

**Destructive Creation: Hurricane-Related Risk and Opportunity  
for Mexican Hotel/Resort Investments for VII LARES  
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**La Creación al Pie de la Destrucción: El riesgo de Huracanes y la  
Oportunidad Para el Desarrollo de Centros Hoteleros en México  
VII Seminario Internacional da LARES**

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**Abstract**

The risk posed by hurricane events in Mexican tourism zones is assessed and hotel/resort development trends after catastrophic events are analyzed. Risk profiles are developed for major hotel/resort zones of Mexico based on 150 years of storm-track data which are plotted using GIS buffering. Yucatan resort centers have a very high frequency of hurricane events with a higher number of category 4 and 5 storms. Hotel data for tourist zones confirm the severe impacts to business following hurricane events. Although personal damages and losses are incalculable, disaster-related destruction can be the catalyst for redevelopment schemes. Wilma's impacts in Cancun (2005), show that tourist arrivals/room occupancy fell considerably but gave impetus to a renewed round of tourism-related development which spurred recovery. Weather-related phenomena pose specific risks to real estate investment and hotels/resorts are especially vulnerable given the short-lease nature of contracts and the overall seasonality/volatility of demand. Climatic conditions will likely worsen in future and the greater density of coastal development, implies that these risks will intensify. More optimistically, these events have shown to be catalysts for renewal and update of stock.

El riesgo que representan los huracanes en las zonas turísticas de México es evaluado, y las tendencias en los desarrollos hoteleros son analizadas después de estas incursiones catastróficas. Perfiles de riesgo son generados para las zonas hoteleras de México, sustentados por 150 años de datos sobre rastreos a huracanes, trazados utilizando interfaz GIS. Los centros vacacionales en Yucatán tienen una alta frecuencia de huracanes, con un elevado número de tormentas en las categorías 4 y 5. Datos hoteleros para las zonas turísticas confirman los impactos severos en los negocios tras eventos huracanados. Aunque los daños personales y las pérdidas son incalculables, la destrucción relacionada con desastres puede dar impulso a esquemas de redesarrollo. El impacto de Wilma en Cancún (2005) demuestra que la llegada de turistas y la ocupación de habitaciones descendió considerablemente, pero dio impulso a una renovación de desarrollos turísticos que promovieron la recuperación. Los fenómenos climatológicos representan un riesgo para las inversiones en bienes raíces y los centros vacacionales son especialmente vulnerables, debido a la naturaleza de los contratos de alquiler a corto plazo y la volatilidad generalizada en épocas de temporada. El empeoramiento de las condiciones climatológicas y el incremento en la densidad de los desarrollos costeros implica que estos riesgos se intensificarán. Visualizados de manera optimista, estos eventos han demostrado que pueden ser impulsores para la renovación y la actualización de desarrollos.

## 1. INTRODUCTION

Weather and climate-change related phenomena pose specific risks to real estate investment, particularly in tropical coastal zones. Notwithstanding the losses of local resident communities and the incalculable costs to human life and injury, damage to built structures may be significant and the tourism industry on which many coastal economies increasingly depend will be negatively impacted. While most commercial property types may suffer damage in catastrophic events, hotels and resorts are usually hardest hit for several reasons: the oceanfront location of many of these assets make them vulnerable; the very short nature of hotel leases can make returns highly susceptible to volatility; the tourism industry is intrinsically highly seasonal and volatile; and perceptions of destination image can be very fickle. Yet increasingly, institutional investors are turning to hotel assets in diversified portfolios and a further trend is for emerging markets – Mexico among them - to offer some of the most appealing returns.

The title of this paper is a twist on the work of Joseph Schumpeter who used the term “creative destruction” to explain cyclicity in the capitalist system and that old ways of doing business are destroyed to make way for the new. Such an idea was a key paradigm in economic development and planning through much of the 1950s and 1960’s. The paradigm held that areas deemed old or inefficient should be destroyed and completely rebuilt for superior economic performance to follow<sup>1</sup>. Hurricanes, and indeed other catastrophic natural disasters, are certainly unwelcome events, yet periodically they do lay waste to large zones thereby creating something of a ‘tabula rasa’ from which reconstruction may proceed. Both risk and opportunity are presented at such a juncture; a particular risk is that a tourist zone is hastily or haphazardly rebuilt without due regard for strengthening the hard infrastructure which makes the area more resilient to future events and which may deter key investment leading to a downward spiral threatening its viability. In other cases, reconstruction following such disaster offers the opportunity to proceed in such a way as to enhance the built, economic and social assets of the area, generating a positive cycle of investment.

Tourism is a very important industry in Mexico. Over 23 million foreign tourists visited Mexico in 2006 (SECTUR, 2007) and it is a key economic driver and an important employment generator<sup>2</sup>. Although Mexico’s tourism product is diverse, to a significant extent it is driven by beach-focused tourism located on its coastlines<sup>3</sup>. Mexico has one of the longest coastlines in the world’s tropical zone and it is one of the few countries that can be affected simultaneously by two independent hurricane regions<sup>4</sup>. With ongoing

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<sup>1</sup> The paradigm was given weight by the strong economic performance of the West German and Japanese economies following the ground-up reconstruction of their industrial cities from the ashes of WWII.

<sup>2</sup> Mexico is the world’s 7<sup>th</sup> largest destination for foreign tourists and the 14<sup>th</sup> largest in terms of revenues. Tourism is the 3<sup>rd</sup> biggest source of foreign currency for the Mexican economy after oil and remittances and it generates approximately 1.8 million jobs – around 6% of the total labor force and contributes over 8% of national GDP. Sources: SECTUR and FONATUR, 2007.

<sup>3</sup> Approximately 63% of private investment in Mexican tourism during 2006 was in beach destinations. FONATUR, 2007.

<sup>4</sup> Those being the North Atlantic and the North Pacific.

expansion of tourism-related development and the increasing participation of international institutional investors in the sector, the risk posed by natural disasters, and hurricanes specifically, takes on particular importance, as does the timing and the quality of the development and subsequent re-development.

Thus, there has been a dramatic increase of asset exposure along the Mexican coasts in just the past few years. First, there has been burgeoning interest among institutional investors in the tourism/resort/second home assets being developed there. The increasing number and density of development in coastal zones imply bigger targets for natural disasters. Second, climatological evidence on rising sea temperatures (Jauregui, 2003) suggests a greater frequency and magnitude of hurricane activity in coming years. Furthermore, the hurricane period may be extended for a longer duration in future years and the possible hurricane zone of activity could be extended across a greater geography.

Mexico has a history of disasters causing major setbacks to economic and social development<sup>5</sup>. Although other parts of the world are even more vulnerable to these threats<sup>6</sup> most nations of the Caribbean basin have proportionally even greater economic impacts, given their high dependency on the tourism industry. With such a formidable force posing such obvious risk to any sort of institutional real estate investment in such zones which have a clear history of repeat impact and which may be set for even more severe future events, what can be done?

Although accurate and long range forecasts of hurricane events are beyond the current understanding of the meteorological and climatological professions, history counts and does allow an approximate calculation of risk profiles. We examine the history of catastrophic hurricane events in proximity to Mexico's tourism zones and identify some broad patterns and discuss recommendations resulting from this analysis. Further, we also emphasize the positive contribution that can be made through institutional investment in the hotel sector in zones that have been impacted by catastrophic hurricane damage. Thus, we emphasize the creation after the destruction. Frequently, zones affected by recurring natural disasters are caught in a vicious cycle of disaster-reconstruction-disaster with haphazard rebuilding acting to increase the vulnerability to future threats. Using the case study of Cancun's reconstruction following the destruction of Hurricane Wilma in October 2005, we explore how greater resiliency and a lowered vulnerability can result when reconstruction is done well and how these events also serve as an opportunity for a tourist zone to be revitalized.

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<sup>5</sup> Most notably the Earthquake which struck the Mexico City metropolitan region in September 1985, which killed at least 6,000 people injured thousands of others, left hundreds of thousands homeless and caused approximately USD 4 Billion damage. Between 1980 and 1998 alone, Mexico experienced 79 major disasters with hurricanes and flooding as the leading causes of damage.

<sup>6</sup> Of the world's 48 most deadly hurricanes, cyclones, typhoons and extra-tropical storms since 1750 the vast majority have been in Asia (especially in India, Bangladesh and China) but 9 of those have been in the Caribbean. Honduras is over-represented given the devastation of Hurricanes Mitch (1998) and Fifi (1974) with death tolls greater than 10,000 (Nicholls, 2006; 92).

## 2. METHODOLOGY

Analysis of the relationship between natural events (in this case, hurricane events) and the destruction and creation of the human built elements (in this case hotels and tourism infrastructure) requires a time series correlation of data which best capture these variables. Storm-track data of the period between 1850 and 2006 from the national oceanic and atmospheric administration (NOAA) are plotted and buffered using a GIS analysis package<sup>7</sup>. In this analysis we used a simple buffering to express a proximity relationship between the tracks and the areas in their path.

Given this history, probabilities are calculated for hurricane events and a ranking of the major Mexican tourism zones is made based on their frequency and severity (using the Saffir-Simpson scale). A key strength in using GIS was in the ability to overlay the storm-tracks with other pertinent variables. In truth, each hurricane event has many unique characteristics, just as each locale has many topographic and other features which may determine the extent of damage at the local level (shape of seabed/continental shelf and above ground – the curvature of coastline, slope and elevation above sea-level). Thus impacts, notably inland flooding and landslides as well as coastal storm surges and wave damage, can be felt quite distant from the actual direct path of the hurricane<sup>8</sup>.

Time series data on tourist visitation, hotel occupancy rates and construction indices are used to assess supply and demand fundamentals following these events<sup>9</sup>. The focus of this paper, however, is a case study on the reconstruction of Cancun after the destruction incurred due to Hurricane Wilma in October 2005. Case study material on this reconstruction effort utilized an investigative approach and drew on media reporting and official statements.

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<sup>7</sup> The NOAA has among the best data on such phenomena. However it is not without some weaknesses, especially during the earlier decades of this period when satellite technology did not accurately allow tracks to be plotted.

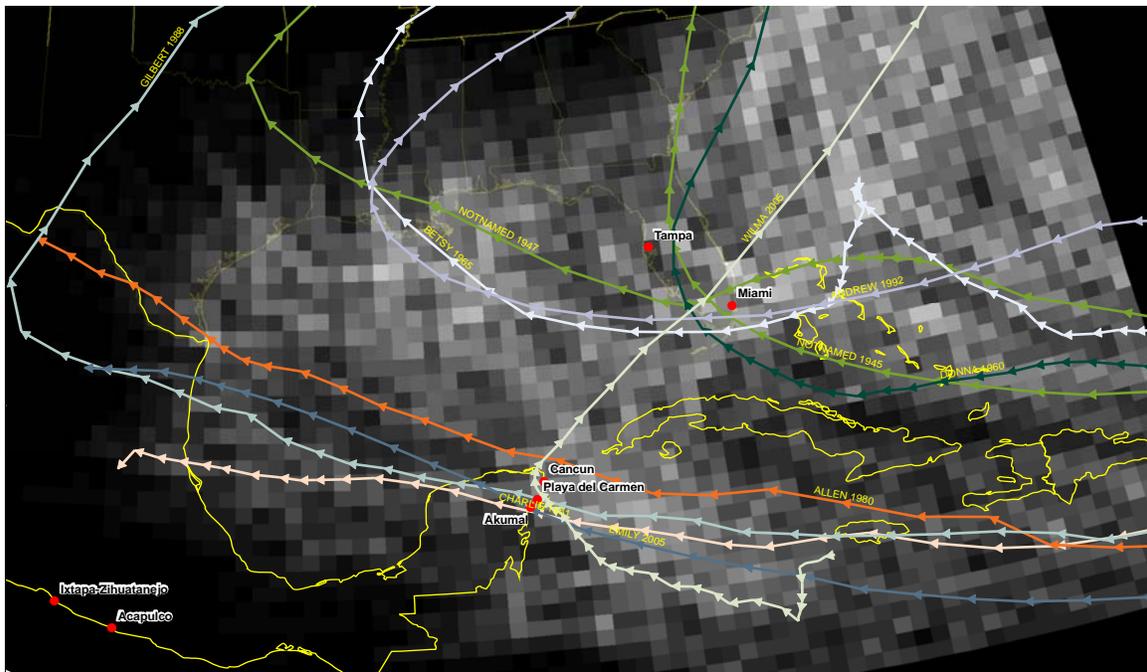
<sup>8</sup> Nicholls et. al. (2006; 79) report that low barometric pressure and wind set-up combine to produce large temporary rises in sea level which can cause extensive flooding of coastal areas and when combined with large onshore waves increases the potential damage caused by the surge-induced high water levels alone. The magnitude of the surge is controlled partly by the storm track and intensity but also by the configuration of the coastline and seabed. Significant property damage can occur even with a relatively mild storm surge of 1 meter. A further impact of these events is the intense precipitation further inland with associated flooding and mudslides, especially a problem in the normally dry desert zones of northern Mexico where flash-flooding is a real risk. Nadim et. al. (2006; 22) develop a general approach for landslide hazard evaluation including five parameters; slope factor, geological conditions, soil moisture conditions, precipitation factor and seismic conditions.

<sup>9</sup> We relied on official monthly data from SECTUR, Mexico's Secretariat of Tourism via their data collection agency, DATATUR.

### 3. RESULTS

Numerous hurricanes have impacted Mexico in the past 156 years<sup>10</sup>, and hundreds of tropical storms – much weaker and generally less destructive in nature – have been recorded in Mexico over this period. We have plotted some of the tracks along with the locations of key tourism zones in Mexico on the Caribbean coast (figure 1) and the Pacific coast (figure 2). One clear trend emerging is that hurricane events tend to cluster; that is an area can go for a number of years without a hurricane event and then can experience several events in quick succession. Geographically, the Yucatan peninsula has been the most intensely impacted area, both in terms of the number of hurricane events and also the intensity of these hurricanes. Furthermore, within the Yucatan, the area near Cancun demonstrates a high historical susceptibility.

*Figure 1: Hurricane Activity on Mexico's Caribbean Coast 1850-2006*



Sources: National Oceanic and Atmospheric Administration, ING Clarion Research & Strategy.

Notes: White coloration indicates the highest level of activity and black indicates the lowest level of activity

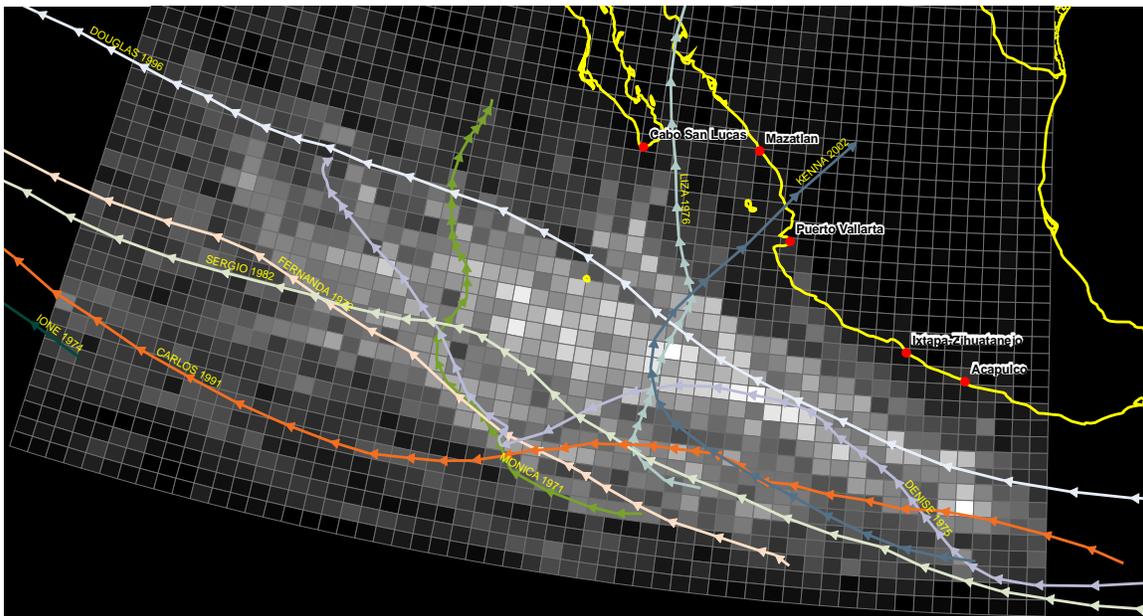
In figure 3 storm path data are summarized for five key Pacific coast tourism zones and three key Caribbean coast tourism zones in Mexico. The tourism zones of Akumal, Cancun and Playa del Carmen<sup>11</sup>, all located in the Yucatan peninsula and therefore with a

<sup>10</sup> Many of these hurricanes have made multiple landfalls affecting several states. This is partly due to the prominence of two fairly narrow peninsulas – Baja California on the Pacific side and Yucatan on the Caribbean side – which bear a landfall, but are usually insufficient to weaken the hurricanes from making further landfalls on the mainland after crossing either the Sea of Cortez or the Bay of Campeche and the Gulf of Mexico.

<sup>11</sup> The Island of Cozumel, and other resort areas including Isla Mujeres and the new Riviera Maya tourist zones – are also within 100km of Cancun and therefore located in the path of frequent hurricane landfalls.

Caribbean coast, have experienced both a greater overall frequency and a larger number of the more destructive category 4 and 5 hurricanes. Analysis of the same data set, including US hurricane events using the same methodology, revealed that Miami and Tampa (in Florida) had a similar profile to these tourist zones on the Yucatan. All five of the Pacific-coast tourism zones here had ten or fewer hurricanes make impact in close proximity over the period and with the exception of Acapulco which had a sizable proportion of Category 4 hurricane events, most others were categorized at a lower strength.

*Figure 2: Hurricane Activity on Mexico's Pacific Coast 1850-2006*

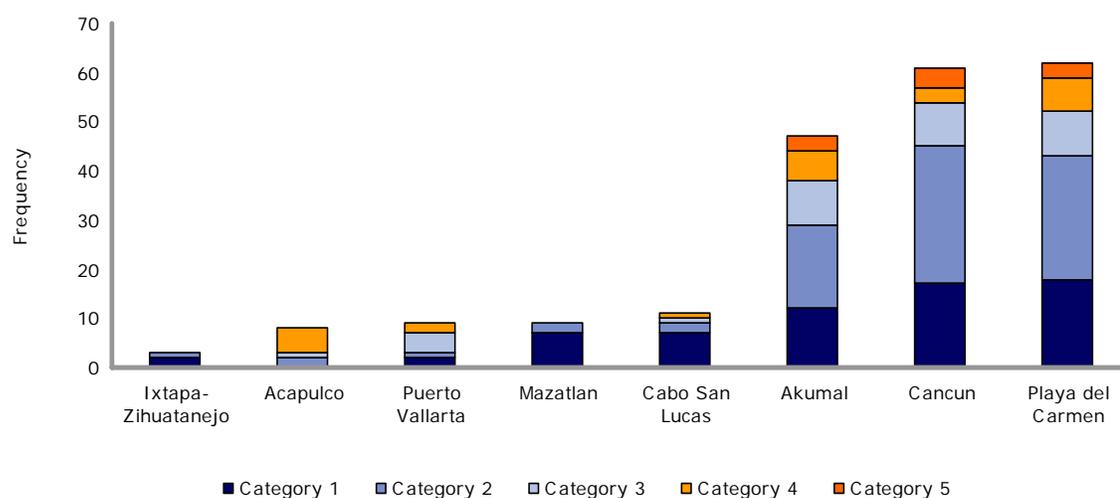


Sources: National Oceanic and Atmospheric Administration, ING Clarion Research & Strategy.

Notes: White coloration indicates the highest level of activity and black indicates the lowest level of activity.

Although there is a general trend towards a lessening of human casualties from hurricanes, largely due to much better warning and evacuation policies and procedures, the financial losses from these same events have been moving higher in recent years. Table 1 below outlines the reported direct losses of selected Mexican hurricane events. Still, the insurance industry is comparatively under-developed in Mexico and compared with the losses in US hurricane events, pales considerably (Table 2).

**Figure 3: Frequency and Severity of Hurricane Events in Proximity to Tourism Zones**



Sources: National Oceanic and Atmospheric Administration, ING Clarion Research & Strategy.

**Table 1: Most destructive Mexican hurricanes**

Year	Hurricane Event	Main Areas Affected	Reported Direct Losses (USD Millions)
1980	Allen	Matamoros	4.3
1982	Paul	Sinaloa	82.4
1983	Tico	Mazatlan	66
1988	Gilbert	Yucatan Penin., Tamaulipas, Monterrey	76
1988	several other hurricanes	throughout the country	597.6
1992	Winifred	Manzanillo	8
1992	Gert	at least 7 Eastern states	18.1
1995	Ismael	Baja California, Sinaloa, Jalisco	26
1995	Opal	Campeche and Tabasco	124.7
1995	Roxanne	Yucatan Penin., Tabasco	1,500
1997	Pauline	Oaxaca and Guerrero	447.8
2002	Isidore	Yucatan	330
2002	Kenna	several Central Pacific states	101
2005	Stan	Chiapas	NA
2005	Wilma	Quintana Roo	20,000

Sources: Munich Re, Geo Risks Research, NatCat Service as at 2004. Note, Mexican-only figures for Wilma's reported losses vary greatly – US damages are included here.

**Table 2: Ten costliest hurricanes ordered by insurance losses**

Date	Loss Event	Region	Overall Losses* (USD million)	Insured Losses* (USD million)	Fatalities
2005 August	Hurricane Katrina	US	125,000	61,000	1,322+
1992 August	Hurricane Andrew	US	26,500	17,000	62
2004 September	Hurricane Ivan	US/Caribbean	23,000	13,000	125
2005 October	Hurricane Wilma	Mexico/US	20,000	12,400	42
2005 September	Hurricane Rita	US	16,000	12,000	10

Sources: Munich Re, Geo Risks Research, NatCat Service

\* Original Values, as at April 2007.

### 3.1 Case Study – Cancun’s Reconstruction after Hurricane Wilma

Mexico’s Federal agency for national tourism development (FONATUR) selected Cancun as the site for a planned integrated tourism zone in 1967. After constructing the first airport and highways linking the area in the early 1970s, hotels began opening for business in 1974 and since then it has come to be one of the most popular tourist destinations in the country and beyond, attracting over 5 million visitors annually. Aguirre (1991) notes that in spite of a plan guiding the tourism development of the zone, Cancun developed rapidly and unequally and he cited bad drainage among its numerous problems.

Hurricane Wilma weakened slightly before making landfall on the Yucatan Peninsula on 21 October 2005 as a category 4 hurricane. As a slow-moving system, it pounded the Cozumel and Cancun areas for three days with heavy rainfall and sustained winds of up to 241 km/h which resulted in damage to 90% of the hotels in Cancun before turning northeast and striking Florida. According to SwissRe, this event is estimated to have caused insured claims of USD 6-12 Billion.

The Mexican government spent over USD 250 Million in the reconstruction of Cancun, much of it in improved infrastructure<sup>12</sup>. As important as the public investments were in Cancun’s recovery, privately held companies were reported to have invested USD 2.2 Billion in the restoration of assets in Cancun in the aftermath of Wilma. In almost all instances, damaged hotels were rebuilt to higher standards and at a higher star rating. The UN World Tourism Organization declared the Cancun reconstruction to be a model to be emulated in future disasters. Such events stood in stark contrast to the response following a hurricane event of similar magnitude which occurred some 17 years earlier<sup>13</sup>.

The impact of Wilma on tourist nights<sup>14</sup>, especially for international tourists in Cancun’s 5 star hotels, was particularly severe (figure 4). Although Wilma struck fairly late in the month of October 2005, there were 346,000 international tourist nights spent in Cancun’s 5 star hotels that month, a figure well down from the October average<sup>15</sup> of over 490,000. But the devastation wrought by the event and the mass cancellations of flights that

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<sup>12</sup> Major boulevards were rebuilt and with better drainage and at higher elevation. Street-lighting and landscaping proceeded with significant investments. At least USD 20 million is reported to have been spent on a beach recovery project that restored more than 7 miles of Cancun’s beaches which were largely washed away by Wilma. Around the same time, and indirectly related, the Cancun International Airport made several key improvements including the building of a new terminal and second runway. A new airport was also constructed at nearby Tulum.

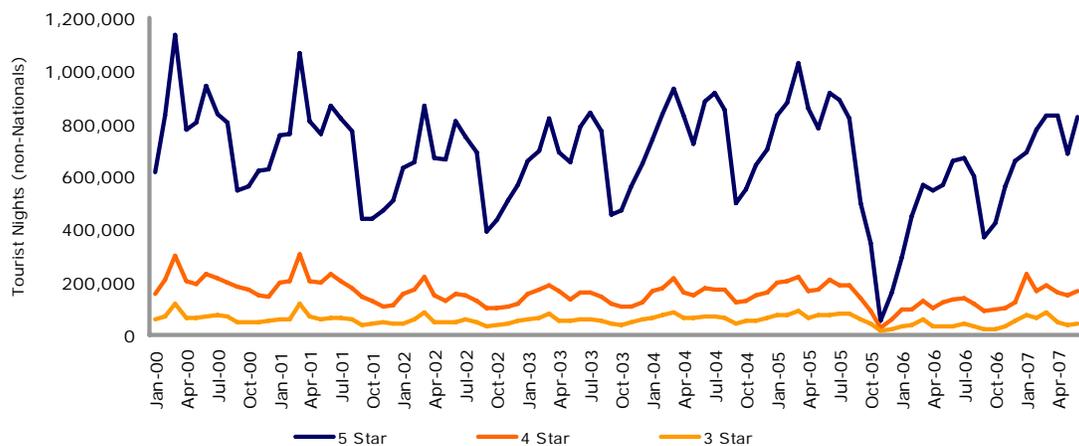
<sup>13</sup> Category 5 Hurricane Gilbert struck the Yucatan Peninsula in September 1988 (after damaging Jamaica and before moving into the Gulf of Mexico and making landfall again in the Mexican state of Tamaulipas). In the state of Quintana Roo alone approximately 35,000 people were made homeless and the Mexican Ministry of Tourism put the costs of structural losses in Cancun, Cozumel and Isla Mujeres at 200,000 million pesos (Aguirre 1991). Further, approximately USD 87 Million were unearned from tourism during October to December on 1988 and state finances declined 65% during this period.

<sup>14</sup> Tourist nights are a function of the number of tourists and the duration of their stay. For this analysis we focus on international tourists, although patterns for Mexican tourists were somewhat similar, while we also focus analysis on the higher class hotels which are more of interest to institutional investors.

<sup>15</sup> Averages reported here refer to the same month of the five years preceding this Hurricane event.

followed resulted in just 55,000 international tourist nights in Cancun's 5 star hotels for November 2005; barely 10% of the average for the previous five Novembers which was 562,000. By December 2005 however, nights by international tourists at 5 star hotels in Cancun had tripled from the previous month and were at 26% of the December average. By January 2006 international tourist nights in Cancun's 5 star hotels were 41% of the January average and by the peak season - February and March and barely six months since the catastrophic event - nights by international tourists in 5 star hotels surpassed the half million mark and represented approximately 60% of the average February and March figures of the five years leading up to Wilma.

**Figure 4: Cancun Night Stays of International Tourists by Hotel Class**



Source: DATATUR, 2007, ING Clarion Research & Strategy. Note: January to June 2007 are estimates.

More remarkable than simply the quantitative recovery undertaken in Cancun, was a qualitative shift which underpinned the reconstruction process. More thoughtful investment, guided in greater part by sustainable principles, also allowed the area to be re-branded and repositioned in the marketplace as a higher scaled destination. The revitalization led by the public sector gave confidence to many of the larger private investors to rebuild their assets to a higher quality and standard. The effect has been to elevate the position of the resort and in turn make it more resilient to future hurricane events and positively reinforce its investability credentials.

#### 4. DISCUSSION

Risk has been defined as a function of two factors - the natural hazard and vulnerability – and risk is the probability and magnitude of the losses associated with a specific natural event at a particular geographical point and time (Keipi and Tyson, 2002; 4). Whereas the natural events that could cause disasters are beyond human control, vulnerability can be controlled and the type and standard of investment in the built environment is a key element.

Climatic change and sea-level rise represent numerous challenges to all development in the world's coastal zones. Quite aside from warning systems and defensive works which

can minimize damage and losses associated with these events, the adoption of resistant infrastructure is key to planning. More robust construction and site planning should consider probabilities of the worst case scenario, use appropriate set-backs where possible and take particular care in flood-plain/seafront sites<sup>16</sup>.

Strengthening the built environment through infrastructure investment, beach nourishment, and better building codes are among the actions to increase the resiliency<sup>17</sup> of assets in vulnerable zones. Land use strategies and regulations, are potentially very powerful planning tools yet are not well used throughout the Americas - and indeed in much of the world. Such tools are especially weak in coastal zones where tourism is an important industry. Stronger regulation of permitted use, density and setbacks and better land conservation may be difficult to attain. Such regulation may be perceived to curtail the development of waterfront properties through restricting the use of the most attractive and highly-valued real estate and adversely affect economic vitality. Such perceptions are often false.

However such reconstruction efforts are much more compatible with an environment which is more conducive to international institutional investment where there is a fiduciary responsibility to consider investment risk along with potential returns. As important as hotels and other tourism-related infrastructure are for the economies of these local areas (indeed for the national economy) it would be ideal if both the better planning and standards adopted through reconstruction and the positive cycle of higher grade reinvestment would influence standards for other property types. If this regime could be transferred to the residential sector it would be of particular benefit to local residents.

## 5. CONCLUSION

Reinvestment, especially of significant amounts and which improves the quality of assets overall, in such a high risk environment will best come about when the cycle of vulnerability is broken and greater, more proactive steps in managing risk are made. Technology at present does not allow natural events such as these to be prevented. However, vulnerability can be reduced and resiliency strengthened through risk management. Such opportunities for existing tourism zones are most realistically presented at times when these areas are most at risk and when conditions are most stressed – during the immediate period following such destruction. More optimistically, these events have shown to be catalysts for renewal and update of building stock related to the tourism industry, and it could be hoped, to other property types.

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<sup>16</sup> According to ECLAC data (1999b), 75% of the damage caused by Hurricane Mitch in Honduras was directly related to inadequate location of buildings and infrastructure constructed in flood prone areas or on unstable soil. Stronger land use planning, zoning and construction codes require political backing since they may imply restrictions on the use, purchase and sale of property and affect its value (Keipi and Tyson, 2002; 8).

<sup>17</sup> Resiliency – the ability to withstand hazard impact and recover without adversity – is a key component of sustainability, an important paradigm emerging in real estate development and management. By aiming for a better balance between economic and financial imperatives, the integrity of the ecological systems and built environment more sustainable investments can result. Whether these developments are vulnerable or resilient depends on commitment from the public and private sectors alike.

It is crucial to adopt a full-range approach to risk management to identify, analyze and begin to quantify the likelihood of loss and act on undertaking preventative or corrective practices. Such practices must include structural investments and nonstructural actions to reduce vulnerability; among the latter including financial protection mechanisms against potential losses resulting from such events. However a win-win situation may result when faced with the need to rebuild following a catastrophe; a more creative and strategic approach may be undertaken by investors to rebuild better than ever and take the opportunity to reposition the destination to an even higher and more investable level.

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