently participating in the formulation of a Cooperative Management Agreement between the Department of Natural Resources, Forestry, Wet Tropics Management Agency (WTMA), the Queensland Department of Environment & Heritage (DEH), the Queensland National Parks & Wildlife Service and Mowbray Falls Enviropark. The agreement will define the terms and conditions of access to the newly created Mowbray National Park and Wet Tropics World Heritage area that adjoin the Enviropark.

The Draft Wet Tropics Plan (1995) encourages agreements of this kind. It also identifies the Mowbray River area as the second priority tourism infrastructure node after the Daintree/Cape Tribulation area. Support from the Wet Tropics Management Authority will ensure an ongoing role for the Enviropark to participate in the management committee of the Wet Tropics World Heritage Area.

Education/interpretation

Interpretation of the natural area surrounding the site, together with the ecologically sustainable nature of the Enviropark and its operation will be presented through self-guide booklets, trained guides, interactive interpretive devices, the interpretive centre, a canopy walkway, walking tracks, the amphitheatre, arts and crafts displays, water gardens, the reforestation program, and the edible (bush tucker) landscape.

Every guest will be issued with the code of environmental conduct which aims to give guidelines on how to respect and observe the wildlife, and how to participate in the recycling and energy conservation programs.

The Wet Tropics Interpretation Centre will feature interactive displays via computers, synchronised slide shows and audio-visual displays about the Mowbray Falls Enviropark as well as the region. The floor plan design separates the different areas of interpretation to minimise any intrusion through sound in the various areas. Power usage monitoring will be displayed and there will be interactive computer games to compare energy consumption.

The Scientific Research Centre will operate as an independent entity from the Enviropark and will be responsible for the management of all native forest planting programs and forest regeneration. It will feature a wet and dry laboratory, a herbarium and a library. While direct seed funding for the centre will be provided by the Enviropark, it is proposed that the centre will be incorporated as an association with a non-profit legal structure. This way the centre can seek to gain income tax exempt status and be sufficiently independent from the influence of the management of the Enviropark to be able to attract government and other grant funds. It is also intended that the Enviropark will provide a given percentage of its net profit for on-going funding of the centre.

Alongside the path leading from the interpretive centre to the water gardens and adjacent to the Scientific Research Centre will be holding bins for forest seedlings. Visitors will be invited to plant the seedlings in appropriately tagged and dug holes in forest regeneration areas. Visitors will also be able to compile their own flora and fauna observation lists if they wish.

The environmentally sustainable features of the development will be very apparent from construction material used with the innovative architectural style to the inclusion of dry composting toilets. Photovoltaic panels on roofs, wind turbines and micro-hydro turbines will be very visible to the visitor. The ongoing monitoring of energy will be highlighted and those staying overnight will be able to monitor their own energy usage. Interpretive displays and explanatory material on the overall environmental impact monitoring process will be provided.

Specialist children's interpretation and devices such as 'touch 'n feel' and CD ROMs will also be available. Children's areas include an adventure playground and bird hides which will be available for both day and overnight visitors.

A computer program developed by CSIRO will be available for use by overnight visitors on laptop computers in the villas and longhouse rooms. This computer program has details of the local species flora and fauna, descriptions of landscapes, topography, geology and other scientific information.

Guides will be available to conduct interpretive tours. Qualifications for interpretive guides are desirable in the form of heritage interpretation courses, specialist skills, and expertise in anecdotal interpretation. A local Aboriginal guide will train all the guides and Aboriginal interpretation will be conducted always by Aboriginal guides.

While the range of activities, education and interpretation is diverse, the overall aim of the Enviropark is to demonstrate a holistic and integrated approach to tourism in natural areas.

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Daintree Wilderness Lodge

ANNA GRAHAM
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Overview

The Daintree Wilderness Lodge was built in 1991 and opened in the same year. The property is located in the Cape Tribulation region about 120 kms north of Cairns on freehold land surrounded by World Heritage listed wilderness. The closest beaches are at Cow Bay and Thornton's Beach, some eight kms or 10 minutes drive away. The lodge was established to provide high quality, relaxing and educational experiences for guests and day visitors. Mossman, the closest town, is approximately 45 kms from the Lodge. Transfers from Cairns and Port Douglas are available for guests on request.

The owner, Anna Graham, states her commitment to sustainable tourism as the underlying reason for operating this family business, and not just for the sake of the environment but for her children's children. The setting is recognised by the owner as a living biological museum. The region offers numerous Aboriginal sites.

Lodge style accommodation is offered in bungalows settled amidst the rainforest canopy and fan palms. The bungalows have a covered veranda at the entrance to the buildings, polished floor boards and an innovative canopy viewing ceiling which provides the cabins with abundant light. Other features of the lodge include a licensed dining room and bar, a jungle Jacuzzi, a natural rock pool and rainforest walks.

There are also tours available from the lodge such as reef trips, scenic flights, horseriding, canoeing and cruises on the Daintree River. Local tour operators are contracted to provide these services and are selected on the basis of the quality of their customer service and environmental knowledge. Extensive bush walks are also available in the area and guests have the opportunity to view animals in their natural habitat such as cassowaries, Thornton Peak Melomys and bandicoots. There is a policy at the lodge not to feed any of the wildlife to ensure their health and survival behaviours are protected.

Biophysical features

The site is located adjacent to the Wet Tropics World Heritage area which lies between Townsville and Cooktown and covers an area of approximately 894,000 ha. The Daintree River Valley is one of the largest rainforest wilderness areas in Australia and provides the only habitat for numerous species of rare plants and animals such as the brush tailed bettong, the spotted tail quoll and the southern cassowary. The vegetation is predominantly rainforest but also includes adjacent sclerophyll vegetation. The Wet Tropics contain an almost complete record of the major stages in the evolution of plant life on earth. Many species within the World Heritage area originated when Australia was still part of Gondwana.

The climatic conditions of the tropics create temperatures from 15–30°C in the winter months or the dry season and 23–33°C in summer or the wet season. The most distinguishing feature of the seasons is the start and finish of the wet season, which commences in November/December and lasts until February/March. Breeding times for the fauna occur all year and the major flowering time for orchids is in June/July and other flora mainly in September and October.

Most of the region's rainfall occurs during the wet season and averages about 3,500 mm per year. Cyclones occasionally approach the coastal regions during the wet season, usually with minor impacts. The last time a cyclone affected the area near the Daintree Wilderness Lodge was in 1934. However, the rainforest on the

site has been untouched for at least 200 years. Due to the continued cyclone risk the local council specifies cyclone ratings for buildings which must be satisfied during the design and construction stage.

The area is not prone to bushfires because of the region's tropical climate and rainforest. Hence, there is little land management necessary to prevent fires and the wilderness around the lodge is untouched. Weeds are not a problem so far at the site. Native rodents intruding into the accommodation buildings are always caught in live traps and released back into nature.

A vegetation survey of the Daintree area has been completed. The survey identified many endangered flora and fauna species in the region.

There is a range of Aboriginal heritage in the area and a tour from Cairns and Port Douglas with an Aboriginal guide provides interpretation of this heritage.

Operational features

Lodge style accommodation is offered in seven bungalows settled amidst the rainforest canopy and fan palms. Some of the bungalows offer accommodation for up to four people. Total bed capacity currently caters for a maximum of 18 overnight guests. A maximum of 40 day visitors is accepted at the site. However, so far the average number of day visitors has been five. Most of the day visitors come from overseas (90 per cent) and participate on day tours such as the Daintree Bloomfield explorer tours.

Overnight visitors originate mainly from Australia (60 per cent) and overseas visitors make up a smaller proportion (40 per cent). Guests come primarily from North America and Europe and domestic visitors originate mainly from Western Australia and Victoria.

Activities and attractions accessible at the Daintree Wilderness Lodge include:

- full and half day snorkelling and diving trips to the Great Barrier Reef;
- fishing on the Daintree River or on one of the beaches;
- Daintree River cruises to discover the mangroves and crocodiles;
- bush walking to waterfalls, creeks and scenic hills;
- access to the environmental centre which offers guided interpretive walks, interactive touch screens and videos, as well as information about the area and its natural and cultural history;
- horse riding;
- scenic flights over the Great Barrier Reef or to Cooktown, with a guided tour of the town;
- access to beaches;
- guided walks conducted by the qualified specialist guides;
- visiting the local ice-cream company which offers fruit tasting;
- safari 4WD tours;
- sunset cruises with champagne and nibbles; and
- picnics with hampers provided by the lodge at the beach or the rainforest pool.

The main attraction for day visitors is a lunch at the Wilderness Lodge combined with a guided rainforest walk.

All domestic animals and non-native plants are excluded from the entire resort area. This is to ensure that existing nesting and feeding patterns of native birds and animals can be maintained and encouraged. There is also a policy at the lodge, in line with conservation and habitat management, that only live traps are used to relocate small animals.

Access to the forest walks is only accessible from the lodge via raised walkways and boardwalks to minimise the impact on the rainforest floor. Litter that falls by the side of the boardwalks onto the rainforest floor needs to be managed and is regularly collected.

The average occupancy rate at the Daintree Wilderness Lodge is around 80 per cent which equates to approximately 5,200 overnight stays per year. Due to the steady increase in demand for overnight stays, the Daintree Wilderness Lodge will add another three lodges to the complex. The average length of stay at the lodge is three days. Approximately 10 per cent of the guest are return visitors.

There are currently four part-time staff employed at the lodge, some of whom come from the local region. Staff are trained in the use of environmentally sound products and educated about the detrimental effects of not using them in such a fragile environment. Information on appropriate garbage disposal, water conservation and flora and fauna management is also provided.

An environmental purchasing policy ensures that most of the necessary food supplies and cleaning and maintenance gear are purchased locally. Environmental impacts caused by the visitors on the property and in the area are regularly monitored.

Planning and approval process

The eight hectare property of the current lodge site was purchased by the owners in 1989 from the Douglas Shire. The rural zoning of the land meant that there were no conditions attached to the purchase of the land.

The owners designed and built the lodge themselves and did not require the services of architects and builders. The development approval process was smooth. Apart from getting road access approved, no other specific conditions had to be fulfilled. As there is no local community close to the site the issue of impacts on neighbours due to increased traffic and noise was not an issue.

An environmental baseline study was completed by the owners before building commenced. The site was and still is virgin palm rainforest and all activities undertaken to construct the lodge were sympathetic to this.

Design concepts and construction techniques

As owner–builders of the project, the Grahams handled all the design and construction. The design and construction of the buildings and pathways aimed to be low impact. Clearings for the construction sites were created by hand with crowbars and shovels. Earth moving machinery was not used at all during construction. Special precautionary techniques were used to ensure minimal disturbance to the site—such as constructing the boardwalks first and then using them to move building materials.

The building design of the bungalows incorporates features such as cross-flow ventilation and north facing orientation. Apart from the orientation, the buildings were also placed around the existing vegetation, including trees. Where trees were in the way, the buildings and pathways were built around them, with the original trees and vines now growing through the floor and roof. Only two trees were removed during the construction of the entire project.

Indigenous seeds were collected prior to construction for regeneration in areas that had been disturbed. However, minimal landscaping and regeneration were required following construction. Since its impact was slight, the construction had little impact on the vegetation and soil.

Other design considerations included sensitivity to the ecosystem, with the aim of enhancing visitors' appreciation of the environment. This was achieved, for example, by building several small car parks in natural clearings.

Raised boardwalks connect all the buildings to ensure ground cover protection and vantage points for observation of rainforest habitat. The positioning of all services fixed to the underside of the walkways and boardwalks ensures easy and economical maintenance and non-disturbance to the rainforest floor. This meant no excavations were necessary for the pipes to be connected to buildings and facilities.

Materials were chosen to reflect the naturalness of the rainforest surroundings. Instead of using concrete or bitumen products on the driveway, gravel was used from the local area. Also the roofs are made from galvanised iron instead of darker colours to keep the indoor temperature lower.

Plantation pine timber was utilised in all of the buildings, while some recycled doors and windows were sourced from a demolished warehouse in Cairns.

All the buildings were constructed with fireproof walls to minimise fire risk. There is also a non-smoking policy in the lodge and none of the cabins have stoves. One of the most unique features of the bungalows is

the transparent ridge cap on each building to make maximum use of natural light and to allow rainforest viewing even from the inside of the bungalows. Wool insulation was used in the roofs and in conjunction with sisalation.

The design also provides full access to the facility for physically or sensory impaired people. Easy wheelchair access is a feature of all the boardwalks, doorways, bathrooms and showers.

Energy conservation

All of the energy used at the lodge is generated by burning oil. At present 7800 litres of oil are used annually. The cost for the oil as the sole energy supply during any year is around $20,000 and the owner is currently investigating the viability of a remote area power supply using alternative technology.

Fluorescent rather than incandescent lights are used throughout the lodge to reduce energy consumption. Energy efficient equipment has been selected for all appliances in the bungalows. Light colours, minimal surface exposed to the sun and textures of the buildings have been chosen to keep the buildings cool inside and to minimise energy use. The generators run from 6.30 am to 10.30 pm. Guests are made aware of the energy conservation reasons for this.

Air-conditioning is not required in the bungalows as the ceiling fans help to keep the rooms cool and the rainforest canopy protects the buildings from direct sunlight.

Water conservation and treatment

Spring water supplies the entire resort with fresh water, which is accessed via a bore.

A waste water system manufactured by BioCycle has been installed for showers, sinks and toilets. The system has been functioning well for eight years and water is discharged after treatment by sprinkler into the garden. The installation cost was around $9,000 and, with regular maintenance and servicing, there are very few technical problems. The lodge was the first in the district to install one of these systems and, following promotion of its success, this method of waste water disposal has become the preferred method adopted by the local council for the Wet Tropics area.

The waste water system has a breakdown alarm and an approved emergency bypass facility for which the manager of the lodge has received specific training. There is also an operations manual and maintenance schedule for the bio-cycle system, which is administered by the manager.

Water saving devices throughout the lodge include small sinks, low flow showerheads, tap aerators and low flush toilets. Guests are provided with general information on water conservation to encourage them to use water carefully during their stay.

A purchasing policy exists for biodegradable, non-toxic cleaning products that are free of petrochemicals or phosphates. The laundry is operated on site using cold water to conserve energy and a phosphate-free biodegradable washing product to reduce the impact on the greywater.

Waste minimisation and recycling

Bulk food and materials are collected or delivered from Cairns, which is the closest city (90 kms) that supplies in bulk. Some of the measures undertaken at the lodge to reduce waste include the use of recyclable packaging to dispense coffee and sugar. In general, disposable items are avoided as much as possible; for example, linen napkins are used instead of disposable ones.

The lodge has a regular maintenance program to repair water leaks and dripping taps and to prolong the life of equipment.

Rubbish generated at the lodge is regularly sorted and transported at the owner's expense to a recycling depot 50 kms south of the lodge. The recycling program separates glass and aluminium cans. The non-recyclable waste is collected by council from a transfer station five kms away from the lodge and disposed of at the local rubbish tip. The cost for rubbish removal for the lodge is approximately $1,040 per year.

Food waste from the kitchen is composted in three compost bins for use as natural mulch. Staff members remove the compost for their own use as the majority of it is not needed on site. The composting system is regularly monitored to ensure that non-native seeds are not germinating.

Community relations/interaction

The local community of approximately 300 residents stretches from Daintree River to Cape Tribulation over a distance of 40 kilometres. The closest population is located at Cows Bay, approximately eight kms from the lodge.

The lodge is used by the local school for their environmental education programs Other partnerships and initiatives by the owners involving the local community have initiated the Daintree Wilderness Chamber of Commerce and the Cassowary Conservation Group. The lodge often hosts the local Chamber of Commerce meetings and special environmental conferences and group meetings. Other organisations such as the Wet Tropics Management Authority, the Cassowary Conservation Group and Biological Study Groups use the lodge as a venue for information evenings and meetings.

Guests also have the opportunity to buy local craft, food and beverages at the Lodge. There are currently four local staff employed in the housekeeping section and kitchen. The intention is to recruit all staff from the local region. The Daintree Wilderness Lodge is a member of the Port Douglas and Daintree Tourist Association and is represented on the Queensland Tourist and Travel Corporation.

Education/Interpretation

The lodge offers an educational experience to guests. Apart from the guided, interpretive walks, there are descriptive folders with information on the fauna and flora in each of the bungalows to help inform guests on self-guided day walks. On completion of the night walks a 'light' sheet is used to attract the area's diverse insect life. A local entomologist helps to identify the insects and explains their role in the rainforest ecosystem.

A touch and feel table is also provided for the guests that contains seeds and pods from the rainforest floor so they can become more aware of the uniqueness of the environment without damaging the fragile rainforest. Nature videos are available for those guests who are not participating in the night walks.

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Appendices

Seminar Participants

APEC Tourism Working Group

Seminar on Environmentally Sustainable Tourism Accommodation

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Ms Helen HALLIDAY	Director, Strategic Policy and Coordination Section, Biodiversity Group, Environment Australia	AUSTRALIA
Mr Nathan KUMIN	Special Project Officer, PNG Tourism Promotion Authority	PAPUA NEW GUINEA
Mr John REI	PR & Media Officer, PNG Tourism Promotion Authority	PAPUA NEW GUINEA
Mr ROSLAND Bin Abdul Ghani	Head, Technical Unit, Ministry of Culture, Arts and Tourism	MALAYSIA
Ms June Yuen-ngor NGAR	Country Parks Planning Officer, Agriculture and Fisheries Department	HONG KONG
Mr Wanchai REUNGUDOM	Chief of Natural Attractions Section Tourism Authority of Thailand	THAILAND
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