COASTAL TOURISM AND SHORELINE MANAGEMENT

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Abstract: This paper examines the environmental factors and the policy framework that have driven new approaches to shoreline management since the mid-90s, and how they interact with tourism development. The paper argues that resorts in the rejuvenation stage have limited options for coastal defense strategies due to the value of their economic (built) assets, unless redevelopment allows coastal re-alignment, while resorts placed earlier in the cycle can implement more sustainable strategies that work with the “natural” environment. However, environmental quality is not coupled to resort cycle stage. It can be enhanced at any stage, but especially so in the earlier and late (rejuvenation) stages. Keywords: shoreline management, coastal geomorphology, climate change, sustainability.

Résumé: Tourisme côtier et gestion du littoral. Cet article examine les facteurs environnementaux et le cadre politique qui sont à l’origine des nouvelles approches de la gestion du littoral depuis les années 1995 et étudie comment ces facteurs interagissent avec le développement du tourisme. L’article soutient que les lieux de villégiature dans l’étape de rajeunissement ont des options limitées pour formuler des stratégies de défense du littoral, ce qui est dû à la valeur de leur capital (construit), à moins que le nouveau développement ne permette un réalignement côtier, tandis que les lieux de villégiature qui se trouvent plus près du début du cycle peuvent mettre en œuvre des stratégies plus durables qui harmonisent mieux avec l’environnement «naturel». Pourtant, la qualité de l’environnement n’est pas couplée avec les étapes du cycle de vie du lieu de villégiature. La qualité peut être améliorée à n’importe quelle étape, mais surtout vers le commencement et vers la fin (rajeunissement). Mots-clés: gestion du littoral, géomorphologie côtière, changement du climat, durabilité.

INTRODUCTION

The coastline has long been a magnet for tourists, which has raised concerns about sustainable development. These concerns will be given a sharper focus as a result of new approaches to shoreline management. In the United Kingdom these new approaches are embodied in the second round Shoreline Management Plans (SMPs), which, together with the formulation of longer-term defense strategies, will form the basis of coastal defense in England and Wales during the first
half of the 21st century. Coastal tourism practitioners will have to
become familiar with the new approaches to shoreline management, in
order to exploit opportunities and to avoid conflicts in planning.

Central to this relationship is the requirement to manage beaches
in a sustainable way. This will only be achieved through management
strategies that work more closely with natural processes, and are inte-
grated within strategic planning that encompasses the coastal zone.
Sustainability is a core component in the second round SMPs and
other shoreline defense strategies. One of the main drivers in the
adoption of sustainability principles is the recognition that natural
sediment supplies to many beaches are scarce, resulting in widespread
erosion (Bird 1985). The management response to this potentially
hazardous situation, exacerbated if near-future climate change and
sea-level rise projections become reality, may result in a reassessment
of how tourism may best be developed. This paper explores the likely
future relationship between UK shoreline management and coastal
tourism. It focuses on an examination of the tourism–environment
relationship, with reference to the resort cycle (Butler 1980).

ENVIRONMENTAL AND POLICY ISSUES

Four issues are responsible for the changing relationship between
coastal tourism and shoreline management: an increase in, and the
changing nature of tourist-related pressure at the coast; advances in
shoreline management approaches including the adoption of Inte-
grated Coastal Zone Management (ICZM) principles, the geomorpho-
logic behavior of coastal systems, and projections of near-future
climate and associated sea-level change. Although each issue will
now be discussed separately, it is their integration which will have
profound effects on tourism.

Tourism—Related Pressure at the Coast

The nature and magnitude of coastal tourism has changed funda-
mentally over time, and especially with the increase in mass tourism
to resorts in the post-World War II era, often equated with the emerg-
ence of the “pleasure periphery” (Turner and Ash 1975). More
recently, the opening of new tourism industry within potentially
fragile environments such as coral reefs, atolls, mangroves, and in
Antarctica has fuelled the debate on the tourism environment
relationship.

The development of seaside resorts has been the focus of a number
Cooper 1990; King 1994; Meyer-Arendt 1993; Priestley and Mundet
1998; Smith 2002; Smith 1992; Stansfield 1970; Towner 1996). It is
not the intention here to review this work, but rather to observe that
many of the older resorts have been described as “in decline” and are
either actively restructuring or re-orientating their tourism business
sector, or are in need of planning policies to arrest further decline.
The approach that these older resorts take to arrest decline cannot be viewed in isolation from broader planning and environmental management initiatives. For example, within Europe, ICZM is aimed at coordinating and integrating all uses of the coastal zone, an area which can be defined as the shoreline and its immediate hinterland. “Hinterland” in this context is often difficult to define as it must include all areas prone to flooding should shoreline defenses be breached, and is largely determined by the area’s physical geography. Additionally, this has to be integrated with the area’s zone of economic, social, and cultural activities, which may broadly correlate with (local) political boundaries, but probably not with the zone of flood hazard. This definition excludes the broader idea of hinterland based on market and wider economic influences.

The growth of seaside resorts has resulted in a substantial infrastructure that developed during a time when ICZM and coordinated shoreline management did not exist. In the UK, these resorts have their origins in the early 18th century when sea bathing became fashionable (Berry 2002), and underwent expansion by the mid-19th century due to a combination of an increase in leisure time and the growth of the rail network allowing large numbers to visit the coast. Thus, pleasure replaced health as the main reason to visit the seaside (Andersen 1996), although concerns about the health effects of pollution resulted in the provision of leisure activities, as for example in the 1875 Health Act. Therefore, ICZM and shoreline management have inherited problems caused by earlier urbanization at coastal locations which now face a serious threat from erosion and flooding.

**Shoreline Management Approaches**

The 90s witnessed a revolution in the approach to managing the UK shoreline. At the head of this revolution, and driven by the adoption of sustainable development principles (Johnson and Seabrooke 1996; Leafe 1998), was a move away from a piecemeal response to erosion problems at the local (political-boundary) level, to a more holistic approach based upon an understanding of natural processes, and the fact that these processes transcend local authority boundaries (Hooke 1998; Johnson 1996). This new approach is coordinated by central government through the Department for Environment, Food and Rural Affairs (DEFRA). This department, originally the Ministry of Agriculture, Fisheries and Food was renamed following the Foot and Mouth epidemic of 2001. It worked initially through the National Rivers Authority, but from 1996 has worked through the Environment Agency (EA), which was created by the amalgamation of the authority, Her Majesty’s Pollution Inspectorate and the Waste Regulation Authorities. The agency works in partnership with, for example, borough and district councils to produce joint shoreline management strategies along developed sections of coast.

Shoreline management strategies were implemented through the first round SMPs, by which all the shoreline of England and Wales was divided into 49 management units, each with its own plan. This
process was completed between 1995 and 2000, and it is expected that SMPs will be revised on approximately a five-year basis (DEFRA 2003). Preparation for the second-round SMPs is well advanced. SMPs are non-statutory but support the planning process at both regional and local levels. They are one of a number of elements that comprise strategic planning of coastal defense, others being strategy plans and schemes. These elements are designed to dovetail into a coherent planning process, with each one having separate but linked aims, deliverables, and outputs (Hamer, Chamberlain and Kersley 2001).

This new way to manage the coastline has not posed many problems for tourists; indeed the adoption of recharge schemes has provided a number of beaches with enhanced tourism potential. However, a number of problems with the first round SMPs have been identified, and their resolution, as will be implemented in the second round, may not be so amenable to tourists. For example, the move towards a more unified and holistic approach to shoreline management has been hampered by, and, ironically, may have spawned a plethora of statutory and nonstatutory bodies and interest groups, which expect an input into the management process. Organization of these varied inputs can be achieved by the establishment of coastal groups acting as forums, as for example the Standing Conference on Problems Associated with the Coast does for the central south coast of England (Bradbury, Beck, McFarland and Curtis 2001; Hooke 1998; Leafe 1998). Tourism, despite its economic clout, may have problems making its voice heard among this spectrum of interest groups. This industry, and other business interests, are excluded from the formulation of the second round SMPs, whose focus is exclusively on the understanding and managing of natural processes and changes. However, tourism development and recreational activities are included in the assessment of the impacts of longer-term (25–50 years) shoreline defense strategies, which adopt a more ICZM approach.

A further problem with the first round SMPs was their focus on the “coastal cell” as a unit of management. Coastal cells are sections of shoreline that encompass an alongshore sediment transport system which is largely independent of its neighboring cells. However, they exist at different spatial and temporal scales. Through time, cell boundaries migrate due to a number of geomorphologic factors. It was this lack of appreciation of longer-term coastal processes and responses within the first round SMPs that prompted the Department for Environment, Food and Rural Affairs to review the cell boundary concept as a basis for management, and put more emphasis on shoreline behavioral patterns that operate on a range of spatial and temporal scales (Burgess, Jay, Hutchinson, Balson and Ash 2001). This approach utilizes the concept of systems behavior whereby the coast is divided into a number of “shoreline behavioral units”, that share common processes, patterns of change, and other characteristics. In this scheme, by placing the strategy for management even more firmly within the physical process arena, recommendations on shoreline management strategies are also likely to reflect the paradigm
shift. This may result in forms of coastal defense that require an adjustment to tourism development and use of coastal areas.

As well as SMPs, another innovation in organizing UK coastal defense strategies is the introduction of Public Private Partnerships (PPPs). The basis of these was the adoption of the Private Finance Initiative (PFI) by the Conservative Government in 1992, as part of their policy to increase the involvement of the private sector in the provision of public services. This was, and still is, seen as a way of countering the historical under-investment in UK infrastructure. The present Labor Government has maintained this policy under the banner of PPPs, whereby, as with PFIs, bidders are invited to make offers to provide services over a contract period, typically about 20 years. The successful bidder is paid an agreed sum at specified intervals which is dependent on the level of service provided, for example for maintaining sea defenses (Chester 2000). At the time of writing (2004), one PPP “pathfinder project” dealing with the management of an open coast has been established, that for Pevensey Bay in southern England (Chester 2000; Hardacre and Chester 2001). This and a 50-year scheme implemented along the neighboring frontage at Eastbourne (Halcrow 2002a,b,c) adopt a more ICZM approach, giving tourist interests a greater opportunity to be considered.

ICZM principles are currently being adopted throughout the EU (Atkins Project Team 2003; European Union 2002). In the Summary Statement of the EU Communication on Integrated Coastal Zone Management: A Strategy for Europe (COM/2000/547), economic, social, and environmental considerations are integrated into coastal planning. Concurrent with this ICZM initiative, the EU is formulating policy on sustainable tourism (European Commission 2003) which includes a recognition that ICZM and sustainable tourism practices must be developed in partnership to achieve maximum mutual benefit. Therefore, although tourism does not have a voice in the formulation of SMPs, the industry has an encouragingly high profile at the ICZM/EU level of strategic planning. However, the implementation of sustainability principles will challenge the industry to take a longer-term, strategic approach to further development.

The Geomorphologic Behavior of Coastal Systems

Coastal systems can be categorized according to the relationship between four controlling variables: sediment grain size, beach gradient, depth of the near-shore zone, and breaking wave type. The interaction among these four controls, operating through complex feedback, results in a spectrum of coastal types, as discussed in Carter (1988). This spectrum can be simplified by classifying shorelines according to their energy regime and sediment characteristics. The most fundamental division of coastlines is according to whether wave energy dominates shoreface processes, resulting in high energy coastal systems, or whether tidal current energy drives the processes. In the latter case, the system is described as low energy, as found
typically in estuarine, salt marsh, and mangrove environments. This paper will focus on the high energy systems as they have tended to be characteristic of areas that developed into seaside resorts and which have serious coastal defense problems. These systems can be crudely subdivided into sandy, mixed sand and gravel, and gravel. In low-latitudes, sand and coral beaches dominate, except where large rivers transport gravel to the coast, as for example in Namibia (Bluck, Ward and Spaggari 2001). Gravel tends to dominate in mid- to high-latitudes where glacial processes have resulted in the extensive deposition of gravel-sized sediments, which have been reworked to form present-day beaches. However, in these latitudes a combination of local geological factors and coastal sediment transport produces a wide variety of beaches, which cover the full spectrum of sediment types. The behavior of sandy, mixed sand and gravel, and gravel beaches differs (Carter 1988), which must be taken into account for their management. For instance, if recharge introduces sediment of different size, shape, and specific gravity from that present naturally, this will trigger changes in beach gradient. The two examples given below are predominantly gravel, at least in their upper profile.

Jennings and Smyth (1990) have argued that most of the gravel on the beaches of southern England has been inherited from severe frost weathering of the chalk, and other gravel bearing strata during the last cold-climatic episode. Therefore, these beaches owe their origin to the reworking of a finite amount of sediment by the rising sea-level since deglaciation around 14,000 years ago. Furthermore, Jennings, Orford, Canti, Devoy and Straker (1998), Orford, Forbes and Jennings (2002) and Orford, Jennings and Forbes (2001) have argued that the major decline in the rate of sea-level rise from approximately 6,000 years ago, has reduced the volume of new material eroded from cliff lines, and this, in association with the finite amount of reworked, inherited sediment is responsible for the sediment-starved state of many beaches. The much slower rate of current sea-level rise (1–2 mm a⁻¹) compared to the pre-6,000 year rate (>5 mm a⁻¹) has had a detrimental effect on coastal sediment supplies, and is the cause of many management problems. Users and managers of the shoreline should consider why, despite slow rates of sea-level rise, there are major management problems, caused mainly by erosion. Concern over the projected increase in the rates of sea-level rise due to current and future global warming is often expressed in a simplistic fashion. A better context for this debate is to recognize that the slow rate of rise experienced over the last 6,000 years has de-stabilized coastal systems through sediment starvation. Coastal defense, by attempting to reduce erosion, has exacerbated the problem, by restricting the release and transport of fresh sediment.

Orford et al (2001) have examined the response of gravel beaches to failing sediment supplies, and have identified a critical transition between beach “consolidation” and “breakdown”. Under consolidation, the beach crest builds to the elevation of storm wave activity by the process of “overtopping”. This involves sediment being transported from the beach face to the crest during storms. However, with
failing sediment supplies, and with even slow sea-level rise, consolidation cannot be maintained. The beach face becomes over-steepened, so that the crest becomes narrow and vulnerable to storm wave attack. At this point, consolidation is replaced by breakdown, as overtopping is replaced by “overwashing” of the crest during storms. This change in behavior and process domain may occur abruptly during one storm, with the beach crest being flattened and moved several meters inland, as occurred at Porlock (in Somerset, England) in 1996 (Jennings et al. 1998; Orford and Jennings 1998).

It is likely that many of the gravel beaches of the UK have crossed the threshold between consolidation and breakdown (Orford et al. 2001), with the natural consequences of this often masked by expensive and ongoing engineering. The recognition of this long-term behavior has had a major bearing on the formulation of second round SMPs and defense strategies.

**Projections of Near-Future Climate and Associated Sea-Level Change**

The debate surrounding this issue has generated numerous publications, but for convenience and by way of a summary, see the Intergovernmental Panel on Climate Change (2003) and the UK Climate Impacts Program (2003) projections. There are two aspects to these projections which impact upon coastal use and planning: the uncertainties or error range of the climate change and sea-level change scenarios, and the probability, arising from these projections, of a significant decrease in the return periods of extreme events.

The uncertainties or error range of the projections pose problems for planning, not least in the difference in cost between planning and implementing coastal defense strategies using the lower compared to the upper range in the projections. For example, the Special Report on Emission Scenarios, of The Intergovernmental Panel on Climate Change, gave a projected range in temperature increase between 1990 and 2100 of 1.4–5.8 °C and in sea-level rise (excluding land-level changes) of 0.09–0.88 m (Brown 2001; Gregory 2001).

Superimposed upon any longer-term climate and sea-level changes are extreme events in rainfall and storm surges. Projections suggest a substantial decrease in the return periods of these extreme events. For example, present 1:100 year surge events may be reduced to 1:5 year events by 2050 under high sea-level rise scenarios (Nicholls and Wilson 2001). Similarly, extreme rainfall events will also have decreased return periods by the second half of this century (Dale and Hartley 2001). The impacts of increased frequency of extreme events should be given a high priority in coastal planning.

**The Porlock Case Study**

The impact that new approaches to shoreline management may have on coastal tourism can be illustrated with two examples; at Porlock (Somerset) and at Sovereign Harbour, Eastbourne (Sussex).
Figure 1 shows the location of these two sites. In both cases, shoreline management and behavior, and climate/sea-level changes are together raising important issues for the use of these areas. An additional rationale for selecting these two examples is the different stages they have reached in resort development. Porlock is in the “late involvement–early development” stage, while Sovereign Harbour represents an attempt by Eastbourne to “rejuvenate” its tourism industry (terminology after Butler 1980).

Porlock, on the north Somerset coast (Figure 1), has an important tourism industry arising from its picturesque location (Table 1). The village lies within Exmoor National Park (Lorna Doone country), its beach is part of a Heritage Coast and designated a Site of Special Scientific Interest (SSSI). (Table 2 for information on these and other conservation designations mentioned in the text). The small harbor at Porlock Weir is popular with tourists. Holiday patterns to the area have changed with more tourists taking their main holiday abroad, visiting the area for long weekends or for early or late breaks (Porlock Visitor Center, personal communication in 2002).

Land ownership and responsibilities for shoreline management are complex, with many parties involved, including Exmoor National Park, West Somerset District Council and Somerset County Council. However, the two main landowners with responsibilities for the shoreline are the Porlock Manor Estate and the National Trust, the former owning approximately the western part of the beach, and the latter the eastern part (Figure 1B). The National Trust is a registered charity, independent of government. It was founded in 1895 to preserve places of historic interest or natural beauty permanently for the nation. This currently includes 600 miles of coastline (The National Trust 2003).

The Porlock shoreline comprises a gravel barrier beach which fronts a low-lying area of marsh. Jennings et al.(1998) demonstrated that for approximately the last 8,000 years the behavior of this beach has been to breach episodically, creating a tidal inlet, and roll inland. Periodically, the beach became stabilized, long enough for an alder woodland to establish in the immediate back-barrier area. However, the slow rates of sea-level rise over the last 6,000 years have reduced sediment supplies to the beach forcing it into more frequent overwashing and breaching, so that the back-barrier environment has been mostly estuarine over this period. In response to the sensitivity of the beach to breaching, the Porlock Manor Estate, which owns the most vulnerable section of the beach ridge, dumped spoil from the nearby harbor at Porlock Weir onto the ridge. This policy of “holding the line” was actively undertaken from the 60s, although the shoreline has been defended for a considerable time. For example, groynes have been used since 1824, many rebuilt between 1967 and 1971. In 1993, the beach ridge underwent major reconstruction, and in 1994 the Porlock Bay and Marsh Working Group proposed that the Porlock Manor Estate be paid US$ 17,000 each year to maintain the ridge within its ownership, most of the money coming from the (then) National Rivers Authority (now the EA) and Exmoor National
Figure 1. Location of Sites Mentioned in the Text

(A). Location of Porlock and Sovereign Harbour (Eastbourne). (B). Detailed location map of Porlock showing land ownership boundaries. Note that the position of the shoreline is that for the pre-1996 breach, which occurred immediately to the west of "new works outfall". (C). Detailed location map of the Eastbourne to Bexhill coastline, with the position of Sovereign Harbour. The information boxes relate to the three management units discussed in the text: Eastbourne, Sovereign Harbour and Pevensey Bay. South East Water is responsible for a small section of rock revetment at Holywell.
Park. This protection allowed the marsh to be grazed and used for cereal production, and a coastal footpath to be established behind the beach crest, between it and the marsh. This footpath is an important element of the South-West Way.

Despite these measures, the gravel beach was breached in December 1981, February 1990, and in the winter 1994–1995, with the ridge being rebuilt after each breach. However, in October 1996, a storm caused another breach, flooding the marsh, but this time the breach was left open and not artificially filled. Orford and Jennings (1998) have argued that the policy of holding the line in the manner undertaken was ultimately doomed to failure. Due to a combination of factors, especially reduced sediment supplies from natural sources, the blocking of longshore drifted material by a groyne at the harbor and the dumping of material on the narrow crest, the beach had become more impermeable and the shoreface oversteepened, so that it had crossed the critical threshold between consolidation and breakdown, making overwashing an increasingly likely event.

Subsequent management has been to “work with the natural processes”, a strategy largely encouraged by the National Trust. The 1996 breach will not be artificially closed. This represents one of the first implementations of “managed re-alignment” of a gravel beach in the UK. However, this implementation was opposed by the local public who were concerned with the loss of the coastal footpath, and the aesthetics of the mudflats which had replaced the marsh following the breach. The path has now been rerouted behind the currently developing mudflat/salt marsh environment. Although the new path is above normal high tides, access is problematic at high water of spring tides (Porlock Visitor Center, personal communication in 2002).

Opposition to the re-alignment driven by the aesthetics of the new mudflat environment may be offset by an increase in biodiversity as a salt marsh ecosystem becomes established. From a scientific and edu-

<table>
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<th>Year</th>
<th>Visitors</th>
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<tbody>
<tr>
<td>1997a</td>
<td>37,403</td>
</tr>
<tr>
<td>1998</td>
<td>46,718</td>
</tr>
<tr>
<td>1999</td>
<td>45,691</td>
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<td>48,073</td>
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<tr>
<td>2001b</td>
<td>50,238b</td>
</tr>
<tr>
<td>2002</td>
<td>53,701c</td>
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</tbody>
</table>

Data supplied by the Porlock Visitor Center, from its magic eye door counter.

- **a** The year the Visitor Center opened.
- **b** In 2001, the Foot and Mouth epidemic reduced tourist numbers to Porlock, but a high proportion of tourists went to the Visitor Center for information on what was still accessible. As a result, numbers to the Visitor Center itself increased.
- **c** Data up to November 22.
cational aspect, the establishment of salt marsh at Porlock is acting as a natural laboratory for the study of environmental changes that follow a breach, and it is doubtful whether tourism to Porlock has been detrimentally affected by the policy of re-alignment. The issues created by the breach and the subsequent policy of re-alignment do not involve threats to houses, roads, or major investments. The issues are low-key, focusing on the route of footpaths and local landscape aesthetics, but the opposition shown by residents at Porlock against re-alignment may have been partly aroused by a feeling of a lack of public consultation and dissemination of information regarding management. When this is allied to the increasingly vociferous demands for “the right to roam” (Curry 2001) and the maintenance of footpaths as rights of ways, a conflict between users of footpaths and shoreline managers has been created. If near-future climate change results in the increasing frequency of extreme storm events, then on sustainability grounds, re-alignment at Porlock is probably the best option. This example demonstrates that at the local level debate about implementing sustainable shoreline defense strategies can revolve around the route of a footpath and landscape aesthetics.

<table>
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<tr>
<th>Designation</th>
<th>Description</th>
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<tbody>
<tr>
<td><strong>Ramsar Sites</strong></td>
<td>Designated under the “Ramsar Convention on Wetlands of International Importance especially as Waterfowl Habitat (1971)”. This requires the UK government to take appropriate legislative measures to ensure the conservation of wetlands and waterfowl.</td>
</tr>
<tr>
<td><strong>Sites of Special Scientific Interest (SSSIs)</strong></td>
<td>Designated under the Wildlife and Countryside Act 1981 by English Nature (a government body). They represent some of the best examples of Britain’s natural features including flora, flora and geology. Planning authorities must consult English Nature before granting permission for the development of land in, or around, or likely to affect a SSSI.</td>
</tr>
<tr>
<td><strong>Heritage Coast</strong></td>
<td>Coasts designated by the Countryside Commission (a government body) for their scenic quality, their largely undeveloped nature and their special wildlife and historic interest. Local authorities assist with their management. This is a non-statutory designation. IUCN Category V.</td>
</tr>
<tr>
<td><strong>Regionally Important Geological/Geomorphological Sites (RIGS)</strong></td>
<td>Identified by locally developed criteria, and are the most important places for geology and geomorphology outside of statutorily protected land such as SSSIs. This is a non-statutory designation.</td>
</tr>
</tbody>
</table>

The Sovereign Harbour Case Study

Eastbourne, on the south coast of England, has a long history of tourism due to its development as a traditional seaside resort, driven largely by the expansion of the railway system in the mid-19th century (Stansfield 1970). Sovereign Harbour (Figure 1), opened in 1993, is a waterside development constructed on 330 acres of a gravel cuspate foreland (the Crumbles Shingle), located on the eastern end of Eastbourne. The development comprises currently 1,500 houses (rising to around 3,000 by 2008), a retail park, superstore, multiplex cinema, restaurant and bar, centered around a yacht harbor. The complex utilizes old gravel pits as the basis of the yacht basins, and has a locked entrance between the outer and inner harbors. An approach channel leads between two breakwaters. This development is aimed at boosting the local economy and further enhancing Eastbourne as a tourism destination.

The Crumbles Shingle and the adjacent beaches at Eastbourne to the southwest and Pevensey Bay to the northeast, have required extensive defense by groyning and recharge to combat erosion. This defense imparts an apparent short-term stability to the coastline, as shown by an engineering report undertaken just prior to the construction of the harbor, which concluded that the beach at the Crumbles Shingle was stable and approaching dynamic equilibrium. However, Jennings and Smyth (1990) and Orford et al (2001) point to the longer-term instability of the coast as being a major concern for the sustainability of the harbor. The former source provides evidence that the Crumbles Shingle is an ephemeral feature, when viewed over longer time-scales. The foreland formed rapidly from the 12th century but, according to cartographic evidence, experienced severe erosion between the 17th and 19th centuries, a process artificially slowed by extensive groyning since the 19th century and more recently by armoring and gravel recharging. The failure of sediment supplies to this coast is part of the natural long-term trend discussed above. The gravel forming these beaches is a finite source, inherited from past climatic conditions, with very little newly weathered and eroded flint entering the system. In beach behavior terms, much of the Sussex gravel shoreline has entered the breakdown phase. The Crumbles Shingle in its “natural” state still had numerous gravel ridges, and thus was within the consolidation domain. However, the recent harbor development, by removing most of the gravel ridges, has had the effect of reducing the beach system to the most seaward gravel ridge only, making the entirety increasingly vulnerable to overwashing and to breakdown.

Concern over current and future erosion and flooding problems has resulted in new approaches to management. The Eastbourne–Pevensey Bay shoreline can be divided into three management units (Figure 1C). Working in the direction of longshore drift, the western unit at Eastbourne is being managed following the adoption of the Beachy Head to Rye Harbor Coastal Processes and Resource Study Strategy Plan 1 (Halcrow 2002a). This was the result of a client group,
which included Eastbourne Borough Council, commissioning Halcrow Group Ltd to formulate a 50-year management plan for flood and coastal defense. This strategy is based on “holding the line” by improving the current standard of service through recharge, profiling, and the maintenance of groynes. The cost effectiveness of this strategy was in part based upon the economic importance of tourism and recreation to the local area. Eastbourne receives over two million tourists each year, 357,000 staying in the town and 2,229,000 making day visits, and there are around one million tourists yearly to Beachy Head (Halcrow 2002a). Tourism supports an estimated 5,600 jobs (Halcrow 2002b). The Strategy Plan valued the recreational assets along Eastbourne seafront at approximately $5 million per year, concluding that the total tourism and recreational economic loss should shoreline defenses fail would be $14.6 million per year (asset loss plus tourist income loss), representing 86% of the overall total economic loss following the failure of defenses. This figure excludes Sovereign Harbour.

The management of the shoreline around the entrance to Sovereign Harbour is the responsibility of the Sovereign Harbour Company, which includes maintenance of the rock revetments and recharge of sediment associated with the harbor arms, and clearing its entrance channel. In 1988, Tarmac, the harbor developers (now Carillion) entered into an agreement with Southern Water regarding the sea defenses, whereby a trust funded by an annual levy on each householder (the Southern Water Rentcharge) makes a contribution to their maintenance. In May 2003, these defenses were incorporated into the Pevensey Bay Sea Defenses Public Private Partnership scheme, but the rentcharge remains.

A small section of the shoreline immediately to the northeast and down-drift of the harbor was managed by the Environmental Agency up to 2003, but this has also now been incorporated into the Pevensey Bay Sea Defenses Public Private Partnership scheme. This is the first example in the UK of a shoreline managed by a PPP contract (Chester 2000; Hardacre and Chester 2001). In May 2000, the Environment Agency (the public partner) and Pentium Coastal Defense Limited (a consortium of private partners) signed a $51 million PPP contract for managing the Pevensey Bay sea-defenses for 25 years. Central to this contract is for Pentium to be responsible for the prevention of major coastal flooding in Pevensey Bay, although this responsibility does not include flooding caused by extreme events greater than a contractually defined magnitude and frequency (1:400 year return period). Furthermore, their contractual obligations may be updated if climate change over the next 25 years results in a rate of sea-level rise and in an increasing frequency of extreme events beyond those stated in the contract. Management is by recharge and profiling but, in contrast to Eastbourne, maintaining an open-beach with the removal of most of the groynes as they become obsolete.

The Environmental Statement of the Pevensey Bay Sea Defense Scheme (Pentium Coastal Defense 2001) details the legislative and policy considerations. For example, Planning Policy Guidance Notes
20 and 21, issued by the UK government, deal with coastal planning and tourism respectively. Guidance 20 directs tourism expansion away from undeveloped coasts, while Guidance 21 recognizes that tourism often depends upon a high quality environment, thus promoting environmental protection. The Pevensey Bay PPP has to be mindful of these guidance notes, other policy statements, and all relevant national and EU legislation. These are addressed via an Environmental Impact Assessment, the analysis of which forms an Environmental Statement, and by an Environmental Management Plan. The Environmental Statement identifies key issues in relation to the sea defense scheme, which include recreational use, conservation, and heritage and archaeological interests, while the Environmental Management Plan details the mechanisms through which these issues are considered. Details of implementation actions are described in Method Statements. In this way, the Pevensey Bay PPP confronts interactions between the scheme and tourism by recognizing potential conflicts and benefits (Pentium Coastal Defense 2001).

Conflicts between the PPP scheme and tourism may have several causes. One, beach recharging has to be undertaken during calm weather in the summer, probably coinciding with the peak tourism time. However, recharge can attract tourists, as the 1986 recharge at Seaford (also in Sussex) demonstrated. Concerns over increased turbidity of seawater during recharge were expressed during the 1998–1999 recharge at Eastbourne, although monitoring showed very little impact. Two, heavy machinery may disturb nearby caravan parks, two hotels, 30 beach huts and one sailing club. These impacts include noise, air quality (exhaust fumes and dust), traffic, visual (plant and material stockpiles), light emissions (due to night-time work dictated by tidal conditions), liquid effluent, and solid waste disposal. Three, the removal of groynes may affect protection for wind-surfers and small boats. On the other hand, benefits of the scheme for tourism may accrue by an open-beach being perceived as more attractive than one with closely spaced groynes; by the enhanced flood protection given by the scheme to caravan parks on the low-lying Pevensey Levels; and by safeguarding the freshwater quality of Pevensey Levels.

Working with natural processes (at the heart of SMPs) would result in a policy of re-alignment along Pevensey Bay (as at Porlock). However, the gravel beach protects 50 km² from flooding, an area which, unlike at Porlock, contains approximately 15,000 properties, several caravan parks, road and rail links, and a SSSI, designated as a Ramsar site since 1999, all relying on the maintenance of the gravel ridge. Therefore, holding the line is the preferred, and only realistic, management option. Further, allowing Pevensey Bay to re-align would pose major problems for the defense of Sovereign Harbour, entailing substantial extra expense not recognized when the harbor was being planned. However, this stretch of shoreline will now have to receive continuous maintenance to combat the natural processes of erosion and barrier beach breakdown.
The Resort Cycle

A conceptual basis for describing the interaction between the growth of tourism and the natural environment is provided by the resort cycle of Butler (1980), as depicted in Figure 2. This is probably the most cited model of resort development in the tourism literature. It depicts an idealized form of evolution against which real life examples can be compared and contrasted (Harrison 1995), which is the approach adopted in this paper. In summary, as a tourist area progresses from exploration through to either rejuvenation or decline, tourism–environment interactions will change. The exploration stage is characterized by small tourist numbers, but these are likely to encounter, and impact upon, either a genuinely natural environment, or at least one where a long history of human use has created a landscape which is valued, as for example is the case for much of the landscape of National Parks and Areas of Outstanding Natural Beauty in the UK, whose qualities evolved out of prehistoric land use. By the consolidation and stagnation stages, mass tourism is likely to have altered substantially the environment of the destination area (Butler 1980), although the subsequent rejuvenation stage is likely to include, and probably be based upon, a major investment in improving environmental quality.

As Butler (1980) points out, the timing and context for the various stages of the cycle will differ from place to place. For example, the impacts upon the environment from the exploration stage may now
be very different, due to conservation measures, compared to older destination areas that underwent exploration prior to the implementation of such measures. Therefore, the relationship between tourism and the (natural) environment will depend upon the stage that a tourism area has reached in the cycle, the time when it reached the various stages, and the development and implementation of environmental management policies.

One factor pertinent to this paper that emerges out of the many reviews and critiques of the resort cycle is issues based on its advocacy of a fixed carrying capacity of a destination, which is reached or exceeded by the consolidation stage due to increasing numbers of tourists. Thus, implicit in the model is a deterministic underpinning of the tourism–environment relationship, by which environmental degradation is an inevitable consequence of tourism development. This fatalistic assumption of the model has been criticized on a number of grounds: that carrying capacity is very difficult to define (Agarwal 1994; Cooper and Jackson 1989; Haywood 1986; McCool and Lime 2001) and that environmental degradation is not an inevitable consequence of tourism development (Bianchi 1994; Priestley and Mundet 1998; Weaver and Lawton 2002). Butler himself recognized that the implementation of environmental management policies could offset such damage (Butler 2001), and a number of authors have stressed the importance of strategic planning and economic factors, rather than tourist numbers in determining the nature, and hence the environmental impact, of tourism development (Cooper and Jackson 1989; Debbage 1990; Haywood 1986; Priestley and Mundet 1998; Strapp 1988).

The unit of analysis (the geographical scale of application) has been another issue with the resort cycle. Individual tourism activities, such as hotels and amusement parks, may fall into a number of the stages, while the urban area or resort in which they are located may belong to a different stage (Agarwal 1997; Cooper and Jackson 1989; Haywood 1986; Priestley and Mundet 1998; Weaver and Lawton 2002). However, this is not such a pertinent consideration for this paper, as both case studies belong to a similar unit of analysis, that of a single urban area.

Examination of the relationship between natural processes, management, and resort development has been conducted for a number of sites, including Pattaya (Thailand) (Smith 1992), South Africa (Burns, Barwell and Heinecken 1993), Nigeria (Awosika and Ibe 1993), the Friesian Islands (Kelletat 1993), France (Miossec 1993), Spain (McDowell, Carter and Pollard 1993), and the south coast of England (Agarwal 1994). Studies such as these usually identify a detrimental link between tourism impacts and shoreface sediment supply, often associated with beach or dune stabilization measures that actually result in enhanced rates of erosion. To combat this problem, management implements recharge schemes, but these often subsequently fail as a result of insufficient knowledge of natural processes. However, if successful, they may be of benefit to tourism, and are
frequently a strategy associated with the rejuvenation of resorts as, for example, at Eastbourne.

Meyer-Arendt (1985) draws a close link between stages of the resort cycle and shoreline management. Thus, during the development stage of Grand Isle, as tourist numbers increased and beach ridges were leveled for development, shoreline retreat was perceived to be a growing problem (also triggered by hurricane strikes), which initiated coastal defense strategies to be formulated by the consolidation stage. Stagnation of the resort was caused partly by ineffective defense, while attempts at rejuvenation were associated with recharge and the development of a marina.

Application of the Resort Cycle

In the context of Porlock and Sovereign Harbour, different stages of the cycle are represented (Figure 2). Porlock may best fit the late-involvement/early-development stages. The local population contributes substantially to the tourism workforce (Porlock Visitor Center, personal communication in 2002). Natural and cultural attractions are marketed specifically, and at peak periods the number of tourists is at least equal to that of the permanent local population, two features of the development stage. However, this has not caused any substantial changes to the physical appearance of the area, due mostly to planning regulations associated largely with Exmoor National Park.

Eastbourne is an example of a resort in the rejuvenation stage. Sovereign Harbour is seen by the developers and by Eastbourne Borough Council who granted planning permission, as having improved the environment and the economic potential of the area. However, this has been achieved at the expense of environmental conservation. The Crumbles Shingle, on which the harbor has been built, represents an important habitat having RIGS (Regionally Important Geological/Geomorphological Site) designation, but little remained at time of designation due to harbor development. Eastbourne Borough Council claims to have adopted sustainability principles in all strategic development, but the question arises as to how sustainable the shoreline defense required for Sovereign Harbour is. In this context, sustainability is being bought by expensive, long-term defense strategies aimed at “holding the line”. The difficulty with implementing this can be gauged by the fact that households within the harbor complex are being charged, on top of other taxation, for local shoreline defense, and that the neighboring stretch of shoreline is the first PPP of its type in the UK. This contrasts with the situation at Porlock, where the absence of any resort rejuvenation-stage project has facilitated the implementation of arguably a more sustainable strategy, that of re-alignment. It is probable that permission would not be given for the development of Sovereign Harbour if it were proposed today, due to the tighter EU, national, and local planning and conservation regulations implemented since the harbor was granted approval. Although refusing planning permission would free-up the
Crumbles to allow some erosion to feed down-drift beaches, nevertheless a strategy of “holding the line” would still be the preferred option of coastal defense at Eastbourne and Pevensey, due to the value of the economic assets.

Geographically, the sections of shoreline encompassed by Porlock Weir (a small yacht and fishing harbor) and Porlock Bay are very similar to that encompassed by Sovereign Harbour and Pevensey Bay, in terms of longshore drift linkage, the low-lying nature of the area behind the beach, and of failing sediment supplies. The contrast is in the use of the two coastal zones, principally in the development of tourism activities. At least in part, this has been responsible for the implementation of very different shoreline defense strategies to combat very similar problems caused by erosion. At Porlock, there is no conflict between re-alignment and the harbor, largely because the latter is not being developed as a major economic project. Although the harbor groyne has been partly responsible for the breaching of the gravel beach by blocking longshore drift, the subsequent policy of re-alignment means that there is now no direct link between the continued existence of the harbor and shoreline management down-drift. At Eastbourne, the long-term viability of Sovereign Harbour is inexorably bound to a policy of holding the line, both down-drift at Pevensey Bay and up-drift at Eastbourne. Here, all sections of this shoreline are linked to one another through this policy.

Implications for the Resort Cycle and Environment Relationship

The contrasting shoreline management policies adopted at Porlock (re-alignment) and Eastbourne–Pevensey Bay (holding the line) suggest that there is a threshold value of economic assets, below which re-alignment is possible, and above which holding the line is the only politically and economically viable option. This threshold can be quantified, on a site-specific basis, by the benefit/cost ratio, which could then be mapped onto the resort cycle. This would indicate that re-alignment is probably only viable in the early stages of the cycle, at least up to the early development stage, as in the case of Porlock, with holding the line being the only viable option for the later stages, unless the stagnation stage allows the total redevelopment of an area, which could include re-aligning the coast.

Rejuvenation is likely to result in an improvement to the quality of the environment, raising the “carrying capacity” of the area through the upgrading of facilities (Weaver and Lawton 2002). This is being achieved at Eastbourne through integrated coastal planning, which can de-couple the relationship between stages of the resort cycle and environmental impacts. The rejuvenation stage may well result in planned, major environmental changes designed to sustain the built environment, but many environmental quality indices may improve as a result. For example, in 2003 Eastbourne and Pevensey Bay gained ENCAMS Seaside Awards for the quality of their bathing water. ENCAMS is the acronym for Environmental Campaigns, which is a charity that runs the Keep Britain Tidy Campaign. Their awards are
based on quality measures set out in the EU Bathing Water Directive (76/160/EEC). The EA, also using the Bathing Water Directive indices, graded Eastbourne’s water quality as excellent and Pevensey Bay’s as excellent in the western (Sovereign Harbour) side of the bay, and good in the eastern section. Porlock was also graded excellent, thereby demonstrating that these two resorts have similar water quality while representing different stages of the resort cycle.

While Eastbourne is achieving some high environmental standards while sustaining the built environment (albeit partly through the ongoing and expensive coastal defense strategy of holding the line), Porlock is following suit while sustaining the “natural” environment. This is based around the managed re-alignment of a beach whereby one habitat (a fresh-to-brackish-water grazing marsh) is being replaced by another (salt marsh). This replacement has the potential of raising biodiversity and possibly increasing tourism potential once the new habitat becomes established. Eastbourne may thus represent an example of “weak” sustainability, or “product-led tourism”, where there is little “natural” environment left to sustain. In contrast, Porlock is an example of “strong” sustainability, or “environment-led tourism”, where ecological and natural landscape considerations form the basis of local development strategies (Hunter 1997).

CONCLUSION

The lessons learned from Eastbourne can be applied to Porlock, or to any other coastal community that has current or potential harbor facilities that could be developed as a major economic/tourist center. Shoreline and coastal zone management, and tourism development can be integrated so that the quality of the environment may be improved at any stage of the resort cycle. Although this can be more easily achieved in the early and latest (rejuvenation) stages, sustainability-based planning could, and will probably have to, be implemented throughout the resort cycle, at least where there is a strong regulatory framework.

One important issue to emerge from these planning initiatives is the point at which resorts will be able to move from an emphasis on protecting the “natural” environment to one where the built environment is the focus of strategic planning. Using coastal resorts as an example, one outcome is that some tourism-centered areas are held in the exploration to involvement stages of the resort cycle by ICZM and conservation designations, as is the case at Porlock. This is similar to Priestley and Mundet’s “self-imposed limitation to growth” (1998:108), and to the policy discussed in Weaver and Lawton (2002) of regulating tourist numbers so that demand is reduced to meet existing supply of facilities. With shoreline erosion expected to increase with near-future climate change, the cost of protecting coastal resorts is bound to increase, and with it political pressure to establish sustainable planning and use of coastal areas.
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