2 An iIntroduction to iIntegrated cCoastal zZone mMmanagement

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Introduction

For millennia, coasts have provided locational advantages for human settlement. As a focus for trade and with ready access to rich coastal resources, the attraction of these areas has resulted in the 'littoralisation' of human society. However, the very attractiveness of the coast has been the agent of its decline. The extensive depletion and degradation of highly productive ecosystems, including mangroves and coral reefs, over the last century is well documented (Agardy *et al.*, 2005; Kay and Alder, 2005). This has resulted in marked reduction of many of the benefits provided by coasts, including their natural defence capacity. Half of the world's wetlands disappeared over the previous century due to human interference (Creel, 2005). Pollution impacts and overexploitation of coastal resources, particularly fisheries, also pose pressures on coastal systems and threaten the well-being of coastal populations.

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Academics and others began to question approaches to coastal governance, particularly institutional arrangements for coastal areas, towards the end of the twentieth century, as they became increasingly aware of the ineffectiveness of traditional sectoral management practices in stemming the decline in coastal environmental quality (for example, Sorensen and McCreary, 1990). Sectoral approaches were deemed incapable of addressing 'wicked' coastal problems: those resulting from the complexity and inter-connectivity of coastal systems, including both human and physical sub-systems and associated cascading impacts. Much debate focused around the inadequacies of fragmented institutional arrangements, which, in many countries, had arisen through the piecemeal and reactive evolution of legislation (Sorensen and McCreary, 1990). It was suggested that the resultant disjointed, sectoral and function-based organisational structures, perpetuated silo-like professional mindsets, leading to narrow windows of decision-making. This, it was contended, could induce significant incompatibilities and potential conflicts between stakeholder groups, especially in the context of the limited space and associated power struggles, typical of many congested coastal areas.

The inappropriate division of responsibilities across the land-sea interface was deemed to lie at the root of many coastal problems. National bodies with long time horizons and strategic concerns generally have dominated offshore. In contrast, onshore, locally-focused bodies, with more community-based and shorter-time priorities, steer onshore decision-making and planning, often compromising environmental health for expediency and shorter-term gain. Figure 2.1 demonstrates the jurisdictional complexity associated with the land-sea interface for the English coast and Table 2.1 highlights the range of fluxes which are common across the littoral. Given the human amplification and derivation of many of these fluxes, it is vital to ensure that this jurisdictional 'jungle' does not hinder the system-based approach required to manage such

processes (Agardy *et al*., 2005). As Cicin-Sain *et al*. (2002) also point out, such fluxes are not insignificant: 77% per cent of land-based pollutants influence coastal ecosystems and 44% per cent of these arise from inadequately treated wastes and catchment runoff.

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This chapter provides an overview of integrated coastal zone management (ICZM), which evolved as a mechanism to address these problems, particularly the inadequacies of existing coastal governance, planning and management. The chapter commences with a brief outline of the evolution of ICZM before providing an explanation of the key characteristics of ICZM and an evaluation of the concept and approach. The chapter concludes by considering the future of ICZM and allied processes alongside increasing coastal environmental and socio-economic pressures.

The development of ICZM

The prelude to coastal zone management began nearly half a century ago with the gradual realisation that well established, sectoral management and planning approaches were failing to curb the degeneration of coastal habitats and overexploitation of coastal resources. Alongside this, heightened recognition of the role and value of coastal areas in supporting coastal communities prompted the first tranche of coastal zone management programmes and associated enactments. These included the Californian Coastal Management Act 1969 and the US Federal Coastal Zone Management Act 1972, following years of gestation and debate (Godschalk, 2010). A significant landmark in the history of coastal management, the US act provided incentive-based legislation and measures to encourage and support the development of coastal zone management policies and plans by individual states, and included provisions for conducting research, training, education and stewardship in estuarine areas of special significance. Such planning embraced both on and offshore areas and was cross-sectoral, addressing key coastal issues including ones associated with hazards, pollution, visual aesthetics and reduced public access to the shoreline. As Godschalk (2010) remarks, pioneering and well-respected state programs, such as that in North Carolina, emerged as a result of this act.

Elsewhere, whilst there was considerable academic interest in coastal zone management, this frequently only led to protracted scrutiny of the concept and its application rather than decisive actions. This was the case in Australia from the 1970s, where a succession of national inquiries and reports, promoting specific national policy and legislation for integrated resource management, provoked little action (Norman, 2009). In other countries, embryonic, prototypes of coastal zone management were emerging, tailored to local concerns. In the United Kingdom (UK) disquiet over the despoliation of natural coastal landscapes associated with urban sprawl and uncontrolled recreational access, resulted in management programmes being established for newly defined ‘heritage’ coasts. These coastal plans, focusing on landscape protection, access and recreation, were supported in many areas by coastal land acquisition under the National Trust’s Enterprise Neptune programme, to many the ‘jewel in the crown’ of European coastal management (Ballinger, 1999).

By the 1980s, coastal zone management practice had begun to proliferate, particularly within South East Asia, the Mediterranean and South America (~~Sorensen~~Sorenson, 2002). This was aided significant overseas aid and technical assistance, particularly through the US Agency for International Development (US AID) and the United Nations Environment Program (UNEP) (Godschalk, 2010). The Association of South East Asian Nations (ASEAN) initiative, supported by the former, was noteworthy. Established in 1986, this addressed natural resource depletion and coastal environmental degradation across the region (Chua, 1993). Whilst initially based on the US coastal zone management 'model,' the different governance and other characteristics of the region, resulted in the tailoring of the generic ICZM approach to suit the specific needs of individual countries.

However, it was the concept of sustainable development, articulated in 1987 by the United Nations (UN) World Commission on Environment and Development report 'Our Common Future,' (the Brundtland Report), which had one of the most profound influences on the development of coastal management. With demands for ecological, economic and social sustainability, this concept became the dominant paradigm for coastal management (Godschalk, 2010) following the UN Conference on Environment and Development at Rio de Janeiero in 1992. The Earth Summit not only promoted sustainable development through its non-binding action plan, Agenda 21, but also placed ICZM in the limelight. Calling on states to introduce coordinating mechanisms for coastal areas, the plan highlighted the need for 'integration' of sectoral programmes. Coastal and marine plans were advised along with a range of other technical tools including Environmental Impact Assessment, capacity-building, monitoring and information management.

Catalysed by the Earth Summit, a plethora of international guidelines, handbooks and prescriptions from various global institutions sought to 'further define, interpret and operationalise the Integrated Coastal Management concept (ICM),' setting ICM as an institutional norm for countries to adopt (Cicin-Sain and Knecht, 1998). Endorsement and guidelines came from, amongst others, the Group of Experts on the Scientific Aspects of Marine Pollution (GESAMP~~:~~, 1996), the United Nations Environment Programme (UNEP~~:~~, 1995), the Organisation for Economic Cooperation and Development (OECD~~:~~, 1998) the Worldwide Fund for Nature and the International Union for Conservation of Nature (WWF and IUCN 1998) and the World Bank (1993: The Noordwijk Guidelines for Coastal Zone Management). These established ground rules for subsequent coastal management, defining the scope as well as the key principles and management measures to be adopted (Cicin-Sain and Knecht, 1998). Indeed, the long-lasting definition of ICM, still widely used, was coined by the GESAMP guidelines over fifteen years ago. Placing ICM firmly centre-stage, such guidelines promoted widespread global investment into ICM projects across the developing world by UN agencies and multilateral development banks, prior to the Global Environment Facility (GEF) supporting such initiatives (Chua, 1993). So by the dawn of the new m~~M~~illennium, Kay and Alder (2005) estimated there had been a two to three-fold increase in ICM efforts compared with the previous decade. Similarly, ~~Sorensen~~ ~~Sorenson~~Sorensen significant growth of ICM local, national and international efforts over this period. Of particular note is the PEMSEA project (Partnerships in Environmental Management for the Seas of East Asia). This supported the establishment of intergovernmental, interagency and multi-sectoral partnerships, a driving force for ICM in the region.

Compared to elsewhere, Europe was a late developer, slow to embrace the need for any specific, dedicated coastal management approach. Whilst disquiet amongst user groups, practitioners, non-government organisations, academics and others was mounting in many countries, such as the UK (Ballinger, 1999), the European Community chose to focus on developing generic environmental legislation rather than any specific instrument for the coast. Whilst this did deliver some environmental improvements for coastal areas (Ballinger and Stojanovic, 2010), these were not considered sufficient. So, by the mid-1990s a Demonstration Programme, including pilot projects and thematic research studies, was conducted to inform coastal policy development. Even then, despite much lesson-sharing only a weak policy instrument, the Integrated Coastal Zone Management (ICZM) Recommendation, was eventually put forward (2002). This merely 'encouraged' MmMember SsStates to develop national strategies for ICZM following comprehensive national stocktakes of relevant institutional arrangements and practices. In contrast to the US Federal Coastal Zone Management Act, it offered little incentive for state compliance, only providing weak interpretation of principles of good environmental governance. Consequently, the Recommendation resulted in piecemeal adoption of ICZM: even some MmMember SsStates which have produced ICZM strategies have subsequently abandoned these. In contrast, the recent ICZM Protocol to the Barcelona Convention (2008) marks an exciting development in the Mediterranean region, fostering better coastal protection and management practice. At a time when the coastal zones of the Mediterranean face many environmental challenges, including climate change, this is a milestone, building on years of site-specific project experience of coastal management. Fostering institutional coordination, it promotes the involvement of relevant bodies, including non-government organisations and competent authorities. With no previous precedent for a specific ICZM legal instrument at a supra-state level, this pioneering initiative may serve as a model for other regional seas as indicated by the intentions of pParties to the Nairobi Convention and the Black Sea countries' (Shipman, *pers. comm*.).

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The cCharacteristics of ICZM

Defining ICZM

From a few pioneering efforts in the 1970s, ICZM evolved to become a well-established concept and mechanism at all levels of governance across the globe, challenging existing management approaches and institutional structures and providing a process attune with modern environmental management paradigms, including the ecosystem approach. Whilst it could be argued that ICZM has a relatively weak theoretical underpinning (Kay and Alder, 2005), international prescriptions from various discipline backgrounds have influenced ICZM practice. Additionally, practitioners and policy makers have fashioned ICZM efforts to serve their needs and

aspirations. As a consequence, there is a plethora of definitions and interpretations of ICZM (Table 2.2, plus, e.g.: Sorensen, 1993; and Clark, 1997). This is both a strength and weakness. It enables proponents to 'cherry-pick' aspects of ICZM with the greatest resonance to their respective communities and interests. However, the term's inherent 'fuzziness' also leads to confusion and scepticism from critics, particularly those from entrenched discipline or sectoral backgrounds more used to tightly defined tools, such as Environmental Impact Assessment. This has lead to some coastal management efforts, such as those in Australia or, Sweden, not even being labelled with the ICZM title to avoid criticism.

To add to the confusion, as major coastal management programmes have been tailored to meet the needs of different parts of the world, so the terminology and associated acronyms have been modified. Whilst the concept emerged as CZM in the United States, subsequent terms have added the word 'integrated,' for example, Integrated Coastal Management (ICM). This emphasised the need for a more comprehensive inter-sectoral approach addressing both socio-economic and environmental matters (World Bank, 1993). The current suite of terms reflects the varying scales and orientations of coastal management programmes, and includes iIntegrated cCoastal aArea mManagement (ICAM), iIntegrated cCoastal zZone mManagement (ICZM) and iIntegrated cCoastal and oOcean mManagement (ICOM), amongst others!

Despite this frustrating heterogeneity, most contemporary ICZM programmes are 'variations on a theme,' with common elements relatively easily distinguishable. All share a focus on the management of discrete, separate coastal areas, including both terrestrial and marine dimensions (Sorensen and McCreary, 1990). All recognise the complex and dynamic multi-dimensional challenges, 'wicked problems', posed by coastal areas which demand coordination. However, the extent to which these efforts incorporate all the dimensions of integration (Figure 2.2), as defined within the academic literature (Cicin-Sain and Knecht, 1998), is variable. In contrast, most state sustainable development as a key aim although some also highlight the overarching environmental and conservation needs for the zone, suggesting a rather 'green' interpretation of sustainability. Many of the key objectives of ICZM programmes are similar. These commonly include ICZM's role in informing decision-making, conflict reduction and prioritisation of management activities. However, given the tailoring of ICZM programmes, many locally specific objectives, ranging from natural hazard management to land-based planning, are also included in individual programmes. Various interpretations of the ICZM 'process' are apparent too when comparing programmes.

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Although the definitions in Table 2.2 indicate that ICZM is a dynamic process, outside academia not all programmes acknowledge this. Some suggest ICZM is a system, framework or even just a project. This causes confusion and serves to undermine the dynamic, governance process of ICZM. Clearly, there can be systems, frameworks, programmes and projects put in place to support the ICZM process, but these alone cannot replace the longer-term integrated and adaptive governance process which lies at the heart of ICZM.

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ICZM pPrinciples

Given the difficulties of encapsulating all the key features of ICZM within a single definition, many guiding principles and interpretations have been developed to assist coastal decision-making and policy formulation. Emanating from international discourse and associated prescriptions many are closely aligned with general principles related to sustainability and good environmental governance (Cicin-Sain and Knecht, 1998; Kay and Alder, 2005; Intergovernmental Oceanographic Commission, 2006). These include the Precautionary Principle, The Polluter Pays Principle, Inter-generational Equity and Transboundary responsibility. In addition, there are principles which relate more closely to methods of management, including adaptive, iterative and focused approaches. Those produced for Europe are listed in Table 2.3. Whilst these have been criticised extensively by academics for their lack of clarity, prioritisation and elusive inter-relationships (for example, McKenna *et al*., 2008; Ballinger *et al*., 2010), they have remained the defining feature of the European approach to ICZM, providing procedural (principles 7 and 8), strategic (principles 1, 2 and 5) and locally based guidance (principles 4, 3, and 6) (McKenna *et al*., 2008).

The ICZM pPolicy cCycle

Bearing close resemblance to classical strategic business and planning cycles, the process of ICZM development can be described in a number of stages. The ICZM cycle, shown in Figure 2.3, illustrates the continuous, adaptive and progressive nature of the process, whereby successive cycles of learning build on previous experiences, events, information and knowledge (Olsen *et al*., 2009).

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As Table 2.4 reveals, there are many interpretations of what makes up each constituent stage of the cycle. However, whilst details vary, the overall concept and direction of travel are similar. All progress from preparatory stages, involving programme planning and institutional and other capacity development, through to operational and formal evaluation stages. All emphasise the importance of firm foundations to ensure a sustainable ICZM process. The initiation and

preparatory stages are vital, providing an holistic understanding of the coastal system and building the support, trust and commitment of relevant stakeholders. It is noteworthy that the ICZM Mediterranean Protocol 2008 and the Integrated Coastal and Ocean Management (ICOM) process supported by the Intergovernmental Oceanographic Commission, adopt an explicitly forward-looking approach through scenario and visioning stages. This contrasts with other models where attention is devoted to identifying and addressing coastal issues at early stages of the cycle. There is considerable potential in structured, formal futures approaches to ICZM, facilitating more creative thinking than traditional technocentric and ecocentric approaches to coastal management. These may encourage more proactive attitudes to adaptation, enhancing appreciation of the interconnectivity of processes operating at varying scales.

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In contrast to most other ICZM models, the Mediterranean and ICOM approaches lack a discrete monitoring and evaluation 'stage' *per se*. However, both stress the importance of monitoring throughout the entire cycle in accordance with principles of general performance management. In response, a vast literature spawned on ICZM evaluation, particularly in the early noughties. This includes discussion of *process* as well as *state of the coast* indicators, as exemplified by the European ICZM Progress Indicator (Pickaver *et al*., 2004) and the Intergovernmental Oceanographic Commission's comprehensive suite of governance, ecological and socio-economic indicators (Belfiore ~~a~~*et al*., 2003). However, the Orders of Outcomes approach provides the most useful framework for understanding and measuring ICZM outcomes (Olsen, 2003). Within this, First Order Outcomes define the enabling conditions for sustainable ICZM (Stages 1 to 3, Figure 2.3), whilst Second Order Outcomes signify deeper seated, behavioural changes, necessary for long-term sustainability of ICZM. The model then suggests that, with time and growing capacity, end outcomes may be achieved. These include Third Order Outcomes where environmental and societal targets may be met, and finally, the Fourth Order Outcome, sustainable development itself.

In practice, the reality of ICZM programme development is less structured and clear than that shown in Table 2.4. Burbridge *et al.* (2001) note that some initiatives are *kick-started* into action through legislative reform at Stage 3 (Figure 2.3) and are then followed by issue analysis and plan preparation, i.e. Stages 1 and 2. Such alterations may reduce the cost effectiveness of programmes as aspects of previous stages are revisited and revised. Presumably, the 'untangling' process may reveal underlying misconceptions, prompting disquiet amongst stakeholders. There may also be tendencies to skip key aspects of previous stages, further undermining subsequent efforts and potentially jeopardising the overall process.

ICZM t~~T~~ools and t~~T~~echniques

Given the broad canvas of ICZM, many tools and techniques have been used and adapted to support the process including many from general environmental planning and resource management. The choice of these is frequently determined by human, technological and financial resources. Ideally, bespoke packages are designed as part of the ICZM preparation stage. These then address specific local needs, including those associated with the strengthening of inter-sectoral and other human-relationships, vital to integration. In practice, the choice and range of

tools employed is generally proportional to the task in hand, whilst being largely dictated by the resources available and technical know-how of staff. So whilst there are programmes which use sophisticated and high-tech, often IT-based tools, these are generally only the well-established and highly resourced coastal programmes such as that for Chesapeake Bay. Elsewhere, less well-resourced ICZM efforts, such as the non-statutory local coastal management efforts of North Western Europe including the coastal partnerships in England, often have to rely on cheaper, less high-tech solutions.

Table 2.5 lists some of the most commonly used tools and techniques, dividing them into those associated with evaluation, implementation and governance improvement. The first two categories are particularly important during the preparatory and implementation stages of the ICZM cycle and include supporting tools to aid process development. The governance-related tools are essential to build institutional, community and public capacity. Within the latter there has also been recent focus on pilot studies and associated governance processes which engender coastal science-policy integration, particularly in the context of climate and coastal change (e.g. Cummins and McKenna, 2010). The ICZM academic literature abounds with papers evaluating the role of other governance-related techniques to ICZM, including ones on stakeholder analysis (e.g. Rockloff and Lockie, 2004) and capacity-building (e.g. Le Tissier *et al*., 2002) as well as others related to data collection, information management, visualisation and scenario development (e.g. Ballinger and Rhisiart, 2011).

Institutional and ~~g~~Governance ~~a~~Aspects

Whilst Mee (2010) contends that there has been almost an unhealthy preoccupation in the ICZM literature with institutional and governance matters relating to coastal zones, a detailed debate on such matters has been necessary. As Le Tissier *et al*. (2002) point out, the formulation of coastal policy as part of an ICZM process is as much a political as a technical task. It demands an understanding of rights, knowledge, values and beliefs of stakeholders to inform meaningful stakeholder participation and associated decentralisation of decision-making. Whilst early literature focused on institutional arrangements for coastal management (e.g. Sorensen and McCreary, 1990), providing much useful analysis of government structures, more recently academics have focused on governance processes (e.g. Milligan and O'Riordan, 2007) and community-based management (e.g. Zagonari, 2008), although authors, such as Boyes and Elliott (2014), continue to stress the inadequacies and over complexity of policy for marine and coastal areas.

In the 1990s, literature focused on different institutional arrangements likely to improve 'integration' (Sorensen and McCreary, 1990). These included arrangements where coastal states had dedicated coastal ministries or departments, ones with inter-agency or inter-governmental bodies to co-ordinate across relevant bodies as well as others with cross-sectoral task forces, committees and advisory groups. Much debate ensued about the appropriate legislative authority associated with such arrangements, inspiring many, almost routine, analyses of governmental structures by both national and regional governments. In England and Wales, for example, the House of Commons Environment Select Committee's 1992 inquiry *Coastal Zone Protection and*

Planning deliberated over the adequacy of existing policy and institutional frameworks before recommending the establishment of an Inter-Departmental Group on Coastal Policy and a coastal management unit within central government, amongst other things (Ballinger, 1999). Whilst the former was short-lived, wa~~i~~vering from the start, a small coastal unit remained within the Department for Environment, Food and Rural Affairs (Defra) for some time.

As noted above, community-based and interactive governance processes have received considerable scrutiny over the last coast of decades. Collaborative approaches, particularly partnerships and networks, have become *de rigueur* within this current phase, borrowing much from general management practices within other discipline areas. Coastally specific partnerships have developed, bringing together otherwise independent bodies to achieve a common purpose, often facilitated by a dedicated structure and plan. Networks, looser, less formal arrangements, have also developed within many sectors and to address community interests in many coastal areas. Some might argue that these new 'institutions' have developed to fill a gap~~,~~ caused by the absence of a coherent institutional framework (Stojanovic and Barker, 2008). Stojanovic and Barker (2008) also point to their value in building local knowledge and capacity whilst others suggest their strength lies in their chameleon ability to modify their focus to suit local needs, aspirations and circumstances. However, whilst there are distinct benefits of these collaborative approaches, as exemplified by Stojanovic and Ballinger (2009), the sheer proliferation of such efforts suggests a need for greater understanding of the relationships between these networks and the individuals within them. Indeed, lessons learnt from the research of Kowalski and Jenkins (2015) about bridging organisations are relevant here.

Discussion: A c~~C~~ritique of ICZM

From the preceding sections, it might be assumed that ICZM has reached maturity, recognised as a mechanism for facilitating the sustainable development of coastal areas and for engendering integration across multi-sectors. The large numbers of ICZM programmes noted by Sorensen and others is testament to its relative success. These cover developed and developing countries across the globe and have been fashioned for all levels of governance, including locally based coastal partnerships in the UK to regional initiatives in South East Asia and the Mediterranean. However, actually pin~~-~~pointing ICZM's overall contribution to the on-the-ground improvement of coastal areas is notoriously difficult. Whilst sets of indicators are reasonably well~~-~~established, capturing specific process and state-of-the-coast outcomes, these are not always rigorously applied. All too frequent evaluation is over-reliant on anecdotal opinion, often from biased perspectives of proponents or antagonists. Frequently also, evaluations *cherry-pick* against ICZM principles rather than being based on empirical scrutiny (Ballinger *et al*., 2010). This was particularly evident within some national stocktakes undertaken in response to the EC ICZM Recommendation~~,~~ previously mentioned. However, isolating the 'added value' of ICZM~~,~~ as one of many management interventions in the coastal zone~~,~~ is problematic. Even for some long~~-~~established ICZM efforts, such as the US CZM programme, this 'attribution issue' has~~,~~ at times~~,~~ led to politicians questioning the overall value of the process.

Further, the US sState-based but fFederally-approved programs display a variety of mechanisms for internal coordination and decision-making, sometimes housing the sState CZM program in one governmental agency and sometimes distributing planning and regulatory functions among multiple agencies. This can create challenges, especially if different agencies view common objectives differently, or if changes in political leadership modify how the program functions or where it is housed. On the other hand, concerning the relationship among state programs and federal actions, Section 307 of the US law, called the "federal consistency" provision, gives states a strong voice in federal agency decision making, which they otherwise would not have, for activities that may affect a state's coastal uses or resources. The federal consistency provision is a major incentive for states to join the US National CZM Program and is a powerful tool that state programs use to manage coastal activities and resources and to facilitate cooperation and coordination with federal agencies.

There are some clearly recognisable benefits of ICZM. Some argue that the focus on areas defined by ecosystem or physical system boundaries is preferable to programmes confined by inappropriate administrative boundaries. Others point to improved practices and capacity, and many the enhancement of participatory management processes through ICZM-type programme development (Christie *et al*., 2005). These are considered to result in improved mutual understanding, trust and respect between stakeholders, suggested pre-requisites to holistic, integrated management. Certainly, on the Severn Estuary, the local non-statutory ICZM partnership has provided some of these benefits (Ballinger and Stojanovic, 2010). Stakeholders have become better aware of and engaged with coastal issues through the Severn Estuary Partnership's regular multi-stakeholder engagement events and electronic communications. Indeed, partners are currently working together to develop a revised ~~the~~ Severn Estuary Strategy, a more coherent strategic estuary-wide framework for decision-making. Overall however, given the specificity of ICZM efforts, generalisation is difficult as benefits reflect specific aims and aspirations of individual programmes. So, whilst the state's CZM efforts in North Carolina have been effective in both hazard management and development control, the programme for New York State has addressed a range of other issues, including visual and access matters.

Unfortunately, whilst it might be suggested that ICZM is a panacea for coastal areas, the practice often falls well short of expectations. Despite some success stories and achievements, its status is often merely confined to a non-statutory activity with consequent low levels of funding and resourcing, leading to a downward spiral of support for and confidence in ICZM. Reasons for under-performance abound. The relatively weak theoretical underpinning and understanding may be partly to blame (Kay and Alder, 2005; Billé, 2007~~; Kay and Alder, 2005~~), leading to confusion and policy makers about what really is ICZM. ICZM then often becomes labelled as vague and peripheral and is discounted or side-lined. This has happened in Europe, where ICZM has lost ground to other more tightly defined ~~planning and~~ environmental management and marine Additionally, the over-reliance on generic environmental governance principles as defining features of ICZM within the EU has not helped ICZM's cause, leading to a 'coastal policy squeeze'. The focus on local levels, often cited to be the most effective level for ICZM development (Power *et al*., 2002) has also lead to decentralisation and associated knock-on issues (e.g. Milligan and O'Riordan, 2007). These include problems associated with redistribution of authority as well as

difficulties with local communities being able to identify with and engage with the long-term priorities and the wider spatial scales required for sustainability (Mee, 2010). Over-emphasis on local levels may also cause national governments to shirk their responsibilities in supporting such practices. In the UK, this is partly the case. Here, central government has recognised the successes of local coastal partnerships, but has provided little more than verbal-/-written acknowledgement of such efforts. Also, many local efforts, in the context of a policy vacuum, focus on non-controversial, quick win-win 'softer' issues, such as recreation and information exchange. They may even follow the aspirations and interests of the most vociferous, charismatic and resource-rich 'champions,' who may have little political mandate. The focus on participation is also a mixed blessing, especially in the context of local situations where there is a limited commitment and capacity of relevant communities, particularly in terms of skills and knowledge, leading to protracted debate and subsequent inertia. McKenna and Cooper (2010) contend this is problematic across Europe. Shipman and Stojanovic (2007) suggest that the project basis of much European ICZM activity has also done little to support the long-term development of the process, leading to high staff turnover as well as fragmented and disjointed policy cycles. This problem, however, is not just confined to Europe: project-based ICZM the world over can result in temporary and unsustainable outcomes (Christie, 2005).

Whilst ICZM is very much a social process and construct, the over-emphasis of recent years on institutional and governance aspects has often been to the detriment of other more pressing coastal management issues (Mee, 2010; Cheon, 2008; Mee, 2010). Billé (2007) questions the utopia' of ICZM alongside the need for institutional integration and associated administrative simplification. He suggests this may merely disguise existing tensions and power struggles 'in house' and queries whether or not stakeholder coordination really will automatically reap true, integrated, holistic management. He notes that setting a problem within a collective framework does not necessarily result in collective concern (Billé, 2007). Trade-offs will always be required, suggesting that ICZM is really as much about distributive as integrative management. Alongside such fundamental issues, others question the divorcing of coastal decision-making from the underlying science of coastal systems (McFadden, 2007; Mee, 2010) and call for much better understanding of the scientific needs of coastal management (Tribbia and Moser, 2008). Despite attempts to redress this, this remains a key challenge for coastal governance. Although, as Billé (2007) argues, the positivist illusion that scientific knowledge will always lead to better decision making may be flawed. The science-policy interface is complex and clearly we need to better comprehend this. In doing this, we must embrace adaptive management and improve our understanding of the operationalisation of the precautionary principle.

Conclusions

As the preceding sections have shown, there has been considerable effort to develop new approaches to coastal management worldwide over the last half century in response to perceived inadequacies of traditional, sectoral approaches. ICZM has been established as a mechanism to help deliver sustainability of coastal areas. For many it may even be deemed to have reached 'maturity' (Billé, 2007; Godschalk, 2010; Billé, 2007; Shipman, 2012). Certainly, the relatively

enactment of the ICZM Protocol for the Mediterranean and the ensuing interest in this approach for other regional sea areas may herald the acceptance of ICZM as a key tool for managing coastal areas and their associated complex, inter-linked problems.

However, as indicated previously, ICZM is not always the panacea some might have hoped for. Deterioration of much of the world's coasts has continued apace as population centres grow and encroach on critical coastal systems. Indeed, 62% per cent of estuaries and coastal marshes, 64% per cent of mangroves and 58% per cent of corals now lie within 25 km of urban centres of more than 100,000 (Agardy *et al*., 2005). Slow recovery of coastal areas and associated natural resources, such as fisheries, mangroves and coral reefs has occurred over the last few decades. However, much of this is more easily attributed to improvements in sectoral management efforts than to ICZM itself. Indeed, the preceding discussion suggests that, despite some notable success stories, ICZM is still plagued by underlying conceptual and more practical issues. These include an obvious implementation gap (Burbridge *et al*., 2001) and associated problems related to difficulties in realising the higher level outcomes of the policy model. Even some well versed success factors of ICZM (e.g. Stojanovic and Ballinger, 2009), have been questioned by recent critics (Billé, 2007).

The aggregation issue certainly provides a dilemma for ICZM evaluation; ICZM development has not only occurred alongside the evolution of modern environmental management but also within a period characterised by significant transformations in both general governance theory and practice. Techniques such as Environmental Impact Assessment (EIA) and Strategic Environmental Assessment (SEA) and new, more integrated planning and management regimes for both catchments and offshore, have all promoted and indeed facilitated more inclusive, holistic and integrated approaches. In Europe, for example, adherence to the Aarhus Convention has helped engender community participation and shared responsibilities, These have in turn led to some recent European legislation, notably the Habitats Directive (92/43/EEC) and Water Framework Directive (2000/60/EC), demanding more coordinated implementation by competent authorities (Ballinger and Stojanovic, 2010).

Whilst these new general environmental management approaches indirectly support the delivery of many ICZM principles of good governance, referred to earlier, their introduction has been accompanied by new legislation and associated responsibilities. Ballinger and Stojanovic (2010) note the increased confusion emanating from additional bureaucracies, superimposed on an already complex patchwork of laws and roles. On top of this, further fragmentation and confusion besets many coastal areas where devolutionary processes have resulted in not only increased numbers of bodies but also diverging agendas across new administrative boundaries. This has been the case on the Severn Estuary, where an already crowded institutional framework has ensued as Wales has gained increasing independence from England (Figure 2.4).

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It is the introduction of marine spatial planning (MSP), however, which is providing one of the most significant challenges for ICZM. This is inducing coastal (policy) squeeze, threatening the very existence of ICZM. Concerns over fisheries, offshore resources and the decline of marine

ecosystem health, has lead to this current interest in MSP. Governments, across the developed world in particular, have formulated new legislation, executive orders and processes, such as the Canadian Oceans Act (1996) and Strategy (2002), the UK Marine and Coastal Access Act (2009), and the US National Ocean Policy (2010). MSP has surfaced as the new panacea to deliver integrated approaches for offshore whilst also offering increased accountability, transparency, science-based policy and stakeholder participation. Déjà vu? There certainly appear many similarities to ICZM. However, as Boyes and Elliott (2015) indicate, the legislation enacted to support the development of MSP in the UK has not really fully grasped the opportunity to create a radical restructuring of marine and coastal governance, although it does point the way to an ecosystem-based approach to management. Interestingly, much of the discussion on MSP in Europe informing the development of the Maritime Spatial Planning Directive (2014/89/EU) revolved around the inter-relationship between ICZM and MSP, debating the differences, similarities and synergy between the two processes. However, the terminology of ICZM was, at last minute, dropped from the directive, to be replaced by a short section on 'land-sea' interactions which, in Article 7, states:

> In order to take into account land-sea interactions in accordance with Article 4(2), should this not form part of the maritime spatial planning process as such, Member States may use other formal or informal processes, such as integrated coastal management.

This has resulted in many of the local, ICZM delivery bodies becoming frustrated at what they see as the overshadowing of ICZM by MSP. In the UK, this has not been aided by the government, which, whilst using some of the coastal partnerships to assist in public engagement events related to MSP, has made little long-term investment in their future. Such practice suggests that ICZM may be left 'on the shelf.'

Whatever the future of ICZM, it is clear that pressures on the world's coast will not abate. Population growth is set to increase at unprecedented levels. Climate change and associated, indirect impacts, particularly sea level rise, will compound existing problems and provide new challenges (Nicholls *et al*., 2007). Billions are likely to be exposed to a range of secondary impacts including increased shallow coastal flooding and tidally-induced recurrent flooding, coastal erosion, salinity changes and habitat degradation (Creel, 2003) and in South East Asia and the Pacific, millions may become sea level refugees by the end of this century (Wetzel *et al*., 2012). In relatively high-risk areas such as low-lying islands and atolls, food and health security concerns will predominate as populations lose access to land for habitation and agriculture, compelling a range of potential responses including displacement, migration and relocation. Such matters will test coastal governance systems and management approaches to their limit and will require further capacity building, changes in investment strategies and the placing of pre-conditions for sound management to be put into place (Glavovic, 2008; O'Riordan *et al*., 2014).

Debate is likely to continue between and amongst academics and practitioners regarding the future of ICZM. Within this, it is inevitable that focus will centre on already well-versed topics (what constitutes appropriate degrees of decentralisation for coastal management, how policy

might be better informed by science, whether statutory or voluntary statutory approaches are more effective, how participatory processes can be made more effective and how ICZM can be better linked to emerging integrated catchment and offshore planning processes). Informed by such discussions, it is suggested their coastal governance and planning is likely to be refined through incremental evolution and in tandem with improvements in general environmental management practice, delivering on-the ground physical coastal improvements. Whilst many think the main challenge may be to ensure that ICZM does not become squeezed out altogether from the already congested policy arena, the key issue is to really ensure that all the planning and management processes operating in the coastal zone, including ones not specifically labelled explicitly as ICZM, reflect and embrace the diversity, complexity and dynamism of coastal systems. These must attempt to deliver ecosystem-based management for coastal areas whilst working together within appropriate structures and governance cultures. Embedding some form of interactive, adaptive polycentric governance, which reflects, and responds to, the demands of complex, multi-dimensional coastal systems is the challenge. In this context, all ICZM scholars, policy-makers and practitioners need to embrace recent emerging academic discourses lead by Ostrom (2010), Pahl-Wostl (2009) and others.

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Figure 2.1 The onshore and offshore boundaries of coastal planning and management in England.

Source: Original.

Figure 2.2 The dimensions of Integrated Coastal Management.

Source: Original.

Figure 2.3 The ICZM policy cycle.

Source: Original; modified from Olsen (2003).

Figure 2.4 Relevant authorities areas of jurisdiction, April 2013 (The Severn Estuary).

Source: Original.

Table 2.1 Main fluxes between land and sea.

LAND Land to sea	Sea to land SEA
⇨ Natural fluxes ⇦	

Earthquake debris ⇨ Volcanic debris ⇨	⇦ Energy/ debris from hurricanes ⇦ Cold water & nutrients from upwelling ⇦ Wave action ⇦ Salt & salt aerosols ⇦ Nutrients through carcasses, guano
→ Natural fluxes (with some human amplification) ←	
River discharge → Groundwater → Sediment → Nutrients & minerals → Humics & organics → Storm debris →	←Sand
→ Anthropogenic fluxes ←	
Herbicides & pesticides from agriculture/aquaculture → Oil & chemicals → Human viruses & bacteria (from sewage) →	← Pharmaceuticals from offshore fish farms ← Oil & chemical spills ← Chronic input of oil & chemicals from offshore operations ← Ship wastes including ballast water with exotic organisms ← Saltwater intrusion of aquifers

Adapted from: Agardy *et al.* (2005).

Table 2.2 –Some international definitions of integrated coastal management.

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GESAMP (1996) –ICM Mediterranean ICZM Protocol (2008) –ICZM European Commission (1992) –ICZM	*'a dynamic and continuous process by which progress towards sustainable use and development of coastal areas may be achieved'* *'a dynamic process for the sustainable management and use of coastal zones, taking into account at the same time the fragility of coastal ecosystems and landscapes, the diversity of activities and uses, their interaction, the maritime orientation of certain activities and uses and their impact on both the marine and land parts'* *'"a dynamic, continuous process designed to promote sustainable management of coastal zones. ICZM seeks, over the long-term, to balance the benefits from protecting, preserving, and restoring coastal zones, the benefits from minimizing loss of human life and property, and the benefits from public access to and enjoyment of the coastal zone, all within the limits set by natural dynamics and carrying capacity.'*

Table 2.3 The European ICZM principles.

~~1.~~ 1. a broad overall perspective (thematic and geographic) 2. a long-term perspective which will take into account the precautionary principle; 3. adaptive management during a gradual process 4. local specificity and the great diversity of European coastal zones 5. working with natural processes and respecting the carrying capacity of ecosystems 6. involving all the parties concerned in the management process 7. support and involvement of relevant administrative bodies

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8. use of a combination of instruments designed to facilitate coherence

Table 2.4 The stages of ICZM: a comparison.

Elements of the ICOM process (IOC)	Stage of GESAMP ICZM Policy Cycle	Coastlearn stages	Mediterranean ICZM Protocol
Preliminary identification *Initialisation* *Feasilbility*	Inception	Initiation	Establishment
Preparation *Socio-economic assessment* *Desirable & possible scenarios* *Management plan elaboration*	Programme preparation	Planning	Analysis and futures Setting the vision
			Designing the future
	Formulation- formal adoption & funding		
Implementation *Insitutionalisation* *Implementation of scheme*	Implementation	Implementation	Realising the vision
Evaluation & adjustment	Monitoring & evaluation	Monitoring & Evaluation	
Consolidation, replication & expansion			

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Consolidation *Replication* *Expansion*			

(Sources: Belfiore *et al*. (2003), Coastlearn website (http://www.coastlearn.org/); Henocque and Denis (2001) and the Mediterranean Protocol 2008.

Table 2.5 Tools and techniques for ICZM.

Evaluation techniques		
Data collection and information management	Assessment techniques	
• Monitoring and surveillance activities and networks • GIS development • Models and visualisation • Scenario development • IT-based management system • Indicator system	• Environmental Impact Assessment (EIA) • Strategic Environmental Assessment (SEA) • Carrying Capacity Assessment • Landscape and visual resource analysis • Rapid Coastal Assessment • Ecological footprinting • Risk assessments (e.g. erosion, flooding, climate change etc.) • Vulnerability Assessment	• DPSIR analysis (Drivers-Pressures-State-Impacts-Responses) • Multi-Criteria Analysis • Resource Accounting • Economic analysis, including Cost Benefit Analysis & Economic Environmental Assessment • Stakeholder Analysis • Indicator-based assessments
Implementation techniques		
Strategic regulatory and policy instruments	Economic, financial and fiscal instruments	Allocation tools

• Law and policy (marine and land-based) • National, regional and local coastal strategies, plans and programmes • National and regional guidelines	• Economic incentives • Taxes • Charging e.g. for effluent disposal • Direct investment	• Zoning • Permitting and licensing • Planning and land use controls • Set-backs • No take zones
Techniques improving governance		
Capacity building and development	Techniques for fostering cooperation and coordination	
• Training for human capacity development • Institutional capacity development • Communication events, outputs and exchange • Decision-support systems • Outreach including public participation events • Research, science and technical assistance • Exchange of information and best practice	• Conflict resolution techniques • Bargaining techniques • Negotiations • Voluntary agreements	