Recreational development and shoreline modification along the north coast of Yucatán, Mexico

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Abstract

The north coast of Yucatán has been a destination for domestic tourists for over a century. Since 1945, recreational development has created a 20-km summer-home strip centred upon the port of Progreso. In response to port and harbour improvements and corollary down-drift erosion, second-home owners have armoured the shoreline with groynes and caused a severe physical and aesthetic degradation of the coastal landscape. Since 1990, even the up-drift coast has become armoured and aesthetically degraded. Here, the impetus to modify the shoreline has been in response to poor construction practices and an inability by vacation-home owners to adjust to the natural processes of accretion and erosion that characterize this physical environment. As groyne construction diffuses eastward into pristine beach environments, efforts to expand international tourism may be hindered by environmental degradation caused by shoreline modification.

Keywords: coastal tourism, recreational development, shoreline modification, groynes, Yucatán (Mexico)

Introduction

The north coast of Yucatán has been a destination for domestic tourists from Mérida, the state capital, for over a century. As a 20-km reach of coast slowly evolved into a conurbation of beachfront summer homes during the 1950s and 1960s, Yucatecan second-home owners faced problems of shoreline erosion, especially west (down-drift) of Progreso, where
extensive port and harbour construction had taken place. The response by individual property owners (or lessees) was to construct groynes (shore-normal, rock-and-timber structures built from the beach into the shallow nearshore environment) and these, in turn, accelerated the problem of down-drift erosion and stimulated even more groyne construction. Between the 1960s and late 1980s, the shoreline west of Progreso became very degraded as a result of a combination of severe human-induced erosion and futile efforts by vacation-home owners to retard the erosion. During the 1990s, however, the locus of groyne construction shifted to the east (up-drift) of Progreso, where the shoreline historically had been natural and relatively pristine. Although some of this groyne construction was in response to the passage of Hurricane Gilbert in 1988, especially in the village of Chicxulub Puerto, most is attributed to misguided efforts by second-home owners to stabilize a shoreline that naturally fluctuates in position.

Second-home domestic tourism is a unique form of tourism that occurs in many coastal reaches of the world in addition to lake and mountain districts (Jaakson 1986). While this form of tourism is characterized by a repeat visitation and leisure-time routine, it is none the less as important as hotel development in the establishment and growth of resort areas. Since recreation is the overriding purpose of seasonal tourists in Yucatán (and elsewhere), the term ‘recreational development’ is used in reference to growth of a second-home landscape here. The term ‘development’ is used primarily in the sense of ‘spatial reorganization’, rather than in the sense of economic growth, modernization, distributive justice or socio-economic transformation (Pearce 1989).

Shoreline change and structural modification have long been research themes of geographers (Johnson 1919; Davis 1956). In the 1980s, Walker (1981, 1984) investigated global impacts of structural modification. A comprehensive volume on artificial structures was published in 1988 (Walker 1988), which included a short section on Mexico (Gutierrez-Estrada et al. 1988). The specific role of recreation and tourism in leading to shoreline modification was addressed in two edited books in the early 1990s (Fabbri 1990; Wong 1993). The impact of artificial structures upon adjacent natural beaches has been documented at various venues, including Hawaii (Fletcher et al. 1997).

This article is presented as a case study of domestic tourism development and physical impacts along the north coast of Yucatán. By focusing upon a study area east of Progreso, it will be demonstrated that recreational development stimulated by seasonal domestic tourism has become as much of a contributing factor in shoreline modification today as port and harbour development was in the past. There are many other issues related to the growth of tourism in this area that deserve much attention, e.g. land ownership and illegal land conveyance issues, socio-political
processes of beachfront development and the internationalization of tourism. The focus here, however, is upon the beaches that attracted domestic tourists and are now in danger of being destroyed by them.

The physical setting

The north Yucatán coast consists of a beach-ridge plain accreted onto the limestone platform of the Yucatán peninsula where it dips gently northward into the Gulf of Mexico (Meyer-Arendt 1993). This beach-ridge ‘barrier’ is separated from the rocky ‘mainland’ by a lagoon/mangrove swamp depression generally referred to as la ciénaga (lagoon/wetlands), but known as the Estero Yucalpetén (estero meaning estuary) in the vicinity of Progreso (Figure 1). The beach-ridge plain varies in width and, in the vicinity of Progreso, it is almost 1 km wide. Active primary dunes are found in unmodified zones of the beachfront and dune heights of up to 3 m are common west of Chuburná Puerto. At the beach, depth to limestone bedrock averages 3 or 4 m (Sánchez & Vera 1963). The shoreline is generally long and straight, except where interrupted by small Pleistocene limestone outliers, some of which function as natural breakwaters and locally reduce wave energy (Sapper 1945; Edwards 1954).

The beach-ridge complex of north Yucatán is thought to have originated in a Holocene sequence of accretion and erosion similar to that of other reaches of the Mexican Gulf Coast (Psuty 1967; Stapor 1971; Tanner & Stapor 1971; Tanner 1975). The multiple-ridge plain reflects a regressive phase of sand abundance and accretion, although transgression has prevailed in the historic period. The beach sands contain no quartz sand but high proportions of shell fragments (Isphording 1975), which indicates a nearshore source of the beach material. There is east–west longshore sediment transport, attributed to the longshore currents coming into the Gulf through the Yucatán Channel. Net westward longshore sediment transport rates of 30,000 m$^3$ per year have been estimated for east of Progreso (Sánchez & Vera 1963; SCT 1986).

Wave energy is relatively low along the north coast of Yucatán, except during storm events. Because of its north-facing orientation, the north coast is more vulnerable to onslaught by wintertime nortes (northeasters) than by hurricanes. On average, 20–25 nortes reach Yucatán during the winter season (Vivó 1964; Mosiño & García 1974), the strongest of these causing erosion and lagoonal flooding. In Tabasco, Psuty (1967) noted a pattern of seasonal shoreline change, whereby wider summer beaches give way to narrower, norte-dominated winter beaches. Hurricanes pass over or near the Yucatán peninsula on an east–west track, usually once a year (Wilson 1980), but only rarely are they of the magnitude of Hurricane Gilbert of 1988 (Meyer-Arendt 1991a,b). Occasionally, a hurricane stalls
for a prolonged period in the central or northern Gulf of Mexico and initiates a reversal of currents along the north Yucatán coast. This reversal, driven by the rare west wind called *chikin-ik* by the Maya, may cause erosion along localized reaches that normally lie in sheltered lee locations (Meyer-Arendt 1993).

The north coast of Yucatán has been in a transgressive phase for the last century or so, although coastal reaches close to the rock outliers appear to be quite stable. Cliffting of dunes is evident in many areas, notably east of Progreso and near Chuburná Puerto, and beachfront coconut palms are periodically uprooted. Shoreline retreat of 200 m over a period of 110 years has been reported (Gutierrez 1983), but this rate appears extraordinarily high and may be based upon inaccurate historical charts.

Analysis of aerial photography revealed variability in shoreline changes along the north coast of Yucatán since the 1940s. Overall, shoreline retreat rates were found to be relatively low, especially compared to rates along the northern Gulf of Mexico, but both short-term and geographical variability were apparent. Although the scale of the photography (1:25,000 was the best) precluded accurate measurement in areas of little change, high rates of change were measured west of Progreso. Immediately west of Progreso wharf, rates of 0.3 to 0.6 m a⁻¹ were measured for the 1948–78 period, and down-drift of the jettied Yucalpetén harbour entrance rates approached 1.0 m a⁻¹ (Meyer-Arendt 1987b). By contrast, the coastal zone east of Chicxulub Puerto remained relatively stable until the 1990s. However, while the shoreline position remained relatively unchanged when comparing 1948 and 1991 aerial photographs, fluctuations were noted in intermediate sets of photos. It appeared that phases of accretion alternated with phases of erosion.

**Coastal tourism in Yucatán**

The origins of domestic tourism and recreational development along the north coast of Yucatán date to the late nineteenth century (Paré & Fraga 1994). In 1856, construction began at a new port, named Progreso de Castro, 32 km due north of Mérida and more easily accessible than the older port of Sisal (Moseley & Terry 1980). By 1861, a crude road from Mérida to the new settlement had been constructed (Ferrer 1945). The first wharf was completed in 1870 and a train service between Mérida and Progreso began in 1881. Although the primary function of the railroad was to facilitate the export of *henequén* (sisal, a fibre used for making binder twine), Mérida residents quickly discovered the beaches for day-use recreation, and wealthy families began to build summer residences (*casas veraniegas*).
Tourism development was accompanied by intensive and extensive landscape change in the first half of the twentieth century. By 1912, Progreso had three hotels and an established reputation as a popular vacation destination for Mérida residents (Frías & Frías 1984; Meyer-Arendt 1987a). In 1928, the Mérida–Progreso highway was paved and a *malecón*, or beachfront promenade, was constructed along the shore-front of Progreso east (up-drift) of the wharf. Restaurants and dance clubs were constructed along the landscaped beachfront drive amidst opulent summer homes and the locus of vacation housing soon spread eastward toward Chicxulub Puerto. Roads were graded toward Chicxulub Puerto in the east and Chelem in the west, while sand roads were extended eastward to Dzilam de Bravo (70 km east of Chicxulub Puerto) and westward to Chuburná Puerto. By 1945, Chicxulub Puerto was an established *playa de veraneo* (summer beach) and many of the outlying fishing and salt-producing Mayan settlements were considered *lugares de recreo* (recreation spots) (Ferrer 1945).

A boom in beachfront development began after the end of World War II. A 2 km long concrete wharf at Progreso was completed in 1947 and shore-front urbanization extended east and west from Progreso (Meyer-Arendt 1990). The beaches closest to Progreso remained most popular for development because of the availability of utilities and proximity to Mérida. As Progreso’s beachfront filled in with summer homes during the late 1940s, Chicxulub Puerto became the next favoured site of vacation-home construction. A secondary direction of expansion was toward Chelem, where property values were lower because of shoreline erosion attributed to the port. Recreational development continued throughout the remainder of the twentieth century and a contiguous urban strip – from Chuburná Puerto to Chicxulub Puerto – has emerged (see Figure 1). Of the strip of urbanization, the largest part is today the vacation home zone, delineated on the 2000 overlay. Much of the area’s permanent population lives along the edge of the marshy wetlands, where recent land reclamation (land-filling) efforts have been concentrated to improve the quantity and quality of housing and sanitary conditions.

During the 1990s, the greatest real estate boom was in the eastern reaches of the north coast urban area where empty stretches of beach scrub and former *cocales* (coconut plantations) have been converted to *fraccionamientos* (subdivisions) or zones of élite beachfront housing. The modern toponyms (shown on bottom panel of Figure 1) reflect a combination of historical (names of *cocales* such as Josefina, Diana Milán and Uaymitún) and modern (developers’ designations such as Costa Dorada and Costa Turquesa).

In addition to single-family dwellings, a condominium ‘boom’ hit the north coast of Yucatán beginning in the late 1980s (Meyer-Arendt 1999). In a 1994 survey by the author, 43 condominiums or suites/villas
Figure 1  Land-use changes on the north coast of Yucatán, 1948–2000.
(multi-unit structures with individual ownership of units) with a total of 551 units were counted between Chuburná Puerto and just east of Uaymitún. Of that number, only seven (77 units) were west of Progreso. In other words, 84 per cent of all condominiums were east of the Progreso wharf, with the zone of greatest multi-unit construction lying between Chichxulub Puerto and Uaymitún.

**Structural modification of the shoreline**

Human modification of the north Yucatán coast via emplacement or construction of shoreline structures dates back to the initial development of Progreso as a port city, while the role of tourists as geomorphic agents is newer but now dominant in importance (Meyer-Arendt 1993). Ever since the first wharves were constructed in Progreso in the late nineteenth century, the western (down-drift) zone has experienced the highest local rates of erosion. Although Dutch engineers designed a new (in 1947) 2 km long wharf to allow throughput of water and sediments (Campos 1990), high rates of shoreline erosion were soon noted. Perhaps as a result, the earliest zone of beachfront development was to the east of the wharf, along what became the Progreso malecón and eastward to Chichxulub Puerto. Not surprisingly, the first groynes were built here to protect the touristic infrastructure.

Groyne building became popular in Yucatán in the 1960s, perhaps because groynes were perceived as an effective means of trapping long-shore sands and offsetting erosion elsewhere in the world at the time, including the United States. The first rock-and-timber groynes (*espigones*), locally known as ‘spurs’ (*espolones*), were constructed by beachfront home owners at Chelem (and possibly Chichxulub Puerto) as early as the late 1950s (Sánchez & Vera 1963). Because of poor design, however, the *espolones* were not very effective and accelerated down-drift erosion. In 1964, government engineers designed and installed a groyne field along the Progreso malecón to maintain a wide beach for day-use recreationists (Meyer-Arendt 1987a). Perhaps because the groynes were designed by engineers, these *espolones* proved to be relatively successful in trapping sand. As a result, groyne building became ever more popular among Yucatecan summer-home owners (Figure 2).

In 1968, a safe harbour (*puerto de abrigo*) for the Progreso fishing fleet was created and the port of Yucalpetén established (see Figure 1), and a phase of down-drift erosion and groyne construction was initiated. A navigation channel was excavated through the beach-ridge plain (which forced a relocation of the highway to Chelem) and jetties (*escolleras*) built to prevent sediments from filling in the channel. The east jetty extends over 500 m seaward from the position of the natural coastline, where much
sand has accreted over the past three decades and a luxury hotel and marina were built in the late 1980s. Down-drift of the west jetty, the shoreline began to retreat rapidly – as much as 30 m in the first few years – and widespread construction of espolones began.

Unlike the groyne field at the Progreso malecón, the groynes extending westward from Yucalpetén were neither authorized nor professionally engineered. Although construction permits were legally required, beachfront property owners perceived groynes as means of saving their property and individually built espolones on a piecemeal basis without obtaining permits. The village council (comisario ejidal) of Chelem did not object to the shoreline armouring, nor did any regional, state or federal authorities (perhaps because the stimulus was the port and harbour improvements).

Continued groyne construction gradually shifted the locus of erosion westward and, in response, the corollary leading edge of espolón construction. During a 1984 aerial survey, 178 espolones were documented along an 8.8 km stretch from Yucalpetén to Chuburná Puerto, an average of one every 50 m (Meyer-Arendt 1987b). Over 75 per cent of the vacation home properties west of the Yucalpetén jetties encroached within the 20 m wide beach easement known as the Zona Federal Marítimo Terrestre, or Federal Coastal Zone (Merino 1987). By the mid-1980s, the cause-and-effect relationship between groynes and erosion was recognized.

Figure 2  Groyne construction along the north coast of Yucatán, 1994.
and Chuburná Puerto officials removed several *espolones* and began to enforce the existing ban on unauthorized groynes in their jurisdiction (Meyer-Arendt 1987a).

Whereas the groynes west of Yucalpetén were built in response to erosion created by port construction and, therefore, seasonal tourists were perhaps less to blame for beachfront degradation, east of Progreso the causal relationships were not so clear. In Chicxulub Puerto, a short wharf (now derelict and partially removed) may have contributed to down-drift shoreline erosion and corollary groyne construction in the late 1950s and early 1960s. East of Chicxulub Puerto, however, there was never any port or industrial construction, neither were there any groynes until the area began to fill in with vacation homes and condominiums. The first groyne was built in the early 1990s and, by late 1999, a 6 km long stretch east of Chicxulub Puerto had become armoured with approximately 100 *espolones*, causing the coastal landscape to resemble the erosional, debris-strewn beachfront of Chelem. Since the primary stimulus for coastal modification appeared to be seasonal domestic tourism, this zone east of Chicxulub Puerto became a focus of research in the 1990s.

**East of Chicxulub Puerto: a case study**

Historically, the shorefront east of Chicxulub Puerto has been untouched by port development or other human modification. The area’s beautiful white beaches and vegetated sand dunes, coupled with its proximity to Progreso (and Mérida), made it attractive to domestic tourists beginning in the 1950s. Beachfront home construction commenced in the 1960s and, throughout the 1970s and 1980s, the area remained popular for real estate development by the Mérida élite and middle class professionals (Figure 3). By the late 1990s, however, the once pristine shorefront had been converted into a Chelem-style landscape of groynes and seawalls, and the ‘touristic frontier’ of vacation-home development had shifted eastward toward Uaymitún. The 5 km long coastal reach immediately east of Chicxulub Puerto provides an excellent case study to better understand the processes of touristic development and corollary shoreline modification within the entire recreationally developed north coast of Yucatán.

As recently as the late 1940s, the area east of Chicxulub Puerto was relatively devoid of human habitation. Development was just beginning to extend the village eastward along the shorefront but, except for a few coconut plantations, the scrubby beach-ridge plain was empty. In the nearshore at the Cocal San Miguel lay a cluster of Pleistocene-age limestone rocks just below the water’s surface (shown only on the top two panels of Figure 3). These rocks explain the sandy headland along an
otherwise smooth and straight beach. Perhaps it is because of the wave-sheltering effects of the offshore rocks that the plantation’s structures were built on the headland early in the twentieth century. (The buildings of Cocal Uaymitún, further to the east, were built in a similar rock-protected headland site in 1909.)

Alternating phases of shoreline erosion and accretion were documented for this reach of the coast. Existing aerial photography (augmented by personal interviews) revealed that the shoreline position has been highly variable since 1948, especially to the west of the San Miguel headland. Whether this is attributed to ‘pulses’ of longshore-driven sediments or the onshore-offshore transport of beach sediments is not clearly understood. The latter is a frequent natural process that varies seasonally as a function of (1) the number and intensity of winter nortes, and (2) summer-season barometric pressure and corollary sea levels (enhanced, of course, by tropical cyclonic activity). Also not clearly understood is the sediment-storage function of the headlands. Some years the San Miguel beaches appeared to be wider, while at the same time the down-drift beaches appeared narrower. On other images, the opposite seemed to be the case. Although the scale and quality of the photographs precluded making definitive conclusions about triggering mechanisms, the alternating phases of erosion and accretion seem to be typical in this area (at least under natural conditions).

Figure 3 Land-use and shoreline changes, Chicxulub Puerto and points east, 1948–99.
As recreational development took place in the 1960s, 1970s and 1980s, the actual siting of the beachfront vacation homes played a great role in the perception of erosion and subsequent attitudes toward groyne construction. A greater distance from the shoreline or, more importantly, a greater distance behind the primary dunes ensured that erosion would not threaten the foundations of homes. Many of the single-family summer homes were built inland of the second line of dunes and, to date, they have not been threatened by erosion. However, more frequently vacation homes were built on or just behind the primary dune, as in the Diana Milán subdivision.

The mid- to late-1980s was a period of much storm activity in the Gulf of Mexico. The combination of shoreline erosion and hurricanes was followed by groyne construction in those areas where threats to house foundations were perceived. The 1985 hurricane season initiated a phase of erosion in the Chicxulub Puerto/San Miguel area. Hurricane Gilbert, however, which in 1988 destroyed or severely damaged every beachfront structure along Yucatán’s north coast, surprisingly left a wider beach along most of the coast (Meyer-Arendt 1991b, 1993). Within a few years, however, as owners repaired their summer homes, the shoreline again began to encroach. Based partly upon advice requested by and provided to vacation-home owners by port employees moonlighting as erosion consultants (and even calling themselves ‘engineers’), the first groynes east of Chicxulub Puerto were built in the early 1990s. (Some home owners blamed the increased erosion east of Progreso upon the 5 km long rubble-mound Progreso wharf extension, although no scientific data support such a position.)

An inventory of groynes conducted in 1994 revealed

1. intensive new groyne development west of the Chicxulub Puerto wharf,
2. a scattering of groynes between Chicxulub Puerto and Diana Milán, and
3. a recently completed groyne field at Fraccionamiento Diana Milán.

At Diana Milán, an indentation in the shoreline had left homes perching precariously just above the surf zone in 1994 and home owners had turned to groynes as a ‘last resort’ to save their property. (Some claimed that an up-drift home owner had earlier constructed a 50 m long groin to extend the beach in front of his home, and this had caused the erosion at Diana Milán. Aside from hearsay, no evidence or proof of this was ever collected.)

By late 1994, there were 12 groynes at Diana Milán and their ineffectiveness was evident. The three up-drift groynes exhibited partial success in trapping sand, but along the nine down-drift groynes, erosion had increased and waves were lapping at the houses’ foundations. Luckily (or not, in view of the odour), a wide swath of sargasso weed filled in this erosion-prone zone in late 1994 and temporarily reduced wave energy.
Home owners near the western end of the subdivision soon felt the pressure to construct groynes, if only in the anticipation of trapping sand and protecting their homes and salvaging their beach. Many, if not most, of the home owners felt that, although groynes were unsightly and degraded the beaches, they offered the last hope of keeping a beach in place. A few resisted the temptation to build, but most gradually accepted groynes as necessary evils. Again, private home owners did not petition for permission from the Secretaría de Desarrollo Urbano y Ecología (SEDUE), the federal regulatory agency, but rather contracted with unofficial ‘coastal engineers’ to design and construct their private groynes. By 1995, more groynes had been built to the west of Diana Milán – a trend of down-drift groyne construction very reminiscent of a similar pattern at Yucalpetén and Chelem in the 1970s.

By August 1999, the locus of down-drift groyne construction had migrated all the way from Diana Milán to the Chicxulub Puerto wharf. During a beach survey, approximately 100 groynes were counted, 80 per cent of them constructed since 1994 (Figures 4 and 5). Although the shoreline position did not appear to have changed significantly since 1994, local home owners described short-term phases of erosion and accretion in interviews with the author.

Figure 4  The shorefront east of the Chicxulub Puerto wharf, January 1984. Note San Miguel headland in far distance.
Although the natural phases of shoreline erosion apparently accelerated the construction of groynes, there was little corollary evidence that the groynes stimulated much beach accretion. One exception was at Diana Milán, where most of the dozen groynes were now completely covered by a nice wide beach. This was, perhaps, a result of a natural ‘pulse’ of sand moving in from the east. However, just as in introductory geology or physical geography textbooks, most of the coastal landscape from Diana Milán to Chicxulub Puerto had become very ‘scalloped’ because of the groynes. Indeed, although the deeper water along the down-drift side of the groynes now provided close-by anchorages for summer tourists’ powerboats and jet-skis, the beach had seriously degraded from its pre-groynes appearance.

Not only had the Chicxulub Puerto/San Miguel stretch begun to resemble Chelem in 1999, but the same pattern was beginning to diffuse eastward as well. At Tropical Riviera, a subdivision east of San Miguel containing vacation homes and condominiums, 15 groynes were built in late 1998 and early 1999. The impact of this recent development upon the San Miguel headland and the down-drift beachfront of Diana Milán is yet to be determined, but if other modified shorelines offer any clues, the prognosis is not good.
Along the north coast of Yucatán, both older urban development and newer recreational development must share blame for encroaching too closely upon the primary dunes and shoreline to allow natural processes of transgression and regression. Where the historical shoreline has been altered by port and harbour improvements, down-drift erosion has been accompanied by groyne construction that has only accelerated the problem of beach erosion. The Yucalpetén and Chelem shorefronts still today exhibit a post-Hurricane Gilbert landscape of concrete rubble instead of a sand beach. The ineffective groynes there only add to the surreal and depressing coastal landscape.

The degradation of the Yucalpetén and Chelem beaches has resulted from both port/harbour construction and ineffective groyne- and seawall-building efforts, but east of Chicxulub Puerto seasonal domestic tourists alone are responsible for the recent degradation of the beaches. Poor siting of vacation houses, an inability (or unwillingness) to adapt to a fluctuating shoreline and a propensity to turn to groyne construction are all to blame for the aesthetic deterioration of the beachfront. Historical photos have shown that this shoreline is fairly stable and that phases of erosion and accretion are normal. The construction of over 100 groynes since 1990 has not improved the coastal environment but rather accelerated the degradation of this coast similar to coastal reaches to the west. Although construction of groynes without permits is illegal in Yucatán, regulatory agencies such as SEDUE have no enforcement powers. In addition, since the summer-home owners represent the political and professional elite of the state, it is unlikely that groynes will be banished.

Seasonal domestic tourism is responsible for the spreading of inefficient erosion-control techniques into pristine coastal landscapes. It is apparent that certain minimal coastal-zone management techniques – such as zoning and construction setbacks – need to be implemented to prevent the entire north coast of Yucatán from resembling Chelem. International tourism has recently begun in Yucatán (in the form of an all-inclusive resort near Telchac Puerto, to the east of this study area), and local civic boosters would like to attract cruise ships and more Cancún-style development. However, if poor planning and beach armouring continue to diffuse eastward, the shift of domestic to international tourism will be quickly ‘nipped in the bud’. Unfortunately, with the exception of the establishment of wildlife preserves (especially in the pink flamingo nesting sites), there is no comprehensive management plan to guide touristic development and beach preservation. Coastal management should be the responsibility of the State of Yucatán, which stands to benefit from properly designed development of its coastal resources. While it may be too late to improve the aesthetic appearance of the 20-km coastal stretch
centred upon Progreso, it is within this zone that coastal managers need to look to understand the processes of beach degradation associated with urban development, port improvements, hurricanes and tourism development. Hopefully, lessons learned can be applied to the remainder of Yucatán’s beautiful beaches.

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References


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Résumé: Le développement récréatif et la modification du littoral qui borde la côte nord du Yucatan, Méxique

Plus d’un siècle; la côte nord du Yucatan a toujours été une destination touristique. Depuis 1945, le développement récréatif a créé 20 kilomètres de pavillons d’été centré sur le port de Progreso. En réponse aux travaux d’amélioration dans le port et la gare maritime et l’érosion corallienne, les propriétaires de maisons secondaires ont renforcé le littoral avec des brise-lames et ont causé de graves dégradations physique et esthétique du paysage littoral. Depuis 1990, la cote ascendante est protégée et esthétiquement dégradée. Ici l’impulsion de modifier le littoral était une réponse à la construction médicre et l’incapacité des propriétaires des maisons de vacance de s’adapter aux processus naturels de concrétion et l’érosion qui caractérisent cet environnement. Tandis que les brise-lames se répandent à l’est de la plage virginale, les efforts de développer le tourisme international peuvent être retardés par la dégradation environnementale résultant de la modification littorale.

Mots-clés: tourisme littoral, développement récréatif, modification littorale, brise-lames, Yucatan (Méxique)
Abstracto: El desarrollo recreativo y modificación de la línea de playa por la costa norte de Yucatán, México

La costa norte de Yucatán ha sido un destino para turistas domésticos desde más que un siglo. Desde 1945, el proceso de desarrollo recreativo ha creado una zona veraniega de 20 km de largo alrededor del puerto de Progreso. En respuesta a la erosión de línea de playa causada por obras portuarias, dueños de casas veraniegas han construido espolones (espagones) que han causado una degradación estética del paisaje costero. Desde 1990, aún la costa arriba y al este de Progreso (no afectado por obras portuarias) fue protegida con espolones. En esta zona, las razones para modificar la línea de playa incluyen malos métodos de construcción (tan cerca a la playa) y una incapacidad de los dueños de propiedad privada a ajustarse a los procesos naturales de crecimiento y erosión que son característicos de este medio ambiente. Hoy la zona de construcción de espolones está moviéndose al este dónde las playas todavía no están destruyéndose por la población veraniega. Pero planes de desarrollar turismo internacional en esta región tienen el riesgo de no ser realizados si la modificación de la línea de playa degrada el medio ambiente costero.

Las palabras claves: turismo costero, desarrollo recreativo, modificación costera, línea de playa, espigones, Yucatán (México)