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White Paper on Tourism and Water

EarthCheck Research Institute

WHITE PAPER ON TOURISM AND WATER

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About EC3 Global

EC3 Global is an international tourism and environmental management and advisory group which was developed by the Sustainable Tourism Cooperative Research Centre (STCRC), the worlds largest dedicated research centre specialising in sustainable tourism and research. EC3 Global work with clients to plan, manage and achieve business, development and marketing objectives; set and achieve sustainability goals with a triple bottom-line focus and implement programs to achieve these objectives. Its global community of clients has access to experienced project managers and allied professionals, as well as global tourism best practice and research. For more information, visit http://www.ec3global.com/.

About EarthCheck

EarthCheck, managed and owned by EC3 Global, is an internationally recognised environmental management and certification program with members in over 70 countries. The program improves operational performance of member organisations and reduces costs. Recent studies show that six million people a week are impacted by EarthCheck's branded solutions. The company takes a scientific and systematic approach to risk mitigation and legislative requirements and is regarded as one of the world's best practice environmental sustainability leaders. For more information, visit http://earthcheck.org/.

About Griffith University

Griffith University is a top-ranking university, based in South East Queensland, Australia. Research on sustainable tourism is largely undertaken at the Centre for Tourism, Sport and Services Research (TSSR), which is part of the Griffith Business School. TSSR acts as a focal point for innovative, quality research in tourism, sport, and services research. Through its activities, the Centre links university-based researchers with the business sector and organisations, as well as local, state and federal government bodies. For more information, visit http://www.griffith.edu.au/business-government/centre-tourism-sport-services-research.

About Ecolab

A trusted partner at more than one million customer locations, Ecolab (ECL) is the global leader in water, hygiene and energy technologies and services that protect people and vital resources. With 41,000 associates and 2012 sales of $12 billion, Ecolab delivers comprehensive solutions and on-site service to ensure safe food, maintain clean environments, optimize water and energy use and improve operational efficiencies for customers in the food, healthcare, energy, hospitality and industrial markets in more than 170 countries around the world. For more Ecolab news and information, visit www.ecolab.com.

About the EarthCheck Research Institute

The EarthCheck Research Institute (ERI) is a not-for-profit company whose goal is to be a leading international centre for scientific excellence in sustainable tourism. The institute focuses on scientific research, education and capacity building to solve real-world challenges. The role of the ERI is to provide advice on the key sustainability and climate change issues now facing the world's travel and tourism industry and to provide advice and assistance to industry on the changing needs of new mandated reporting standards for climate change and sustainability. The ERI includes eight international centres of excellence with an established reputation for ground-breaking research. For more information, visit http://earthcheck.org/science.aspx.

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1.
EXECUTIVE SUMMARY

Water stewardship, water stress and availability have become increasingly important planning and development considerations for the tourism industry world-wide. Water challenges will be particularly important in the Asia-Pacific region – the world's fastest tourism growth region, with a total of 216 million international tourist arrivals in 2011. This White Paper on Tourism and Water provides an overview of the key water-related challenges for the tourism industry in the Asia Pacific region. The paper discusses the tourism industry's water requirements, including 'benchmarks' for consumption, in various types of tourist accommodation. Strategies for reducing water consumption, improving efficiency and quality, and engaging in water stewardship initiatives are presented.

Global fresh water consumption has tripled over the last 50 years, and the lack of access to clean drinking water is a critical issue for many countries in the Asia-Pacific region. Population growth is a key driver of water demand, with about two-thirds of global population growth occurring in Asia, resulting in an additional 500 million people in the next decade. Existing water stress and scarcity are likely to be exacerbated by climate change. A range of global initiatives and standards are being developed to address these water challenges and it is critical that tourism becomes an active contributor to these discussions and activities.

Water challenges are assessed along the three dimensions of business risks; cost, availability and quality , and observations on geographic water stress are provided. Understanding the importance of cost, availability and quality of water raises important questions about design, planning, procurement and development pathways for the tourism industry. The cost of water is likely to increase and new legislation or investor pressure that could initiate some form of 'Water Footprint' estimation or disclosure from the hospitality sector is conceivable, if not inevitable. Businesses that are prepared to audit their water consumption will have a competitive advantage when faced with such requirements or expectations. In addressing tourism's water consumption, we also need to consider tourism's embeddedness in local destinations and communities, its potential leadership role, and its potentially high indirect (i.e. embodied) water footprint.

A benchmarking review based on hotel data from the EarthCheck certification and benchmarking programme reveals that the water consumption at hotels is considerable, with per guest-night-usage rates far exceeding local domestic water use. The variation across world regions and also Asia-Pacific destinations, is vast with some countries consuming up to five times as much per guest night than others. The benchmarks provided in this White Paper highlight important geographic, legislator, behavioural and cultural differences that require further examination. This is even more important for those regions that are already experiencing water stress.

Reducing water consumption and increasing water efficiency can be achieved in many ways. Organisational change and management, technology and efficiency options and behavioural change are examined. This is the first of three research reports which will be delivered by the EarthCheck Research Institute. The second paper will examine water use benchmarks and baselines and the final report will document operational best practice using case studies drawn from the Asia Pacific region.

2. INTRODUCTION AND GLOBAL CONTEXT

Water stewardship, water stress and availability have become increasingly important planning and development considerations for the tourism industry world-wide. This paper puts forward the proposition that an integrated destination approach to water management provides the best means of reconciling competing demands for water supply, as well as a framework to guide effective operational actions at a property and precinct level. Another way of looking at this is that sustainable tourism cannot hope to be achieved without a broader commitment and understanding of sustainable development outcomes across the wider community.

The Cooperative Research Centre for Sustainable Tourism (STCRC) in Australia developed the science and benchmarking behind the EarthCheck Community and Company Standards in 2000 based on Agenda 21 principles (UNCED, 1992). The EarthCheck Standard was one of the first programs to require operators to provide verified data on potable water consumption and recycled water use.

"Sustainable tourism cannot hope to be achieved without a broader commitment and understanding of sustainable development outcomes across the wider community."

The Global Sustainable Tourism Council (GSTC) recently launched the Global Sustainable Tourism Criteria in which it is stated that the activities of a tourism company should "not jeopardise the provision of basic services, such as water, energy, or sanitation, to neighbouring communities" (Tourism Concern, 2012). Clearly, taking responsibility for managing water responsibly goes beyond technical approaches of water conservation within a company's premises, to also include aspects of supply chain management and consideration of the needs of the local community (UN, 2012).

The starting point for any tourism business, however, must be its operational efficiency, as this directly addresses business risks associated with water scarcity and quality. The next step is to understand the broader responsibilities that can contribute to water sustainability at a precinct, community and destination level. This White Paper takes a specific focus on the business-related water challenges and opportunities in the Asia Pacific region. To date, a large proportion of the tourism related research on sustainable development has been focused towards European and North American experience data and metrics. As we are now 10 years into the Asian Century, it is timely to focus our attention on this growth region. While 70% of global freshwater withdrawal and over 90% of its consumptive use is for agriculture (Food and Agriculture Organization (FAO) 2012), tourism is beginning to put an additional strain through its need for a clean water supply and the pressure the activity places on existing water resources such as lakes and rivers and estuarine environments. International tourism arrivals have been growing world-wide, according to the United Nations World Tourism Organization (UNWTO) (2012). The Asia-Pacific region is the world's fastest tourism growth region, with a total of 216 million international tourist arrivals in 2011.

The Pacific Asia Travel Association (PATA) predicts that "international arrivals to Asia Pacific destinations will expand at a rate of around five percent per annum over the next three years to 2014, at which point the region should welcome close to half-a-billion international visitors annually. Asia will continue to lead the way, with arrivals growing at an annual rate of almost six percent, with the Pacific following with just under two percent" (PATA 2012) (See Figure 1).

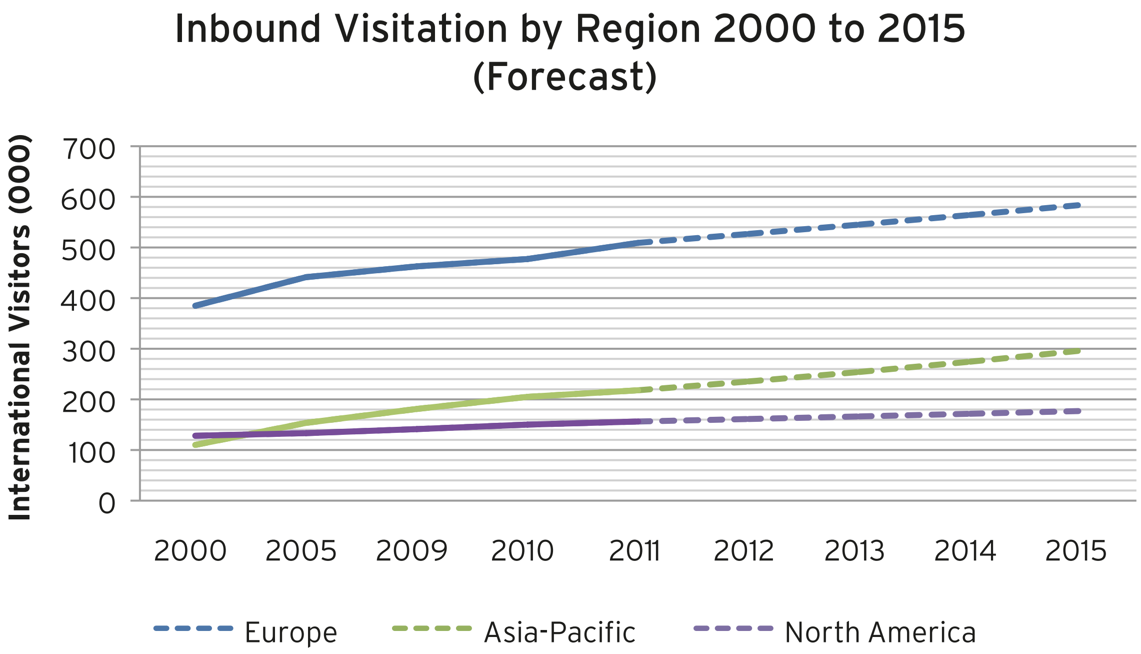

Figure 1 International arrivals to world regions and forecasts (extrapolated using average annual growth figures by region over the last 12 years) (Source: UNWTO Tourism Barometers vol. 10, 2012).

QUESTIONS:

- Do you agree that the tourism industry needs to get directly involved in destination planning issues, such as water stewardship?
- Who in the tourism industry needs to provide the leadership to address issues associated with water scarcity and water stress at a precinct or regional level?
- Apart from the EarthCheck Community and Company Standards, what other tourism specific sustainability standards benchmark water use and provide baselines for geographic and climate zones?

Water scarcity and quality also have become increasingly important strategic considerations in both corporate and business planning (GreenBiz & Ernst & Young, 2012). Strategic questions include, for example, who is responsible for water stewardship at the destination level, whether the tourism industry actually should be engaged in water management planning and how operators can play a part in responsible water use and management at the site level. There is a growing realisation that tourism needs to take responsibility to ensure that not only is water consumed efficiently and in the most sustainable way, but also that risk management procedures are in place that guarantee continuing water supply for the long-term viability of hospitality businesses, as well as the broader community. Potential water shortages pose a threat to business growth and expansion, and conflicts over water supplies may create a security risk (KPMG, 2012).

This White Paper on Tourism and Water aims to provide an overview of the key water-related challenges in the tourism industry, present insights into the tourism industry's water requirements and puts forward benchmarks for 'good practice' associated with water consumption in various types of tourist accommodation. The target audience for the White Paper is the major hotel and leisure asset owners and managers in the Asia Pacific Region, local tourist destination managers and planners (e.g. Regional Tourism Organisations) and, international tourism industry associations, such as Pacific Asia Travel Association, World Travel & Tourism Council, the United Nations World Tourism Organisation, and the International Tourism Partnership.

3.
THE GLOBAL WATER CHALLENGE

The 2012 United Nations World Water Development Report highlighted that trends of urbanisation, rapid development and increasing intensity of agricultural production in Asia Pacific have resulted in increased pressure on water resources, with mounting risks of water stress (UNESCO, 2012). Water stress has been defined as a threshold that is reached when annual fresh water supplies drop below 1,700 kilo-litres per person (equating to 4,660 litres per day); water scarcity means that less than 1,000 kilo-litres per person (or 2,740 per day) are available (UN Water, 2012). In addition to stress or scarcity, water might be readily available, but heavily polluted or saline. In the Asia-Pacific region only 15-20% of used water is treated before being discharged into natural waters, resulting in very high levels of pollution in some areas (UNESCO, 2012). With the Asia-Pacific being home to some of the largest populations (Economic and Social Commission for Asia and the Pacific, 2011), the region faces increasing challenges.

"The most prominent shift is that, unlike energy and carbon, in which global strategies can shape global action, many water issues are local and must lead to strategies and initiatives at the catchment level"

Global fresh water consumption has tripled over the last 50 years, and the lack of access to clean drinking water is a critical issue in many countries in the Asia-Pacific region. Constraints in fresh water supply are a result of limited availability in some regions, as well as insufficient infrastructure and polluted groundwater (Tourism Concern, 2012). Population growth is a key driver of water demand, with about two-thirds of global population growth occurring in Asia, resulting in an additional 500 million people in the next decade, especially in urban areas. In Asia, the urban population is expected to grow by 60% by 2025 (Leadership Group on Water Security in Asia, 2009).

"While the true costs of energy and water use are both far exceeding their present traded price, water is undervalued to a far greater extent than energy."

In his book *Corporate Water Strategies*, Will Sarni (2011) highlights the shifting paradigm in environmental management, as a change of focus from energy use and greenhouse gas mitigation to water stewardship (see also Text Box 1). The most prominent shift is that, unlike energy and carbon, in which global strategies can shape global action, many water issues are local and must lead to strategies and initiatives at the catchment level. In addition, water issues tend to be unique, not just because of geographical location, but also due to cyclic or random temporal aspects.

Text Box 1: Global context of water stewardship

In 1992, the Rio Earth Summit made global concern on water the focus of Chapter 18 of Agenda 21, and the inter-linkages of water and sanitation have since been monitored by the Commission on Sustainable Development (CSD) (UN, 2012). Agenda 21 also highlighted and promoted the development of sustainable human settlements in its seventh chapter. This called for, amongst other things, adequate shelter for all, the promotion of sustainable land-use planning and management and promoting the integrated provision of environmental infrastructure: water, sanitation, drainage and solid waste management. On World Water Day 2005, the "Water for Life" Decade was launched. This aimed to promote efforts to fulfil international commitments made on water and water-related issues by 2015. A further initiative was the Millennium Development Declaration that called upon the world to halve, by 2015, the proportion of people without access to safe drinking water and basic sanitation.

While the true costs of energy and water use are in excess of their present market prices, water is undervalued or subsidized to a far greater extent than energy. Moreover, water has not been subject to market driven "price" fluctuations to the same extent as energy. This limits the ability to make a conventional business case for water conservation and efficiency projects, even as businesses face more and more competition for reliable municipal water sources. Also, unlike energy, water extracted from natural sources is subjected to multiple human uses prior to being returned to nature. As a result, water risks cannot just be managed internally within a business entity or property, but require robust engagement with other stakeholders in the watershed or catchment.

"Water risks cannot just be managed internally within a business entity or property, but require robust engagement with other stakeholders in the watershed or catchment."

Water stress and scarcity are exacerbated by climate change, as highlighted by the Intergovernmental Panel on Climate Change in 2008 (Text Box 2). In its targeted report on this subject of water scarcity and climate change, the Pacific Institute analysed water demand by sector and the implications of climate change on water reliability (Morisson et al., 2009). While the analysed sectors (apparel, electronics, beverage, food, pharmaceuticals, forest products, mining and metals, electric power and energy) did not include hospitality or tourism, several relevant factors were considered. Impacts of higher ambient temperatures on increased water needs for industrial and institutional cooling and increased water for hydration is one example. Pressures on non-consumptive and recreational water uses are another. Salt water intrusion from excessive groundwater depletion and rising sea-water levels is of particular significance to tourist destinations. Increased public health risks due to mobilization of pathogens and contaminants from severe weather events and water-borne illnesses from declining water quality are increasingly relevant to the tourism industry.

Text Box 2: The Intergovernmental Panel on Climate Change (IPCC) (Bates et al., 2008) summarises the following key points on water and climate change

- Changes in the hydrological cycle have been observed (e.g. more water vapour in the atmosphere, changing precipitation patterns, more extreme events, melting of glacial and polar ice);
- Increased rainfall intensity is very likely to result in more frequent heavy rainfall events, and likely to result in more frequent drought;
- Higher water temperatures and more floods will reduce water quality and exacerbate pollution;
- Existing water-related infrastructure, including hydropower and drainage systems, are expected to be negatively affected by climate change.

While launching its Water Disclosure Project (2010), the Carbon Disclosure Project outlined the various risks to commerce from water scarcity: (1) physical risks from compromised water quantity or quality, (2) regulatory risks from changes to water quality standards, water rights and public policy, and (3) reputation risks from perceptions of specific market sectors, competing demands within stressed watersheds, and degradation of ambient water quality. These business risks highlighted the inherent financial cost of operations, embedded resource costs in raw materials, eroding competitive advantage and the escalating costs of environmental compliance associated with water.

How various market sectors perceive and communicate their business risks associated with water can be gauged by the extent of their water disclosure. In an analysis of global water disclosure by sector, a CERES report provided insight into this dimension of transparency (Barton, 2010). This report analysed various aspects of business: water accounting, stakeholder engagement, and risk assessment in the supply chain and direct operations. Most of the risks identified were physical (quantity or quality) and few companies collected or disclosed local water use data or engaged with local stakeholders at the watershed level.

There are several initiatives underway at the non-governmental and inter-governmental levels, to shift the dialogue on water challenges from one on inventory (water footprints and life cycle analyses) to impact and stewardship. The scope of ISO 14046 (under development, part of the ISO 14000 Environment Management and Organisational Sustainability family of International Standards) is to address the use of all types of water from an inventory and impact assessment perspective.

The Alliance for Water Stewardship (a collaboration amongst some of the world's leading players in sustainable water resource management) released a draft Water Stewardship Standard in 2012 and intends to release a fully operational (or "implementable") beta version of the AWS Standard in February 2013. Ecolab is participating on technical panels developing the ISO 14046 standards and has made significant public commitments to road test the AWS standards through its customers, including those in the hospitality sector. The EarthCheck Company Standard requires a tourism business to submit data on total potable water consumption and also recycled water use. In addition it asks for inputs on:

- How often does the organisation check for leaks?
- What percentage of all toilets installed are low / dual flush?
- What percentage of all tap fittings are low flow?
- What percentage of all shower fittings installed are low flow?
- Waste water treatment on site
- What percentage of water sprinklers are used / operated after dark?
- What percentage of the landscaping requires minimal irrigation?
- What percentage of total water consumption is from recycled / grey / rain water sources?

The EarthCheck Community Standard examines water conservation and management across the tourism destination and seeks to determine the strategies which are in place to measure and map water use. Figure 2 below summarises the key sustainability and stewardship issues related to water-scarcity of supplies, degrading quality and increasingly stringent regulations, and growing demands.

Increasing Water Stress and Scarcity	Degrading Water Quality & Stringent Regulations	Increased Demand in Developing Regions
By 2025, 1.8 billion people will be living in regions with absolute water scarcity. By 2050, 3.9 billion people will be living in river basins under severe water stress.	Over half of the water available for human use is polluted. Regulations are constantly evolving and more stringent standards are being adopted throughout the world.	80% of global population growth is expected to occur in developing countries by 2020. Water demand is projected to increase by 55% globally and by over 80% in BRICS countries between 2000 and 2050.

Figure 2 Key issues related to water (Sources: Coping with Water Scarcity, FAO 2007 and 2012; Environmental Outlook to 2050: Key Findings on Water, OECD 2012).

QUESTIONS:

- Do you agree that water is undervalued to a far greater extent than carbon emissions?
- Has the tourism industry in the Asia-Pacific region recognised the need to plan for climate change and the risks associated with water quantity and quality in the design and construction of new resorts and hotel infrastructure?

4.
GEOGRAPHIC PRESSURES IN ASIAN COUNTRIES

The Asia-Pacific region is inhabited by 60% of the world's population, but it has only 36% of global water resources (UNDCWS, 2012). Water resources in the Asia-Pacific region face many complex challenges, resulting in regional hotspots. The hotspots are areas that face multiple issues, including constrained access to water and sanitation, limited water availability, poor water quality and increased exposure to climate change and disasters. The hotspots identified by UNDCWS (2012) include Pakistan (due to the high risk of flooding), Cambodia, Indonesia and Lao PDR (due to exposure to natural disasters and limited access to drinking water and sanitation), India's Punjab and the North China Plain (facing falling water tables by 2 to 3 m a year), and also water-rich countries, because of deteriorating water quality and high levels of pollution from untreated sewage. Water risk maps for the Asia-Pacific region are shown in Figure 3.

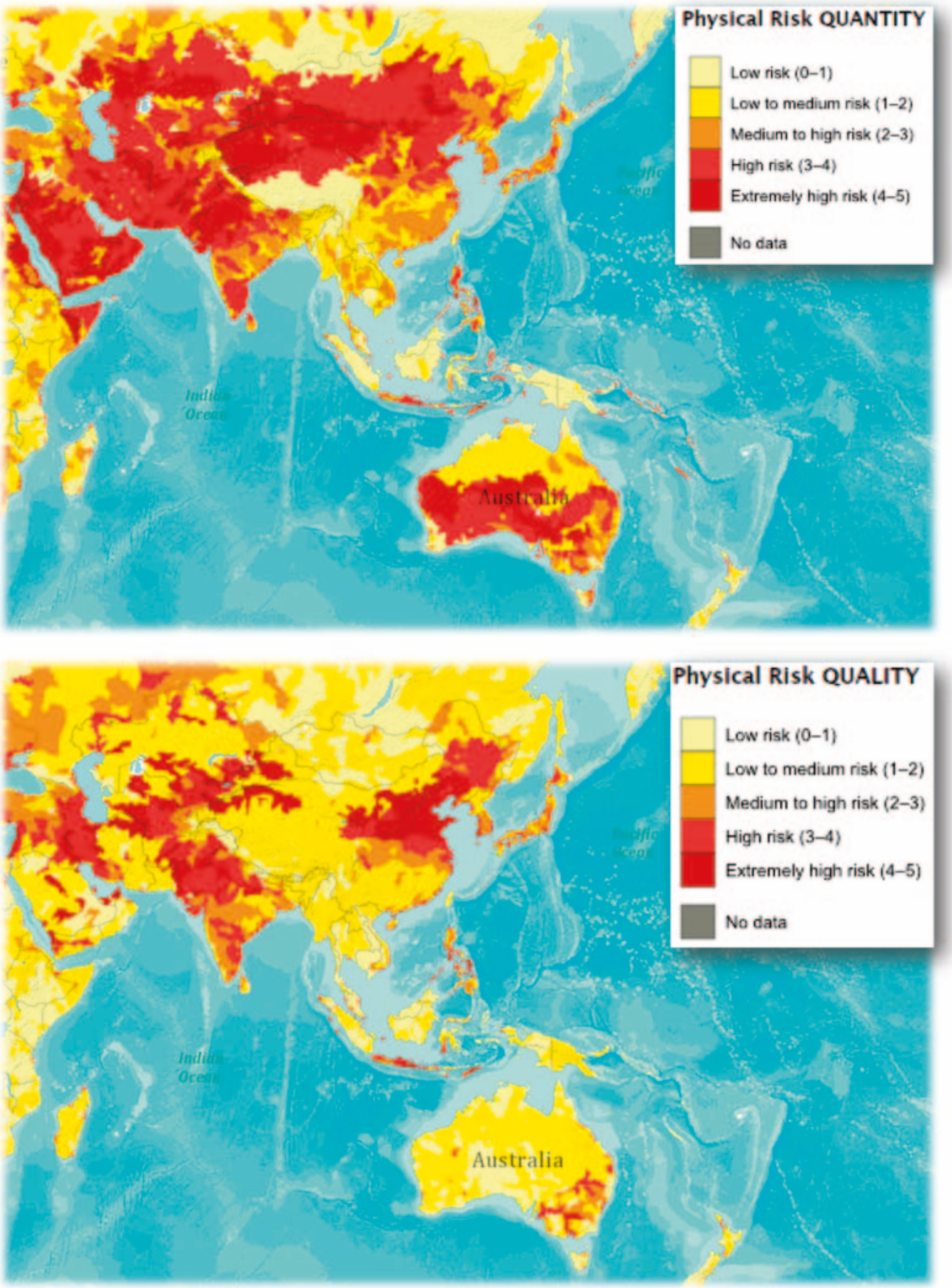

Figure 3 Water Risk Maps for the Asia-Pacific Region: Quantity and Quality (Source: WRI, 2012)

Water challenges, which can be assessed along three dimensions, namely cost, availability and quality, vary across different Asian nations in the Asia-Pacific region (Figure 4). The Maldives face critical conditions for all three stress dimensions, with costly water that is limited in supply and poor in quality. The same is true for various regions (northwest and south) of India. Regions in South China and Australia either display acceptable or moderate levels of concern on cost and availability, although degrading water quality remains a concern in South China.

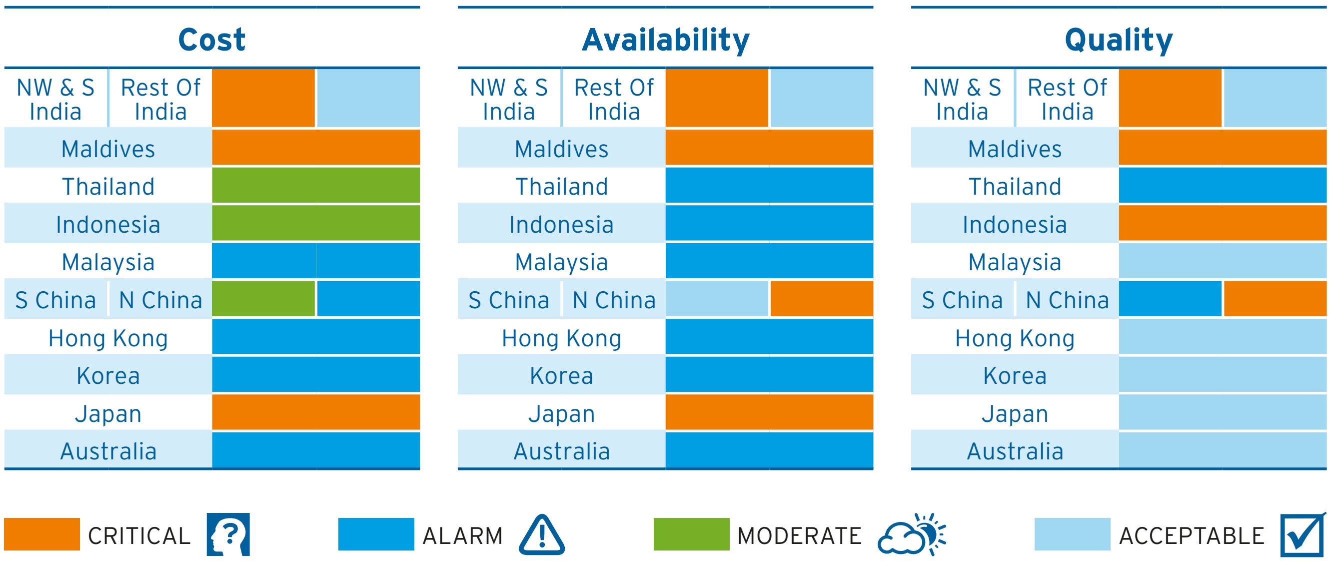

Figure 4 Key dimensions of water stresses in the Asia- Pacific region (Source: Ecolab, 2012).

While industrial water use in Japan tripled between 1965 and 2005, most of it has come in the form of recycled water, resulting in a levelling of freshwater withdrawal for industrial use since the mid-1970s (Ministry of Land, Infrastructure, Transport and Tourism, Japan, 2008). Per- capita domestic (household and commercial, including hotels) water use in Japan doubled over four decades due to lifestyle changes, while population changes and economic growth resulted in the tripling of absolute domestic water consumption in the same period. The absence of significant water recycling and reuse in these sectors has resulted in critical stresses in costs and availability. Over 88% of the water withdrawal in Japan is from surface water sources and 12% is mined from less sustainable groundwater. Surface water quality has been preserved through stringent regulations and implementation of state-of-the-art technical solutions for treating discharged wastewaters.

"Water challenges can be assessed along three dimensions, namely cost, availability and quality."

Increasing water scarcity often leads to conflict: there were more than 120,000 water-related disputes in China alone since 1990 (UNDCWS, 2012). The Mekong Delta is a classic case study where all three dimensions of water cost, availability and quality present challenges. The question of water management in the Mekong Delta raises questions beyond individual users' responsibilities, and demands a much broader approach of destination management and stewardship. Text Box 3 below illustrates how water has increasingly become a political issue, not only because waterways often cut across many nations and one country's use may impinge on downstream country's opportunity of use, but also because there are different priorities in terms of how different countries want to make use of the available water. Examples of conflicting types of use are the damming of waterways to generate hydro-electricity and the extraction of water for agricultural irrigation. Both of these uses have implications for ecosystem values and services.

Text Box 3: The Mekong River Commission

The tourism potential of the Mekong Delta is recognised across a range of countries. There is a constant need to develop marine tourism as well as sea, river and island facilities that highlight the more than 120 cultural and historical sites and biosphere reserves found within the Delta. (Source: 'Vietnam: Tourism discussed in the Mekong Delta', Asia News Monitor, 31 May 2010, Thai News Service Group, Bangkok, Thailand).

The Mekong River flows for more than 4,800 kilometres through China, Myanmar, Laos, Thailand, Cambodia, and Vietnam, and terminates in the South China Sea. Thailand and Laos share the highest percentage of area in the basin with 23% and 25%, respectively, while Laos contributes the greatest amount of flow (35%). Vietnam has the highest population density (236 persons per square kilometre) and the lowest percentage of basin area (8%), posing concerns with respect to its political influence. The Mekong's annual flow varies widely based on the monsoon season, ranging from 78 to 475 cubic kilometres from dry to rainy seasons, respectively.

The relationship between the upstream and downstream states in the Mekong River system is highly politicised. China occupies a much stronger position in the basin because of its political power. China is also the upstream state, which results in an extreme asymmetry of power relations. The varying interests were successfully negotiated and codified in a framework agreement of the Mekong River Commission (MRC), which was signed in April 1995 between the governments of Cambodia, Laos, Thailand and Vietnam. This agreement sets a mandate for the organization "to cooperate in all fields of sustainable development, utilization, management and conservation of the water and related resources of the Mekong River Basin."

Source: extracted from Leadership Group on Water Security in Asia, 2009, p. 17, and originally supplied by Vitoon Viriyasakultorn, (USAID/ECO-Asia)

"… the tourism sector will be competing for a significantly diminished share of available water, assuming that industrial water demand in Asia will follow in the footsteps of European and North American countries due to development."

Analysis of per capita water use in Asia (based on several data sources, including the FAO, 1999 and 2012, and the World Resources Institute, 1994 and 1998, in collaboration with the United Nations Environment Programme and the United Nations Development Programme) indicates that water use intensity is about half of that in North America (Figure 5). However, in contrast to North America, the most significant fraction of this freshwater use is for agriculture (Figure 5), with the per capita agricultural water use intensity in Asia higher than the global average of 930 litres per person and day. This puts the non-agricultural water use intensity in Asia at a third of the global average and less than 10% of the corresponding use intensity in North America.

The historic data shown in Figure 5 have to be seen in the context of growing demand for industrial water use in the Asia-Pacific region, which has been experiencing the rapid increases in industrial activity for the past few decades. Water use reported as "domestic water use" by inter-governmental agencies is misleading, as it identifies quantities of water associated with municipal supply for residential, commercial and industrial users in some geographies. However, looking at the current non-agricultural water use intensity in Asia (i.e. the sum of domestic and industrial in Figure 5), and the industrial water use in North America and Europe of about 800 to 1200 litres/person/day, it is clear that the tourism sector will be competing for a significantly diminished share of available water, assuming that industrial water demand in Asia will follow in the footsteps of European and North American countries due to development.

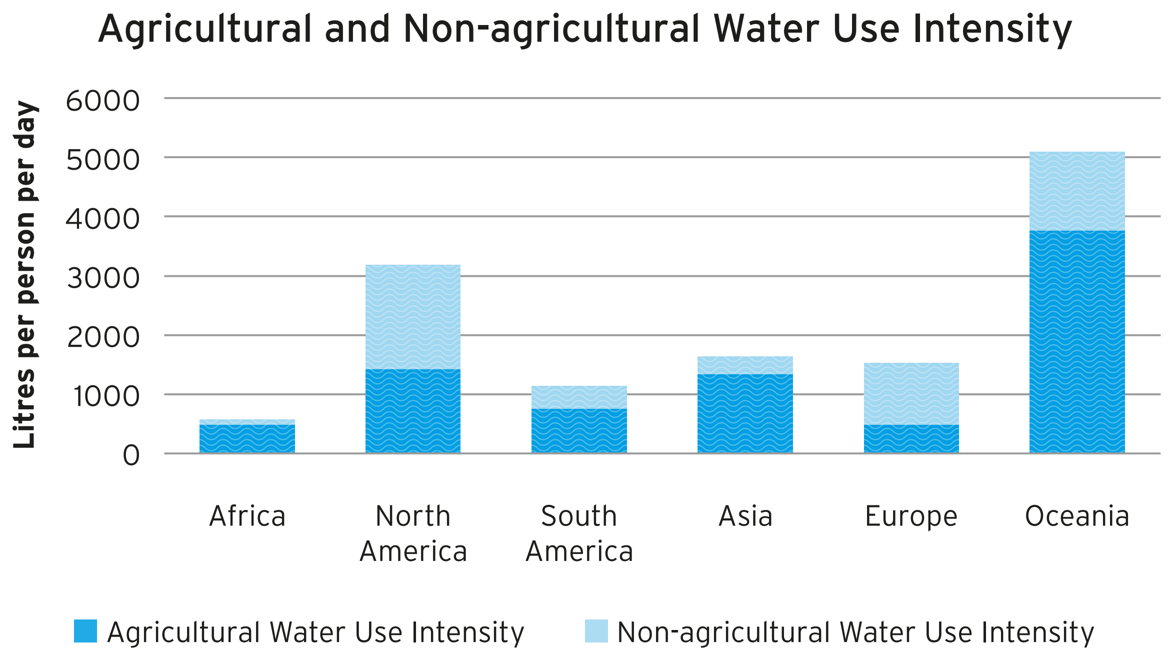

Figure 5 Water intensity (litres per person and day) for world regions (Sources: FAO, 1999, 2000, 2012; World Resources Institute, 1994; Eurostat Yearbook, 1997; Kenny et al., 2009; Eurostat, 2004 and 2005; Environment Canada, 2005; Hidalgo, 2010; Pink, 2010; China Ministry of Water, no date; Frenken, 2008).

QUESTIONS:

- Increasingly water scarcity can lead to potential areas of conflict between different industry sectors. Are there any case studies which demonstrate the conflict which exists between the tourism industry's needs for potable water and those of the broader community?
- Can thr Asia-Pacific region 'leap frog' into patterns of greater water efficiency compared with Western countries?

It is interesting to note that the average non-agricultural water use intensity in Asia of 308 litres/person/day is significantly lower than use by tourist accommodation which is in the order of between 800-1800 litres/guest night, as indicated in the tourism literature (see also Section 6). The reputation risks for tourism businesses associated with the high water use are obvious, particularly when one notes that the average domestic water use in Asia (from municipal water sources) is just 146 litres per person per day.

5. KEY ISSUES AND IMPLICATIONS FOR TOURISM

The global challenges and geographic pressures outlined above have major implications for tourism in the Asia-Pacific Region. Building on the three dimensions of water introduced earlier in Figure 4, namely cost, availability and quality, there are clear design, planning, procurement and development implications for the tourism industry. The cost of water is likely to increase and legislation that will initiate some form of 'Water Footprint' is conceivable, if not inevitable. Businesses that are prepared to audit their water consumption will have a competitive advantage for such legislation (see also Text Box 4).

Text Box 4: Impact of tourism on water and wastewater services in small towns

Tourism requires a high standard of water supply and wastewater services. In small population centres tourism growth can significantly increase pressure on the infrastructure that is typically funded by ratepayers, and sometimes provoke demands for 'tourism taxes'. However information is rarely available on tourists' level of use of these services and debate over the pressures due to tourism is often speculative.

Research by Lincoln University undertaken in Kaikoura, Hanmer Springs and Akaroa – all small tourism centres in New Zealand – provides a method for measuring water consumption. Usage rates were collected for a wide range of tourism businesses, including different types of accommodation, restaurants, laundries, petrol stations, and other retail (e.g. a bakery). The findings highlight that tourism is clearly a key factor in local water demand, especially in the peak season where shortages may be observed. Peak periods also were found to drive capital costs of the physical infrastructure (e.g. size of the water treatment plant).

The growth in water demand by tourism has, in some instances, led to proposals for tourist-specific charges. Whether tourism-specific charges are economically justifiable can best be determined after assessing the role of tourism in demand for the services and comparing the costs tourism imposes on local authorities compared to the share of revenue tourism provides.

Source: Dakers et al. (no date)

In terms of water availability, and the predicted increases in water stress, it is clear that tourism businesses will have to strive to do more with less. Investing in new technologies to bring about productivity, efficiency and reliability is becoming critical for tourism businesses to reduce their water use and minimize total costs of operation. Moreover, considering increasing levels of water pollution and decreasing water quality, the discharge of wastewater is likely to become more stringent, and companies will be driven to use more advanced wastewater technologies and recycling options (Ecolab, 2012).

In general, tourists use more water when they are on holiday than when they are at home, which increases total global water use (Gössling et al., 2010). Tourists use water, wastewater and solid waste services both directly and indirectly (Cullen, Dakers & Meyer-Hubbert, 2004). When on holiday, people consume water for drinking, washing or using the toilet, and when undertaking activities or using swimming pools. Tourism businesses also use water to maintain gardens, fill swimming pools and wash down facilities. More broadly, tourism is a generator of activities such as infrastructure development, food and fuel production and the supply and maintenance of public toilets that contributes to water use (Chapagain & Hoekstra, 2008; Gössling, 2001).

Many forms of tourism are dependent on water both directly and indirectly. This includes golf and adventure tourism , ecotourism and leisure tourism. Changes in water supply can be detrimental to these activities.

"In general, tourists use more water when they are on holiday than when they are at home, which increases total global water use."

Moreover, many tourism regions are based in coastal areas or islands, which are typically extremely sensitive to water pollution (Kent, Newnham & Essex, 2002) and to the degradation of key tourist attractions, such as beaches (Garcia & Servera, 2003). Due to the transient nature of tourism, tourists create uneven water demand over time and location (Gössling, 2001). Tourism activity can be seasonal and often tourists arrive in the dry season when rainfall is lower and water availability is reduced (Garcia & Servera, 2003).

While water is a natural resource that is generally readily available, quality potable water requires infrastructure and ongoing operational expenditure. With population and tourism growth, it can be difficult to find funds to pay for the required additional infrastructure and expenditure, particularly when there is not a large or wealthy resident population (Cullen, Dakers & Meyer-Hubbert, 2004). While tourism businesses may pay for excess water, they generally pay the same fixed charges as other businesses, thus tourists' water use is generally subsidised by the permanent population. Lastly, unlike other economic sectors, such as agriculture, there are limited water use statistics for tourism (Gössling et al., 2012).

Clearly, to reflect the tourism industry's embeddedness in the broader environment of a tourist destination, water stewardship needs to be taken up and addressed by the tourism industry at both the destination and site specific levels. Traditionally, Destination Management Organisations (DMO's) have only focussed on demand based planning, which invests in marketing and promotional activities. Supply side issues, such as water and waste management, transport infrastructure and labour skills, now need to be factored into all future tourism planning. Work undertaken by the CRC for Sustainable Tourism and EarthCheck in Australia indicates that successful tourism destinations work because of the tangible links which exist between tourism priorities and the development plans and strategies of the broader economy and community (Taylor et al., 2010; McLennan & Ruhanen, 2008; Ruhanen et al., 2012). Tourism can make a valuable contribution to local communities and resource stewardship however the industry needs to work closer with local and regional planning authorities (Dredge and Moore, 1992).

"Traditionally, DMO's have only focussed on demand-based planning, which invests in marketing and promotional activities. Supply side issues, such as water and waste management, transport infrastructure and labour skills, now need to be factored into all future tourism planning."

A number of larger corporations outside tourism have begun to internalise the external costs associated with their resource consumption, partly to address reputational risks (see Text Box 5).

Text Box 5: Is internalizing true value the answer?

The market price of energy does not account for all the environmental and societal costs associated with climate change, air and water pollution impacts. Similarly, market prices of water do not reflect the costs of ecosystem services and other intangibles. While it is not specific to the Asia-Pacific region, prices paid by commercial and industrial consumers of water often do not reflect the true value of this increasingly precious "commodity". This makes it difficult to make a compelling case for action based on traditional ROI calculations.

This is true even for hospitality customers who account for all on-premise costs of total water cycle management (raw water costs, on-site water treatment and effluent treatment to meet regulatory requirements or restore to ambient water quality). Even after the embedded thermal energy in water is monetized, all business risks associated with water scarcity and stress are not accounted for. While externalizing costs keeps prices to customers low, true costs to society continue to escalate, which is unsustainable (HBR, 2011).

True Cost Accounting and *Environmental Full Cost Accounting* approaches have become more mainstream (although not commonplace) in the greenhouse gas space over the past few years. Royal Dutch Shell uses three undisclosed internal carbon prices to evaluate hurdle rates for projects, based on markets: EU, other developed countries and the developing world (Pew, 2006). BP factored in a price for carbon into all investments (US$ 40/metric ton CO_2e for industrialized countries, substantially higher than real market prices), to account for greenhouse gas and climate change impacts in its business decisions. This was after BP concluded that an enterprise-wide GHG emissions target was no longer practical or useful in driving emissions reduction at the local plant and operational level (BP, 2009).

In 2012, Microsoft set an undisclosed internal price on carbon, to "internalize the external impact of operations" (Microsoft, 2012). To further drive action by teams responsible for emissions, Microsoft implemented a carbon fee chargeback model in 2013 for all internal operations. This internal source of revenue is earmarked to fund emission reduction and offset initiatives.

Internal environmental full cost accounting has not been used just to manage risks- it also helps identify true value opportunities. In Australia, Rio Tinto's 2007 premium bid for Alcan was based on the low carbon intensity of Alcan's production operations (PwC, 2008). Competitive advantage and payback came in the form of better preparedness for Rio Tinto, when the Government of Australia enacted a carbon tax of $25/MT CO_2 in July 2011.

Puma's environmental P&L statement for 2010 was the first attempt by a major corporation and its entire supply chain to measure, value and report on its environmental externalities (Puma, 2011). Puma accounts for the social cost of carbon based on economic value of damages resulting from current and future climate change. Puma's internal value of water is a function of scarcity, with the weighted average value based on their factory and supply chain locations is US$ 1.08/m^3. More recently the Chairman and CEO of Nestlé announced that "sustainable water policies should adequately price water to cover costs and reflect its true value (and scarcity)" (Nestle, 2012).

Is internalizing the true value of water the answer to the challenges of making the business case for water conservation and efficiency projects within individual properties, while driving water stewardship at the enterprise level, in the hospitality sector?

QUESTIONS:

- Does the tourism industry have the technical capacity to understand its water footprint at a precinct and destination level?
- What is the indirect water footprint (e.g. water embodied in food) compared with the direct one (e.g. water consumed at a hotel)?
- Quality potable water requires infrastructure and ongoing operational expenditure. Is adequate provision being made by the tourism industry to pay its way with regard to the development and maintenance of this infrastructure? Should this be a concern for the tourism industry?
- Is internalizing the true value of water the answer to the challenges of making the business case for water conservation and efficiency projects within individual properties, while driving water stewardship at the enterprise level, in the hospitality sector?

6.

WATER USAGE IN THE HOSPITALITY INDUSTRY - OVERVIEW

Tourism is a significant user of water. Research by Gössling et al. (2012) suggests that tourism- related water use represents an increasing share of domestic water use in many Asian countries, particularly Indonesia (8%), India (7.6%) and Thailand (6%) (Table 1). With the ongoing growth in tourism visitation, the industry must start to become more involved in understanding the part it needs to play in water management issues. Recent research on water embodied in food also indicates that the indirect water requirements of tourism are substantial, just as they are for tourism's carbon footprint (Gössling et al., 2011).

Table 1 Water use in selected Asian countries in 2000 (Source: Gössling et al., 2012) (Renewable water relates to rainwater and surface water that renews within short time frames)

Country	% of renewable water already used	Total international tourism-related water use (million m3)	Total domestic tourism-related water use (million m3)	International tourism share of domestic water use	Domestic tourism share of domestic water use	Total tourism share of domestic water use
Indonesia	2.9%	18.5	337.5	0.4%	7.6%	8.0%
India	33.9%	18.3	1872.9	0.1%	7.5%	7.6%
Thailand	21.2%	22.4	76.1	1.4%	4.6%	6.0%
China	21.8%	75.8	840.6	0.3%	3.2%	3.5%
Japan	20.6%	10.8	414.9	0.1%	2.4%	2.5%
Malaysia	1.6%	19.1	10.7	1.4%	0.8%	2.3%
Philippines	6.0%	6.9	81.4	0.2%	1.8%	2.0%
South Korea	26.7%	9.8	62.6	0.2%	1.0%	1.2%

It is important to understand the key touch points for water use and management in a hotel or resort. Water is required for a range of services and the specific profile varies for each accommodation establishment. There are vast differences in the literature on how much different service components contribute (Ecolab, 2012; City of Melbourne, 2007; PUB - Singapore's National Water Agency, 2011; Sydney Water, 2012), but it appears that the most important areas of water consumption are:

- Guest rooms, with about 25 to 56% of consumption;
- Cooling towers (air conditioning), in the order of 10 to 34% with higher needs in hot, tropical countries;
- Swimming pools, contributing about 15 to 20%;
- Kitchen and restaurant, with about 20% of end use.

The example of Sydney hotels in Figure 6 below highlights how the profile is influenced by the presence of a cooling tower and in-house or outsourced laundry. For example, a hotel with no cooling tower and no in-house laundry is likely to have most of its water consumption in its guest rooms (56%). The second largest water use area is the kitchen. Guest rooms are still the most important area of water consumption in hotels with cooling towers and laundries, but their relative important is somewhat less.

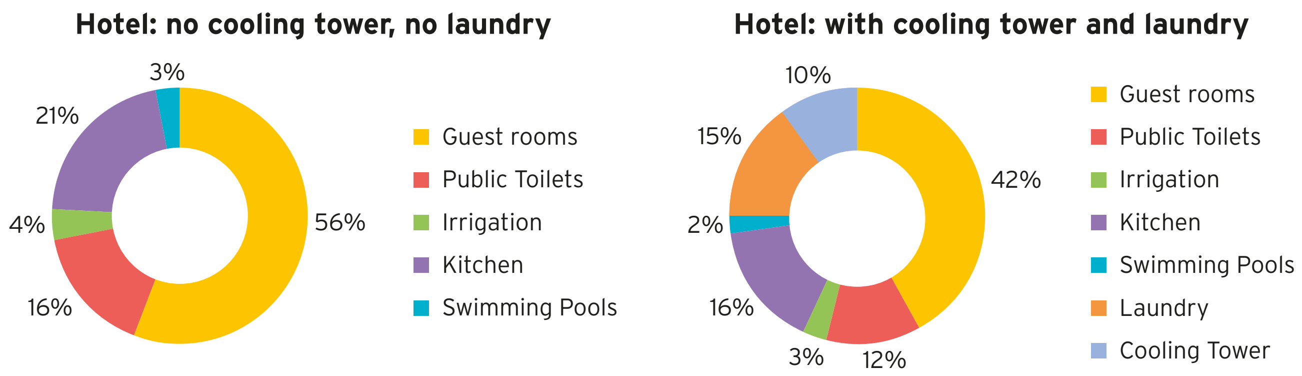

Figure 6 Water consumption profile for two different types of hotels in Sydney (Source: Sydney Water, 2001).

Detailed system audits and diagnostics to prescribe the best programs to maximize boiler system performance and efficiency, through an effective boiler water treatment program, are critical for guest rooms, kitchens, laundry and space heating. Effective mechanical, operational and chemical management of cooling towers, including makeup water treatment, is critical for space cooling. Another aspect of utility water use that can be significant in tourist destinations is associated with public spaces- pool and spa, landscaping and water features - where state of the art chemistries and water conditioning solutions can provide significant opportunities for reclaimed water use.

Effective cleaning and sanitation solutions that combine optimized chemistries, dispensers, equipment and automated controls can significantly reduce water consumption in the kitchens, restaurants and guestrooms. Resource optimized effective chemistries for ware-washing, floor care and on-premise laundry can further reduce water use in a hotel (for a case study see Text Box 6). Individual solutions for these various application platforms, when combined with either point-of-use or end-of-pipe water reclamation solutions, can significantly reduce the consumptive use of water by hotels located in water stressed-communities.

Text Box 6: Dusit and the water use in laundry operations

Water Challenge:
Management at Dusit recognised the opportunity to reduce their water use in laundry operations. Dusit site management at the Dusit Hotel in Bangkok contacted Ecolab first for assistance in measuring the laundry operation's current usage of energy and water as part of benchmarking for the EarthCheck program.

Ecolab completed a site survey in the laundry operation. The Dusit property operates four large capacity washing machines and used a traditional hot water laundry cleaning process. They heat their water using steam with water coming from a gas-fuelled boiler.

Solution:
Ecolab helped reduce the amount of hot water used, which lowers the amount of energy consumed by adjusting the wash formulas and optimizing rinse cycles to reduce the overall water consumption. This resulted in a projected annualized water reduction of 4.7 million litres and ฿74,400 (US$2500) in projected annual water savings.

Key touch points associated with integrated water management in a hotel are identified in Figure 7, with candidate locations for reclamation identified. Figure 7 highlights the complexity of water management at a hotel, and the need to take a holistic systems approach when investigating and implementing water quality, efficiency and conservation measures. This is further discussed in section 8 Taking Action.

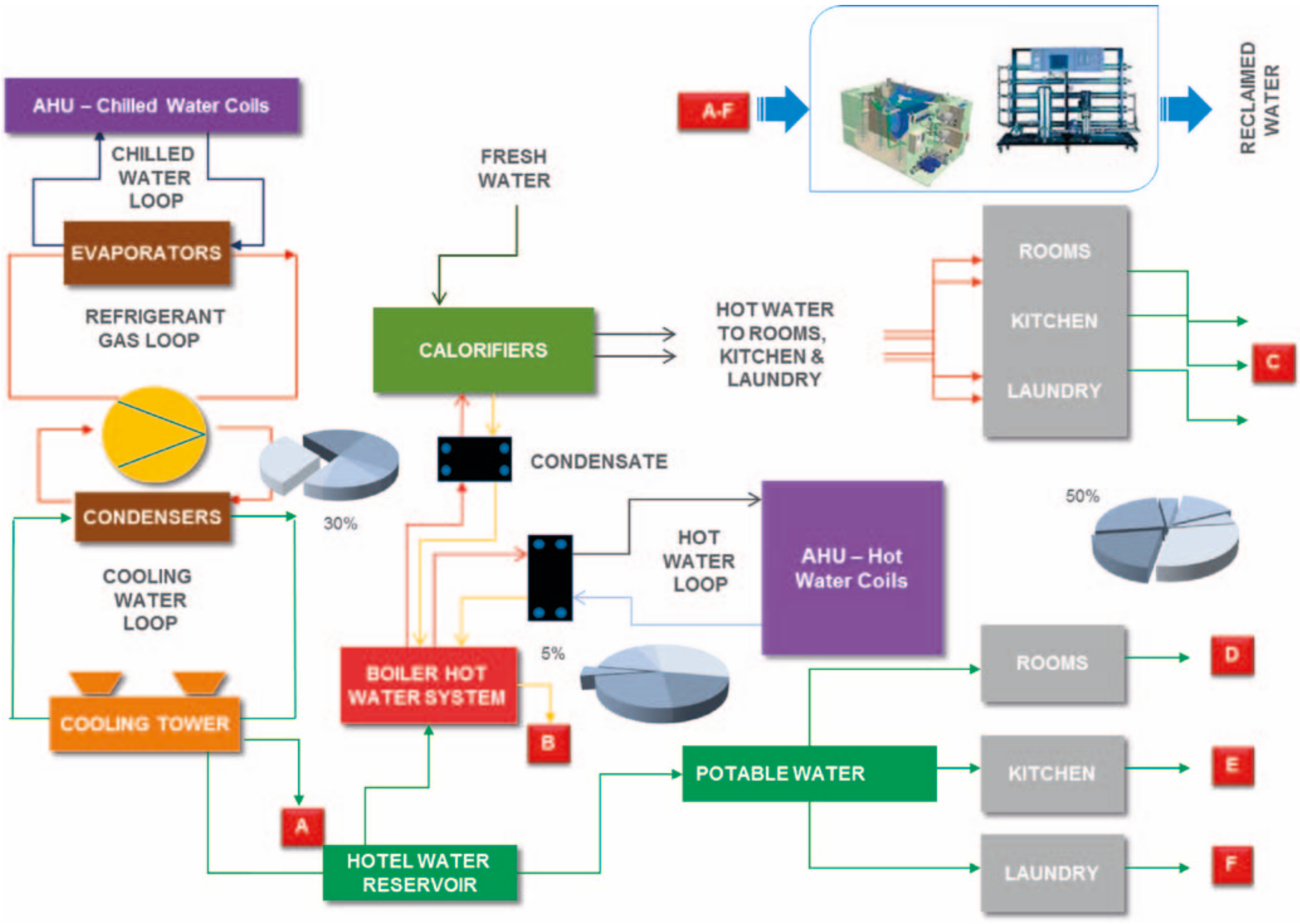

Figure 7 Points for integrated water management with on-premise reuse at a hotel (Ecolab, 2012).

QUESTIONS:

- Is the water consumption profile provided consistent with your understanding of average water consumption needs across the hotel sector?
- What are the key water 'touch points' and challenges for water consumption in your business?

7. BENCHMARKS FOR WATER CONSUMPTION

The literature indicates that the current data available for water consumption in the accommodation sector worldwide are limited, sporadic and uses varying metrics for measurement (e.g. Bohdanovicz & Martinac, 2007; Charara et al., 2011; Deng & Burnett, 2002; Tortella & Tirado, 2011). This highlights the need for properties to measure and report on their water usage in a consistent and timely manner. One of the most comprehensive data sets available is that collected via the EC3 Global's EarthCheck benchmarking programme (see Appendix).

This programme allows properties to assess how they are performing across time and geographic climate zone and against their peers, enabling them to make informed decisions regarding their progress and the level of improvement required to meet current best practice within their sector or region. While other data sets generally include only one or two property groups, the strength of the EarthCheck data is that it collates information for a large number of accommodation providers worldwide, providing a comprehensive overview of the burden placed on world water resources by the accommodation sector. Table 2 shows a breakdown of Asia Pacific countries with data currently submitted to EarthCheck.

Table 2 Countries by key Asia-Pacific regions with data currently submitted to EarthCheck

North Asia	Pacific	South Asia	South-East Asia
China	Australia	India	Cambodia
Hong Kong	New Zealand	Bangladesh	Indonesia
Japan	Cook Islands	Bhutan	Malaysia
Republic of Korea	French Polynesia	Brunei	Philippines
Taiwan	Fiji	Maldives	Singapore
		Nepal	Thailand
		Sri Lanka	Vietnam

As at 21 November 2012

To establish and analyse benchmarks for water consumption it is important to distinguish between different types of accommodation types. The dominant types of businesses in the Earthcheck database fall into two categories; business hotels and vacation hotels. Other studies use different categories such as luxury, fully-serviced hotels, mid-range hotels and budget hotels. There is clearly a need to agree on the best accommodation category and definition and the methods used to measure water use. For this review water data for EarthCheck hotel types have been grouped to provide a relative indicator of water use per geographic sector and country. A separate report will be prepared to examine the different water use experienced for a wider range of accommodation types. The validity of mean usage differs for the different regions and accommodation types due to variations in sample sizes. More detail on regional sample sizes by accommodation type is provided in the Appendix.

The relatively low consumption levels in the Pacific are likely to be influenced by the water efficiencies which have been achieved in Australia and New Zealand over the past five years (and the large number of properties in the database, relative to other nations). Both countries have benefited in recent years from dedicated marketing campaigns to influence consumer behaviour and hotel managers in relation to the need to conserve water (Figures 8 and 9). Overall, European hotels are on average more water efficient than those in some parts of the Caribbean, the Middle East and South and East Asia.

When comparing water consumption at different properties and across countries, it is important to understand that reporting protocols and standards vary widely between programs and also between hotel corporate groups. Also, data quality is an important issue that raises questions around the true comparability of water benchmarks. Nevertheless, the data presented in Figures 8 and 9 provide important insights into general patterns of consumption.

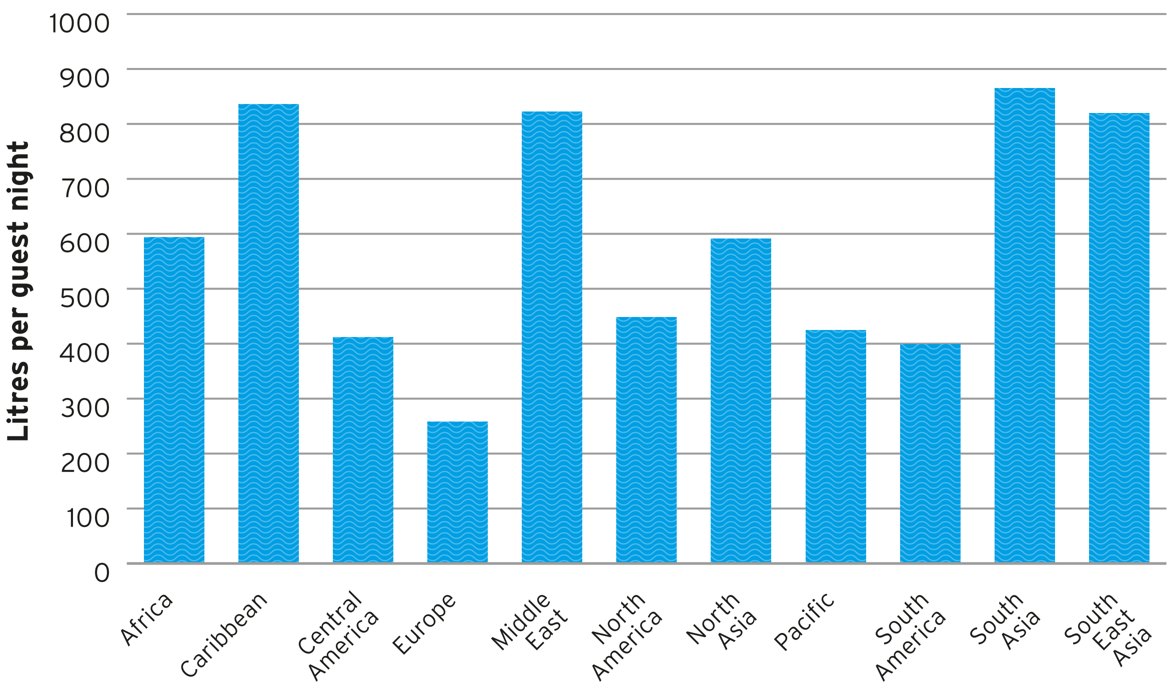

Figure 8 Average water usage per guest night in hotels in world regions (EarthCheck global data base).

More specifically, a comparison of business hotels in Asia Pacific shows a wide range of 292 litres per guest night in Australia, compared with 956 litres per guest night in China. Hong Kong and Japan, and to some extent the Republic of Korea and Singapore, display medium efficiency, whereas the remaining countries are characterised by high water intensities (Figure 9). High usages in some Asian countries are likely to be related to extensive use of water for garden facilities, including elaborate water features both inside and outside the building.

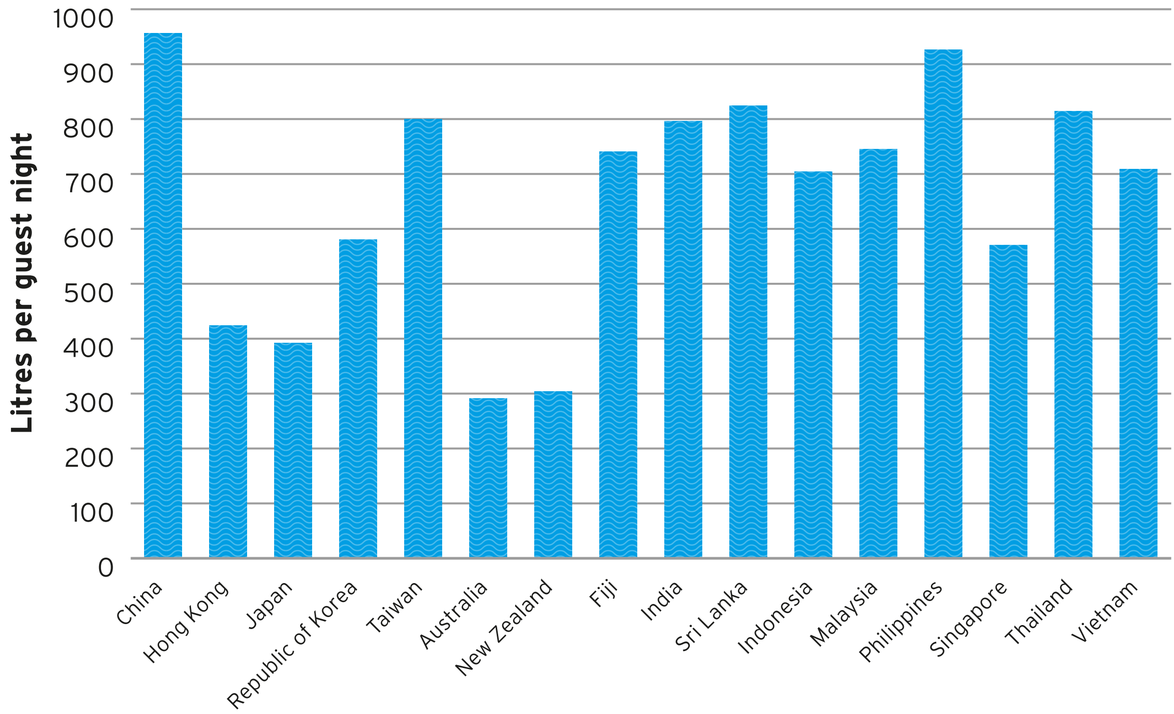

Figure 9 Water usage in litres per guest nights for business hotels in the Asia Pacific region (EarthCheck global data base)

"..reporting protocols and standards vary widely between programs and also between hotel corporate groups. Also, data quality is an important issue that raises questions around the true comparability of water benchmarks."

Overall, the benchmark data displayed above highlight several important points. First, there is a great variety between world regions and countries. In some cases, there is almost a factor of five in terms of water consumption per guest night. Further research on what exactly drives such significant differences would be highly beneficial. Some reasons include the type, size and style of properties typical of a region and hotel group, other reasons might include differing legislation, the quality of equipment (e.g. high water leakage rates are very common in some countries), and cultural habits and values. Second, when comparing the water consumption per guest night with non-agricultural water intensity in different parts of the world (Figure 5 earlier) it becomes clear that tourism is an important consumer of water. For example, a guest night in India (about 887 L) is about three times as water intensive than the average use for all non-agricultural water consumption per person in Asia. This is even more significant considering India's context as a water-stressed country (Figure 3).

It is important to distinguish between potable water usage and recycled water consumption (Text Box 7).

Text Box 7: Types of water

Potable Water Consumption: To provide consistency in measuring potable water consumption we would recommend the following calculation be used. The calculation of total Potable Water Consumption is available from water bills issued by an organisation's water supplier or directly from the organisation's water meter gauge. In the event where a water meter is currently not installed, an organisation can estimate its total Potable Water Consumption based on the standard consumption table provided.

Potable Water Consumption EarthCheck indicator measure:

$$= \frac{\textit{Total potable water used (L or kL)}}{\textit{Guest Night}}$$

Recycled/Captured Water Use: To complete the Recycled/Captured EarthCheck supplementary indicator, the organisation is required to determine the proportion of total potable water consumed by the organisation that was from recycled/captured sources. We recommend this can be calculated using the following equation.

Recycled/Captured Water EarthCheck indicator measure:

$$= \left[\frac{\textit{Total water consumption from recycled, captured water sources (L) per annum}}{\textit{Total water consumption (L) per annum}} \right] \times 100$$

QUESTIONS:

- The literature indicates that current data available for water consumption in the accommodation sector is at best limited and inconsistent. Do you agree with this statement or are you aware of current research that has been undertaken on benchmarks for water consumption?
- Overall European hotels appear to be more water efficient than those in the Caribbean, the Middle East and South-East Asia. Is this consistent with your knowledge and understanding of the industry

Many global hotel groups publish information related to their enterprise-wide water use and enterprise-wide available rooms and occupancy rates (often broken down by facility types, brands and/or geographies) in their annual financial reports. By combining this information from public sources, one can estimate average daily water use per occupied room. An analysis of these data shows that the spread of reported enterprise-wide average water use intensities ranges from less than 6 to over 700 L /occupied room /night, for hotel groups that are similar in size (several hundred thousand available rooms in portfolio), average occupancy rates (65-70%), and geographic distribution. While water-use intensities can be impacted by the facility type (limited service hotels, vacation rentals, full-service hotels), the dramatic spread is a reflection on inconsistent scope of reporting. Based on existing regulatory requirements on financial reporting, one has to surmise that the inconsistency would be associated with the accounting for water use and not room occupancy counts.

8. TAKING ACTION

From a destination level, water is used by a wide variety of stakeholders, including local residents, commercial operations (including tourism operators), and public utilities. If not correctly managed, the development and operation of large integrated tourism precincts and individual hotels can place pressure on existing water supplies, reducing availability and affecting the potential supply to other users. Implementation of water conservation and management strategies should allow long-term sustainability to be achieved without compromising overall operation. These strategies should consider core principles of the three dimensions of water supply, namely cost, availability and quality of the water supply (Figure 10).

Water supplied to any tourism site or precinct may be of differing quality to coincide with its use; residential water supplies need to be potable whereas water required for usage where there is no public consumption or access (e.g. landscaping) can be grey water. As there is an energy and chemical requirement associated with producing potable and higher quality water, there are economic and environmental advantages to treating water only to the required standard. Matching water quality with its use increases sustainability.


Cost	Availability	Quantity
Introduce water saving measures and manage water as a limited resource.	Review implications and risk associated with reductions in supply due to climate change and water scarcity.	Measure and monitor water use and quality and review financial regulatory and reputational risks.

Figure 10 Key principles for managing cost, availability, and quality of water.

Tourism businesses can get involved in broader destination initiatives that enhance the stewardship of water resources. In some cases, the tourism sector can even play a leadership role and act as a role model or innovator to improve resource efficiency and management. An example where tourism contributed to overall water quality improvements at the destination level is presented in Text Box 8.

Text Box 8: Kaikoura, New Zealand – destination certification

Kaikoura (District), New Zealand, was the first (territorial) local authority to achieve EarthCheck benchmarking and certification status (2001). During the course of their benchmarking the critical limiting point to acceptance was the quality of public waterways. The indicator standard was the proportion of waterways passing 'accepted' water quality standards. Specific measures included pH, E Coli (*faecal coliform*), turbidity, nitrate and nitrites, total and dissolved phosphorous, total nitrogen, and dissolved oxygen. Groundwater and beach water (Pacific Ocean) were similarly tested and reported.

In the absence of comparative longitudinal data, comparisons were made with the full Canterbury regional data set (comprising 10 districts). Because of its extensive lowland agricultural base, the Kaikoura District reported only a 79 % pass rate (438 of 553 sample sites). As an example, the 'beach' water quality at 79% was compared with other TLA is the south Island (which reported 94 – 100% pass rates).

Thus at its first assessment the District did not meet minimum criteria for certification, with water resources being the sole failing criteria. Determined to ensure their place as the first District territory to achieve the global destination certification standard, members of the tourism sector and community reached out to the agricultural sector to assist directly in locating older chemical dumps (for sheep parasite control) and to assist in riparian strip planting to restrict cattle access to waterways and improve inflow filtration.

Water standards rose to meet the benchmark criteria and the District was the first to achieve the EarthCheck destination criteria, which it has exceeded for the past decade.

According to Tourism Australia, water use in Australian hotels could be reduced by 20% without compromising guest experience (in Smith, 2009). Addressing water consumption in a tourism accommodation business involves three key dimensions: organisation/management, technology, and behaviour.

Organisational change and management:

- Water demand can be reduced by the adoption of best practice water management principles (e.g. demand management, a policy for infrastructure maintenance and renewal, and a management document detailing sinks and sources and how to manage them for conservation purposes).
- Reduce potable water consumption by using treated wastewater and stormwater for non-potable usage such as for gardens and water features. This will reduce the amount of water treatment required.
- Ensure distribution and irrigation systems are efficient and well maintained.
- A proactive Leaks Maintenance and Detection Program will usually pay for itself in reduced water production costs, additional pumping costs because of pressure drops in the pipe work and reduced future repair costs. Leaks also can affect building structures and services, be a health and safety concern or detract from guest amenity.
- Track utility costs through a bill monitoring program in the accounts department

Technological change:

- Harvest rainwater for use as a primary source of potable water.
- Use groundwater in such a way as to avoid drawing down the aquifer from which it is extracted.
- Chose technologies which are environmentally friendly, e.g. low flow showerheads.
- Use technologies which can control and monitor KPIs.

Behavioural change:

- Increase your own knowledge and provide opportunity for staff to learn about water conservation and efficiency.
- Develop staff programmes that provide reward and recognition for excellence in water management and stewardship.
- Develop a guest education programme.

All of these measures can be targeted at increasing water conservation or water-use efficiency (i.e. achieving a comparable service with less water as in the case of low flow shower heads). An audit of water consumption is an essential starting point to managing water quantity, quality and costs of the operation. Key questions that will be answered by a water audit are: where do we currently stand with respect to water consumption; where are the opportunities to improve or reduce water use; how can we make it happen; and what are the quantifiable and qualitative returns on investments.
A water audit is likely to focus on the following end use areas: Cooling Systems; Hot Water Systems; Waste Water Systems; and Laundry.

Table 3 provides examples of why it is important to manage these systems and what losses could be incurred if water is managed poorly. For example, the costs of an outbreak of diseases due to safety issues in either the cooling, hot water or sewage system are immense and also long-term due to serious damage to a hotel's image. Lack of maintenance leading to corrosion, for example can also lead to substantial financial costs, for example in the order of $100,000 per annum.

Table 3 Key issues associated with cooling, hot water and waste water systems

Issues	Due To Water	Impact	Potential $ Loss
Cooling water systems			
Safety	Quality	Legionella Outbreak	Immense
Fouling	Quality, Quantity, Cost	Heat transfer in Condensers & Evaporators	Up to $ 45,000/ yr due to 3° ↑ in CAT
Corrosion	Quality, Quantity, Cost	Loss of Equipment (viz. Condenser Tube Bundles)	Up to $ 100,000/yr due to pitting corrosion
Loss of CT Cycles	Quality	Water Loss	Up to $ 19,000/yr due to 4 units ↓
Hot water systems			
Safety	Quality	Boiler Failure	Immense
Fouling	Quality, Quantity, Cost	Heat transfer between Boiler Tubes and the Fire Side High stack Temperature High CO emission	Up to 3.5 %↑ in Fuel for a 1/64 " thick Iron + Silica scale Detrimental environmental effects
Corrosion	Quality, Quantity, Cost	Loss of Equipment (viz. boiler tube Bundles)	Up to $ 100,000/yr due to O2 pitting corrosion
Waste water system			
Safety	Quality	Odour, Pathogens	Immense
Discharge Norms SS, BOD, COD, pH	Quality	Environmental Non Compliance	$ Penalties, Brand Image
Water Footprint	Quantity	High Water Consumption	Up to 35% or 58,500 m3/ year of fresh water or 175 Million Glasses of drinking Water could be saved
Operational Cost	Cost, Quantity	High Water Consumption	Up to $ 58,500 / yr

The water consumption for individual activities varies considerably depending on equipment. Table 4 provides examples of typical consumption rates, best practice, and investment costs to reduce consumption rates.

Table 4 Typical water savings per guest room of a hotel (Smith, 2009, based on Sydney Water, 2001)

Component	Best Practice	Existing Usage	Saving per room kL/year	Saving per room $/year	Supply & Installation Cost	Description	Payback Period (years)
Showers	9 L/min (AAA Rated)	15 L/min	28	$100	$50-$120	New showerhead, plus option of flow control	0.5-2
Toilet	6 L for full flush, 3 L for half flush	11 L	17	$30	$400	New pan and cistern	>5
Basin	6 L/min	12 L/min	5.3	$5	$20-$40	Flow control in spout or in taps	1.3-2.6
Cleaning	-	-	3.7	$10	0	Typical saving	0

Savings can be substantial and a business case for investing in water conservation or efficiency can be based on information such as provided in Tables 4 and 5. Table 5 below gives further examples of specific initiatives and actions across different types of end uses, including technical and managerial solutions for reducing water consumption in garden areas of hotels.

Table 5 Strategies for improving water use and likely saving

Area for improvement	Strategy	Saving	Source
Indoor hotel water use	Install water-efficient fixtures	Reduce water use by approx. 30% (ranging from 10% to 45%)	Cooley et al. (2007); O'Neill, Siegelbaum & the RICE Group (2002)
Showers	New showerhead, plus option of flow control	28 kL/yr per room	Sydney Water (2001), quoted in Smith et al. (2009)
Showers	Efficient flow showerheads	Use less than 7 L per minute, compared to 13 L used by older ones	
Showers	Efficient and low flow showerheads can.	Faucet flow restrictors can reduce water use by half to 2.5 L per minute	O'Neill, Siegelbaum, & the RICE Group (2002)
Toilet	New pan and cistern	17 kL/yr per room	Sydney Water (2001), quoted in Smith et al. (2009)
Toilets	Dual flush, reduced flush and dry composting toilets	The most efficient toilets can use as little as 1 L for a "miniflush"	Carmody (2007); Kavanagh (2002); Thompson (2008)
Basin	Flow control in spout or in taps	5.3 kL/year per room	Sydney Water (2001), quoted in Smith et al. (2009)
Gardens	Install water metres to monitor use, mulch garden beds to reduce evaporation, install a drip irrigation system with moisture sensors, and use rain or grey water for irrigation.	Conserve 30-50 % of water	Smith et al., (2009)
Gardens	Use indigenous plants for landscaping with appropriate garden designs	Eliminate the need to irrigate	Carmody (2007); Harris & Varga (1995); Thompson (2008)
Pools	Pool night covers	Reduce evaporation in hot climates	Smith et al. (2009).

The Public Utilities Board (PUB) of Singapore provides a water efficiency calculator for hotels and an interactive tool with water savings suggestions (Figure 11).

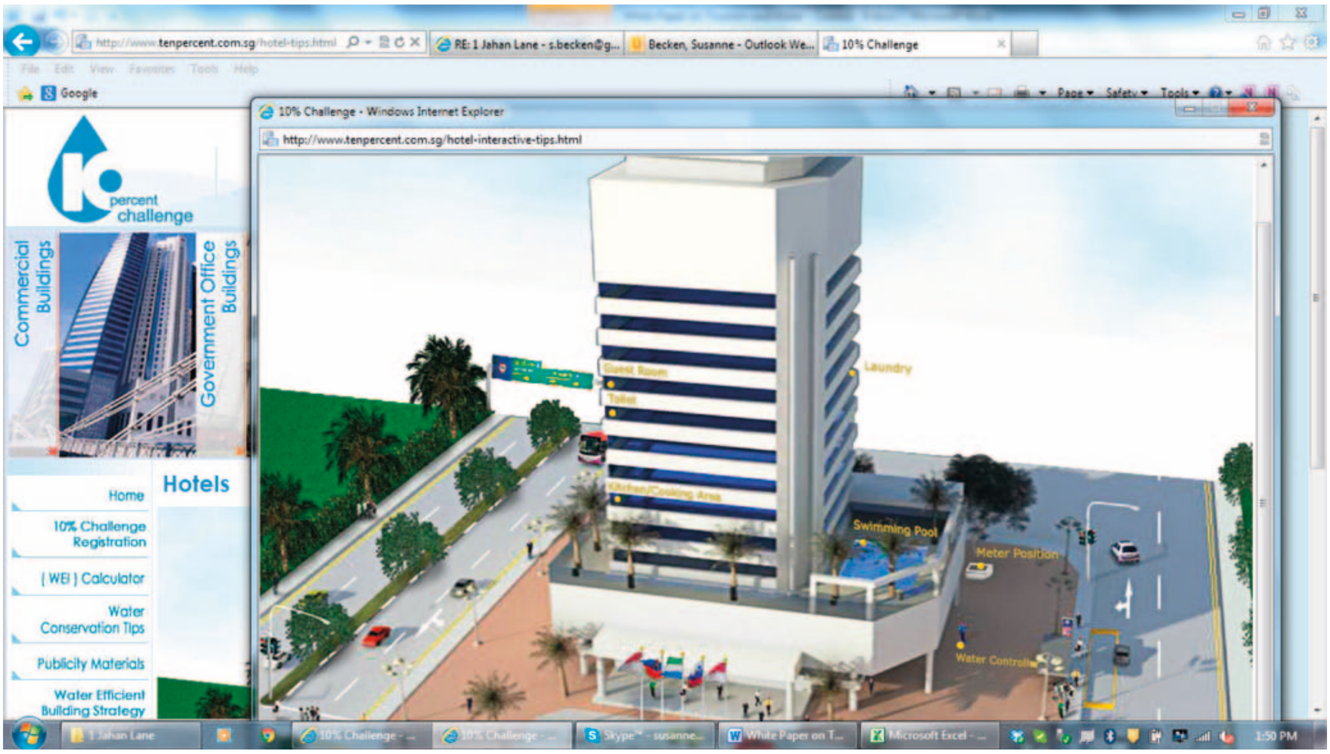

Figure 11 Interactive tool provided by PUB, Singapore (http://www.tenpercent.com.sg/hotel-tips.html)

QUESTIONS:

- A wide range of technical reports are now available to assist operators to take action on water management. Please identify any report that in your opinion provides the best advice and recommendations on this issue for the industry.

Finally, while the focus in this section was on initiatives that an individual tourism business can get involved in or implement (as highlighted in the complexity of Figure 7), there are a number of broader issues and opportunities that the tourism sector could address. One relates to the full accounting of environmental costs, as indicated in Text Box 5. Microsoft's approach of using real fees (through all divisions) was meant to drive behavior change, accountability through the entire organization, risk reduction and a demonstration of commitment to customers (differentiation). Internal pricing can be transparent, higher than market prices, enterprise-wide and virtual, to demonstrate the hospitality enterprise's recognition of future water-related business risks and improve the hurdle rates for projects (the BP strategy).

Displaying greater transparency on the embodied water in tourism products might be useful to inform decision making by tourists and give those properties an advantage that invest in a 'broad portfolio' of sustainability measures, i.e. beyond their own premises. Thus, the role of tourists as consumers of tourism and hospitality products needs to be better understood. For example, greater understanding on how to actively involve tourists and contribute to customer experience as a result of supporting sustainability measures, would be extremely helpful in increasing the effectiveness of such measures.

9.

CONCLUSIONS AND NEXT STEPS

This White Paper provides a starting point in discussing the global and regional context for water stewardship and water use efficiency in the tourism sector in the Asia-Pacific region. The risk of water scarcity and stress, in combination with increasingly polluted or contaminated water, has been discussed, especially against the background of increasing populations, growing industrialisation, and changing hydrological cycles due to global climate change. Tourism businesses will have to consider the cost, availability, and quality of water supply for the future viability of their operations.

Whilst not as big a water user as the agricultural sector, tourism will likely become an increasingly important player in discussions about water for several reasons. First, as the water-intensity data extracted from the Earthcheck database have demonstrated, the average use per guest night in hotels far exceeds local levels of water consumption. A high variability between countries has been observed as well. Tourism's water intensity has major operational, but also reputational implications, both for a business and the destination.

Tourism operations tend to be in the concentrated sensitive environmental areas which include national parks, island locations or coastal areas. Often, these geographic areas are particularly vulnerable to water shortages or conflict. Tourism is also highly seasonal, putting peak demands on water systems at times when water supply (e.g. through rainwater collection) is minimal. The implications might be the need for seasonal pricing for water and wastewater services to account for these higher tourist water demands in the peak season (Cullen, Dakers & Meyer-Hubbert, 2004).

A brief overview of the dimensions where water consumption in a hotel could be reduced has been provided. A water audit – in addition to the increasingly employed energy audits – is an important starting point to measure and analyse a businesses' consumption. This will then allow making a business case for investing into specific initiatives and technologies. Examples of efficient water technologies and practices have been provided. One key area relates to the maintenance of gardens and outdoor entertainment areas; the use of recycled water might be a viable option to reduce the usage of potable water.

While the EarthCheck data is leading the way in supplying water consumption statistics to accommodation providers, there are areas in which the dataset could be further expanded and enhanced. Importantly, there is opportunity to introduce not only overall measurement of water usage within properties, but also data by specific areas within the hotel to enable benchmarking by sections, such as housekeeping, guest rooms, and food and beverage. However, to achieve this, it would be necessary to install individual meters for each area within the hotel.

Finally, water stewardship goes beyond the individual tourism business. It includes aspects of community engagement, catchment management and public-private sector partnerships. Leadership is essential and ways for integrating the tourism industry into local governance structures and decision making need to be identified. Further understanding of how to involve tourists into water stewardship, whilst at the same time increasing customer experience, is important.

This White Paper will be followed by more specific analyses of particular aspects of water use by tourism.

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11.

APPENDIX EARTHCHECK'S WATER CONSUMPTION INDICATOR

The EarthCheck benchmarking system uses a series of indicators to gauge an enterprises' environmental and social performance against baseline and best practice levels appropriate to the type, activity, market and location of the enterprise. Baseline and Best Practice levels for each indicator are derived from extensive worldwide research into available and appropriate case studies, industry surveys, engineering design handbooks, and energy, water and waste audits and conditions.

One of the core indicators in the EarthCheck benchmarking system relates to water consumption. As with all core indicators, the water data have been submitted by EarthCheck members since the year 2000. Over 1000 members have entered data on an annual basis from the time they entered the programme. Enterprises who wish to benchmark are required to measure their performance annually with a range of indicators, including water consumption. The results provide a cost control and reduction mechanism from the systematic collection and analysis of operational performance data. The outcomes can be also used for triple bottom line accounting by adding the capacity for reliable accounting of environmental and social performance criteria. In Asia Pacific some regions have more extensive data than others dependent on the uptake of the programme.

Objective of the water consumption indicator
To promote reductions in potable water consumption, thereby achieving both reduced operational costs and major environmental benefits.

Potable water resources can be consumed not only by drinking, but also through activities such as washing (personal and laundry), gardening, cleaning and the use and maintenance of recreational facilities, amongst others. Many enterprises are also located in regions where access to fresh water is a concern. Irrespective of location, however, actions leading to an overall reduction in water usage without compromising safety and health (from lowering demand and/or increasing reuse and recycle) will be a significant contribution to the local environment and the long-term sustainability of the enterprise.

It is recognized that some enterprises will have access to their own supply of potable water (e.g., from bore holes) or water is not regarded locally as a scarce resource. However, all water consumption irrespective of source or scarcity, is counted when estimating an enterprise's annual consumption. The reason is that the goal is to encourage a philosophy of water consumption minimization, irrespective of an enterprise's location.

Indicator measure and units

Measure: Total volume of potable water consumed / Annual level of the sector specific activity measure
(e.g., guest nights pa, visitors pa, total area under the roof (m2)).

Units: kilolitres (kL) per activity measure

Indicator methodology
In certain sectors a major determinant of potable water consumption is the climate in which an enterprise is located. This is particularly true for those with large grounds and/or significant water-based facilities or activities. Thus enterprises located in hot climates are more likely to consume more potable water than equivalent enterprises located in cooler climates. In the accommodation sector, factors that are likely to lead to a higher level of potable water consumption include increased evaporation rates of swimming pools, personal bathing and irrigation demands of grounds.

As some countries range over significantly large latitudes and can experience different climates from one area to another, a methodology was devised to separate nations with latitudes that span over 10° into sub-regions. For example, as the 48 contiguous states of the United States of America range from approximately latitudes of 25° to 48° North the region has been separated into three climatic bands of approximately 7° latitude each.

In order to determine the dominant climatic conditions (temperature), data from around the world was used to obtain an average surface temperature over a year. In the case of countries where the latitude span of the countries was less than or equal to 10° an urban region approximately in the centre of the nation was used as the reference point. In the situation where the latitude of the country was greater than 10°, a city in the approximate centre of each region was used as a reference point.

AAT (Average annual temperature) = Average temperature (˚C) over a full year	
High potable water demands	AAT > or equal to 14.5˚C
General potable water demands	AAT < 14.5˚C

Accordingly, to create a level of equality between enterprises and to avoid unfair penalty due to the climate in which they are located, high and general levels of expectant potable water consumption intensity have been devised. As a result, Baseline and Best Practice levels can vary in relation to country or latitude location.

The number of businesses from around the world that have measured their water consumption for one or multiple years is shown in Table 6 below. Note the business hotel use in the Caribbean is based on one property only and the consumption of water is therefore unlikely to be representative of other businesses in this region.

Table 6 Number of business and vacation hotels that provided data on water consumption by world region

Region	Business	Vacation
Africa	17	26
Caribbean	1	69
Central America	2	48
Europe	227	5
Middle East	9	2
North America	9	4
South America	13	2
North Asia	51	13
Pacific	108	59
South Asia	64	41
South East Asia	64	60
Total	565	329

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