FONDAZIONE ENI
ENRICO MATTEI

NOTA DI LAVORO
71.2009

Coastal Zone Management in the Mediterranean: Legal and Economic Perspectives

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Summary

This paper examines existing measures taken to protect the coastal zones of the Mediterranean Sea and assesses their success. A summary of the main pressures facing these zones is given, followed by an analysis of the legislation covering coastal zone development in ten countries: Algeria, Croatia, Egypt, France, Israel, Italy, Malta, Spain, Tunisia and Turkey. We find that not all of these states have legislation specifically covering coastal zones, but there is concern in all areas that the legislation is not working, We also look at the costs and benefits of controlling coastal development. Firstly, a literature review of valuation studies identifies a range of values placed on developed and undeveloped coastline for both users and local property owners. These values were then used in a model to evaluate policy options to control development of a stretch of coastline. The model indicates that a stricter control regime of coastal development may provide significant benefits.

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"Coastal Zone Management in the Mediterranean: Legal and Economic Perspectives"

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Abstract

This paper examines existing measures taken to protect the coastal zones of the Meditterranean Sea and assesses their success. A summary of the main pressures facing these zones is given, followed by an analysis of the legislation covering coastal zone development in ten countries: Algeria, Croatia, Egypt, France, Israel, Italy, Malta, Spain, Tunisia and Turkey. We find that not all of these states have legislation specifically covering coastal zones, but there is concern in all areas that the legislation is not working,

We also look at the costs and benefits of controlling coastal development. Firstly, a literature review of valuation studies identifies a range of values placed on developed and undeveloped coastline for both users and local property owners. These values were then used in a model to evaluate policy options to control development of a stretch of coastline. The model indicates that a stricter control regime of coastal development may provide significant benefits.

Key words

Coastal Zone Management, Legislation, Littoral, Mediterranean, Recreation

Abbreviations

CAMP   Coastal Area Management Programme

CVM   Contingent Valuation Method

ICAM   Integrated Coastal Area Management Protocol

ICZM   Integrated Coastal Zone Management

PPR   Piano Paesaggistico Regionale (Regional Landscape Plan in Sardinia)

VOE   Value of Enjoyment

WTP   Willingness to Pay

1. Introduction

It is widely acknowledged that the coastal zones of the Mediterranean are coming under increasing pressure, which in turn is having serious implications for the environment and for the sustainable use of these highly valued ecosystems. All the littoral states have undertaken some measures to try and protect their coastal zones from overdevelopment, or development that is socially and environmentally damaging. The success of these measures, however, is questionable. In spite of well-reasoned and carefully drafted regulations, the pressure has continued to increase. The laws are often ignored by developers who put up illegal units. In this and other ways the regulations are ineffective in achieving the key goals of sustainable development: i.e. development that protects the environment for present and future generations to enjoy.

This background paper is structured as follows. Section II summarizes the changes in the use of coastal land in the Mediterranean region over the last 30-40 years through the presentation of a number of key indicators. Section III reports on the legal framework for 10 littoral states (Algeria, Croatia, Egypt, France, Israel, Italy, Malta, Spain, Tunisia and Turkey[i]). A review of the laws and their effectiveness leads to some proposals as to what works in protecting the coasts and what does not work. These are discussed in the conclusions. Section IV lays out the evidence on the economic estimates of the value of visual amenities in general and of coastlines in particular. It reports on studies carried out in Europe and the US that have valued the benefits of a sea view and access to the sea to those who have property overlooking it. It also reports on studies of the costs of different types of building development on the enjoyment of those who are not owners of the properties and whose access and enjoyment of the property has been affected. Section V uses the estimates from these studies to value different conservation or development policies for 'representative' coastal areas, with typical land values, rates of visitation etc. Section VI concludes with some general comments on the implications of the economic analysis for

development and conservation policy in coastal zones and some proposals to make existing regulations more effective and to introduce new regulations where appropriate.

2. Increasing Coastal Pressures In The Mediterranean

There is ample documented evidence that the human pressure on coastal resources is increasing. Table 1 gives some basic data for the countries covered in this study. In the 30 years to 2000 densities in coastal areas increased by 49 percent, ranging from a low of 5 percent in Croatia, to a high of 112 percent in Algeria[ii]. The same period has also seen substantial increases in tourist densities in all countries except Egypt. Values for the others range from 25 percent in Spain to 73 percent in Turkey. In general the North African countries with the fast growing populations are also the ones with the highest rates of growth of coastal densities, including tourism densities (Algeria, Tunisia and Turkey).

We also observe some shift in the relative densities of the population between the coastal zones and the national average. The last column of Table 1 gives the percentage change in this ratio between 1970 and 2000. It shows a relative movement outward for Croatia, France, Italy, Spain and Turkey. In Algeria, Egypt and Israel the density has increased slightly faster on average than it has in the coastal zones.

Table 1: Indicators of Coastal Zone Pressure in the Mediterranean

Country	% Increase in coastal residential density 1970 to 2000	% Increase in coastal tourist density 1970 to 2000	% change in pop. density in coastal areas relative to average: 1970-2000
Algeria	112	34	-2
Croatia	5	n.a.	4
Egypt	104	-89	-1
France	31	38	12

Israel	92	72	-3
Italy	8	29	1
Malta	22	38	0
Spain	27	25	8
Tunisia	90	50	0
Turkey	107	73	13
All	49		

Source: Plan Bleu, 1989, 2005, Attané and Courbage, 2001

In view of these strong human pressures on coastal zones, it is clear that increased regulations may be warranted to protect the resources. The next section looks at the present regulatory framework and assesses its efficiency.

3. Regulations Governing Coastlines In The Mediterranean

All the countries reviewed in this study have some form of regulation that applies to coastal areas. They differ, however, in many respects. Some have specific laws that deal with coastal zones and some expressly forbid construction or development in a 'no build area' that varies from country to country. The definition of what constitutes a littoral zone also varies across countries (the no build area and the littoral zone are not the same). Others rely on the application of general planning laws. Table 2 summarizes the main findings from the review.

Table 2[iii]: Coastal Zone Regulation in the Mediterranean				
Country	Specific coastal zone legislation	Limits set by law	Sanctions	Special features of the country situation
Algeria (1)	Yes. 2002 Law	Littoral zone is from 800m to 25 km. Also defines littoral plain of 3km. No construction within 100-300 m.	Fines and demolition of illegal constructions.	No assessment of effectiveness of laws. Concentration of activities in littoral areas has continued very fast. Anarchy has characterized its coastal urban development.
Bosnia & Herzegovina	No	No limits set by law. Construction limits defined by regulation plans.	Law on Physical Planning and Land defines sanctions and competencies of urban and construction inspectors.	The Law on Physical Planning and Land Use defines conditions for construction. A competent body issues construction permit after urban consent. A competent body issues urban consent according to the regulation plan and urban project.
Croatia (2)	Yes 2004 Regulation	Marine property is 6 metres strip. Law of 2004 defines coastal zone of 1000 meters. No construction within 70 metres (housing) and 100 m (tourism) in urban areas and 100 m in other areas.	Fines and demolition of illegal units with owners paying the cost.	Plans for land use are general with insufficiently strong instruments of management or implementation. Coastal towns, however, have retained their typical features. Pressure though still low is increasing with illegal dwellings.
Egypt	Yes.	Very general littoral zone (up to 30 km.). No building normally within 200 metres. Building with 200m requires an EIA.	Fines and possible demolition.	Laws are not well enforced. Poor coordination between authorities and overlapping and conflicting responsibilities result in severe and increasing pressure. A framework programme for ICZM was issued in 1996 and steps are being taken to prepare a national ICZM strategy .
France	Yes	Littoral zone is defined by coastal municipalities. No building within 100 metres.	Fines and demolition.	Considerable illegal construction, more or less tolerated by authorities. Public management of these areas needs strengthening. ICZM is weak because of a plethora of laws and planning instruments that are poorly coordinated.

Table 2: Coastal Zone Regulation in the Mediterranean (Contd.)				
Country	Specific coastal zone legislation	Limits set by law	Sanctions	Special features of the country situation
Israel	Yes	Varies from 1-2 km. No building allowed within 100 metres.	Fines.	Most land is under national ownership so access should not be a problem. But the national Land Administration has joined Local Authorities to 'privatize' a lot of coastal land which has reduced public access to beaches. There is a lot of pressure to further convert coastal areas into housing. The new Coastline Protection Law is sound in principle but implementation is crucial.
Italy	Yes	Varies according to ecological region. No building within 300 metres. Some regional variations (e.g. Sardinia)	Fines and, exceptionally, demolition.	Coastal planning is conflicting and fragmented between different levels of government. Frequent amnesties on illegal construction have resulted in a large level of infringement. More than two illegal actions per kilometre of coast. Many are luxury developments. Yet some regional initiatives are encouraging. In Liguria a coastal plan has been prepared which pays special attention to the preservation of special areas. In Sardinia a wider restriction of on average 2 km has been introduced. Building inside this zone is only possible as part of an urban upgrading or conversion program.
Malta	No	Littoral zone is 250 metres. No construction within zone of variable depth.	Fines	Very great pressure to develop along the coast. The privatization of the coastline is proceeding fast and access to the sea is diminishing.
Morocco	Draft Law	No construction within 100m besides for activities that require the nearness of the sea.		

Table 2: Coastal Zone Regulation in the Mediterranean (Contd.)				
Country	Specific coastal zone legislatio n	Limits set by law	Sanctions	Special features of the country situation
Spain	Yes	Land bound limit is 500 metres. Construction allowed within 100-200 metres is restricted but not banned.	Fines but with a statute limiting action to 12 months. If no legal action is taken there is no sanction.	Poor coordination between authorise has resulted in very fast coastal urbanization. A lot of illicit building has been taking place and is still ongoing. There has been considerable controversy on the modification of the Shores Act, which was basis of coastal regulation. Amendments allow urban plans to override coastal zone protection legislation and make the case for development in costal areas easier.
Tunisia	Yes	Limits vary from site to site. No construction is permitted within 100 metres. Within settlements construction is permitted within 25m.	In many cases the authorities reach an agreement with the violator. Fines are available and applied occasionally.	Minor infringements are declining but some major tourist developments remain problematic vis-à-vis the law. Studies are under way to identify areas that need protection but implementation of the plans will need funding which is difficult to get.
Turkey (3)	No	Landward limit is 100 metres and is uniform along the whole coast. Construction prohibited within 50 metres but exceptions are made.	Fines and in principle demolitions are available but they are rarely used.	Implementation of coastal management is very weak. The settlements law has been highly misused for improper developments of secondary housing. 'Local land use plans' are often careless and override urban planning at higher level.

The main comments are the following:

1.   Six of the ten countries have some form of coastal zone legislation regarding development. Others rely on the normal land use regulations and apply them to coastal areas as appropriate. There is, however, in almost all countries, an expressed concern that the planning process is not working adequately. ICZM is being hampered by a lack of coordination between the regulating authorities (e.g. those responsible for land and sea and those responsible for different levels of government). The presence of specific coastal legislation does not appear to guarantee a better performance in terms of coastal protection.

2.   The definitions of littoral zones vary. Where a figure is specified it is in the range of 100 metres to as much as 2 kilometres. The non-building zone (setback zone) can be as small as 50 metres and as much as 500 metres. It should be noted, however, that in several countries the ban on construction of dwellings within this zone is not absolute (non dwellings can be allowed if required for safety or provision of essential services). Exemptions are given, although it is not known how frequently this happens.

3.   The sanctions in place are fines and possible demolitions. The latter are rarely used, and in a number of countries some form of amnesty is applied for dwellings that have been in place for some time (e.g. Italy, Spain and France). Tolerance for infringements seems to be high in these three countries and also in Croatia, Tunisia and Turkey.

4.   There is limited information on the efficacy of the regulations. The only quantitative data that could be obtained was for Italy, which indicated at least two major infringements per

kilometre of coast per year. Data may be available for other countries but it was not accessible through the databases and websites to which the public has access. This makes it difficult to assess the extent of the problem, but the qualitative reports all reach the same conclusion – i.e. that the regulations are frequently evaded or interpreted in such a way as to suit the developers.

5.   Not all is gloom, however, and there are some indications that things can work. The cases of Liguria and Sardinia are examples of regional governments taking the problem seriously and making regulations that are substantially protective of coastal zones. The case of Sardinia is particularly interesting in showing what can be done with the right political will (see Box 1). In Tunisia detailed studies are being undertaken of where protection is most needed and plans in support of these are being drawn up. More generally there is an increasing awareness of the need to make the regulations that manage the coastal zones more effective and more protective of these fragile environmentally stressed areas.

It is not possible to establish how effective the different instruments such as setback policies and other regulations have been in protecting coastal zones. We do not have a detailed assessment of the extent of violation of the setback rule and in any case that would only be a small indication of the status of the coasts: for example with a small setback area, and a policy of intense development close to the sea one can end up with a coastal zone that is substantially developed. In Figure 1 the percentage of land that is built up within one kilometre and ten kilometres of the sea is given for two years (1990 and 2000) and for three countries: France, Italy and Spain. The graph shows that development in all three Mediterranean countries has increased in both zones over those ten years. The increases are not large in the one kilometre zone (about half to one percentage of the area) but this has also been a time when awareness of the need to protect coastal

zones was increasing. More generally, as the data presented in Section II show, the pressure on

the coastal zones is not abating. Action is therefore needed to draw up the regulations that exist

more effective and to introduce new regulations where appropriate. These are discussed in the last

section of the paper.

Box 1: The Piano Paessagistico in Sardinia

In an interview given to EcoMEDia magazine in April 2007, Renato Soru, president of Sardinia explained that, "in order to stop Sardinia from becoming a continuous coastal sprawl, boost economic development in existing coastal settlements and promote a model of sustainable tourism that ensures the participation of local communities" the **Regional Landscape Plan (Piano Paesaggistico Regionale or PPR)** was adopted by the Sardinian regional council at the end of 2006.

The aim of the PPR is to meet the objectives of the Integrated Coastal Area Management Protocol (ICAM). The whole territory has been divided into 27 coastal areas and building in most of these has been declared unlawful on any part of the coastline. You can only upgrade what has already been built, and the authorities offer incentives to those willing to improve the architectural and urban quality of existing structures. Furthermore, incentives are being provided for the transformation of holiday homes into accommodation facilities, offering a slight increase in building cubature to bring about the required functional changes.

One of the aims is to prevent development of coastal developments that are only for tourists and that become ghost towns outside the tourist season. Thus tourist infrastructures are only allowed to expand (if at all) if they are integrated with local villages. As Mr. Soru says, "it has now been widely understood that the PPR has nothing against small coastal towns; on the contrary, it is there to protect them and ensure that no one, ever again, can buy a piece of land for a pittance and build another tourist resort in a prime position on the waterfront, turning its back both physically and metaphorically to the community". Presently 87% of second homes are built on the coastline.

Now, a few months after its adoption the PPR is being recognized as a tool for better coastal management although not everything has been smooth going. The original aim to increase capacity for tourism by 80,000 beds is unlikely to be met. Moreover, the plan has led to the stop of several urbanization projects in urban areas, such as Cagliari, generating heavy local conflicts. On the other hand interest in sub-coastal settlements is clearly growing, while they used to have very limited appeal in the past.

Slowly people are becoming aware that the value and future of a territory does not depend on what has been built, but on what has not yet been built. President Soru makes no secret of the fact that a plan such as the PPR can only be successful if there is a strong willpower behind the central administration. "Authorities should not only listen to the community, but guide citizens using precise regulations that transcend the interests of a particular territory, whilst offering wide and comprehensive regional scope. Coastal development is a problem that affects the entire Mediterranean region and therefore binding regulations should be imposed for environmental protection". "In my capacity as a citizen - he ends – "I sincerely hope that the Mediterranean will not be transformed into a bath tub with cement walls. If people are left to their own devices that's exactly what will happen. It's simply a matter of time".

Figure 1: Percent Changes in Built Up Coastal Areas in Three Mediterranean C

Built Up Areas Near Coasts

Legend: % 1990 1 km. ■ % 2000 1 km. □ % 1990 10 km. □ % 2000 10km.
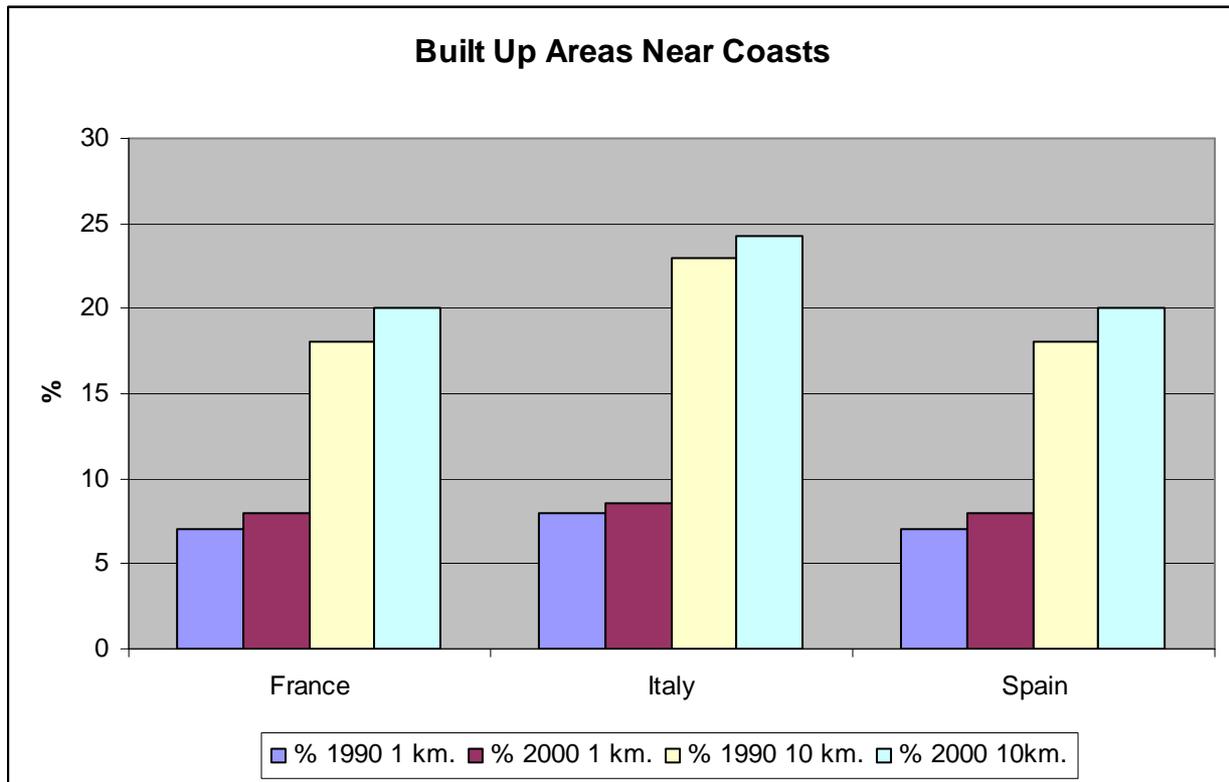
4. Values of amenities in coastal zones and of landscapes

Any policy of coastal zone protection and land use planning would benefit from a better idea of the benefits and costs associated with different patterns of land use. The pressure on the coasts is coming from individuals who derive benefits from living near the sea. Yet the same actions are causing external costs in the form of reduced visual benefits and reduced access to others who enjoyed these environmental services before.

The aim of this section is to report on research that has valued such benefits and costs. In the next section the estimates from these studies are used to evaluate plausible but artificial coastal development plans.

There are a few studies available of the value of coastal landscapes. Here we divide them into those that value a landscape for households that own and occupy or households or hotels that rent property with a sea view, and those that relate to the value of a landscape from individuals who are not occupiers of property on the coast. The latter are divided into people that visit the coast or live in coastal areas but not in close proximity to the sea, and people that want to see the coast preserved but do not visit the coast (the so-called non-use values). Often these two sets of values are in conflict: for owners to capture the value of a sea view means detracting from the value those visitors may get from access to a sea view or access to a beach or may wish to see it preserved for its own sake. The next section reports on how these conflicting values compare and uses them to assess olicy options.

4.1 Values Of Coastal Landscapes For Owners Or Occupiers Of Property

The technique most used to value the benefits of visual amenities from property is referred to as the hedonic method, where house price data are used as the basis for calculating premiums placed on houses in locations with different landscape attributes. In this section studies that value coastal and lake views are reported.

Benson et al [1] conducted a hedonic study of the impact of views on property prices in Bellingham, Washington. They found a significant price premium associated with different types of views. They derived seven different categories of views finding a premium of 58.9 percent for an "unobstructed ocean view" down to 8.2 percent for a "poor partial ocean view". A lake view adds less (18.1 percent) than an ocean view in most cases, but lake-frontage is found to add 126.7 percent to house prices – capturing aspects of the recreational amenities that are additional to the amenity value provided by the view itself. This study shows the potential for the use of hedonic

analysis to further understanding of the valuation of unimpeded views relative to other types of views.

Fraser and Spencer [2] considered the residential land amenity of an ocean view by a scoring system based on three sub-characteristics of the view based on housing data from 114 sites in Western Australia. The three dimensions they used are degree of panorama, potential loss of view and elevation. The potential loss of view dimension introduces both time and uncertainty into people's valuation. They find that the first two characteristics are dominant over the third, which was therefore not included. They also find diminishing marginal utilities to the purchaser as the level of each of these characteristics increases. A scoring matrix was used to determine the quality of the ocean view for each site. They estimate that for the best views with the lowest likelihood of the view being lost the view adds a premium of an extra 25 percent to the house price. The important point this study makes is that the impact of an ocean view on property will depend on how certain the purchaser is that the view will remain and not be blocked in the future. (See also Abelson and Markandya, [3]).

Bond et al [4] investigated the impact of views of Lake Erie on residential property using transaction based house prices. This was an analysis based on building codes, which reflected whether a house had a view or not. Having the desirable view of Lake Erie was shown to add an 89.9 percent premium to the house price.

Parsons and Wu [5] used a random draw of 1,435 houses sold in 1983 from one county on the Chesapeake Bay coast, Maryland, USA. They used their findings to estimate the impact of regulations requiring houses to be built further away from the waterfront by estimating housing development over time under various restriction scenarios. Using hedonic analysis, they

distinguish impacts on three types of properties of different land use regulations: houses with frontage, views and distance from the water. They find that the value of lost frontage, views and distance leads to a loss of between $74,763 and $96,672 (depending on the econometric model). For loss of views and distance alone there is a loss of $6,553 to $7,883, and with distance by itself there is a loss of $233 to $524 per property. Hence the value of frontage alone would be in the range $68,880 to $90,119. As a percentage of the price of a house this amounts to a premium for sea frontage of between 75 and 98 percent.

In Europe Luttik [6] used hedonic analysis to identify price premiums for different landscape types in the Netherlands. Using a sample of almost 3000 transactions, Luttik finds a premium for houses in attractive landscape types of 5-12 percent over houses in less attractive landscapes. Houses overlooking water attract a premium of 8-10 percent, whilst those overlooking open space attract a 6-12 percent premium.

Muriel et al [7] conducted a hedonic analysis for Finestère in France. Using a sample of 185 houses in 2005, they derive a property premium of 78 percent for a house with a good view of the sea compared to one without any view of the sea. They also assess the responsiveness of house prices to distance from the sea, finding an elasticity of -0.087 – i.e. a one percent increase in distance from the sea results in a 0.087 percent decline in property value (at an average distance of 6.5 kilometre). So a house that is 3 kilometres from the sea as opposed to 6 kilometres would have a value that is 4.3 percent higher. One that is two kilometres would have a value that is 6 percent higher. These numbers look rather low but are the only ones we could find that estimated a decay function.

A study in Israel (CAMP Israel, [8] estimated increased room rates for hotels along the seashore of the country. It found accommodation within 2km of the coast charged rates that were about 39 percent higher than in similar classes of hotels further away from the sea.

Although the results do vary by site, there is some agreement across them. As a rough guide, a property with an uninterrupted ocean view will attract a price premium of between 25 and nearly 100 percent. The premium will be less for a partial view – perhaps a low as 8 percent for a 'poor partial view'.   The Israel study estimates hotel premium rates of 39 percent. The 'decay' function with respect to distance from the sea implies a decline in values of about 9 percent for households that are up to one kilometre from the sea as opposed to half a kilometre. There is no doubt, however, that more studies are needed to answer questions about the impact of density of housing and access to the beach on the value of such properties.

4.2 Values Of Coastal Views And Access To Non-Property Owners

4.2.1 The VOE Approach

A number of processes can also be used to value coastal views to non-property owners. The most common in the literature is often used to value the recreational amenity of a beach, and is known as the Value of Enjoyment (VoE) method. This is included in the 'Yellow Manual', produced by the Middlesex University Flood Hazard Research Centre (Penning-Rowsell et al [9]) and recommended by the UK government for valuing coastal protection (Whitmarsh et al. [10]). It elicits stated preferences by the use of a direct open question about the value placed on the enjoyment of a visit to the beach, and so does not require any payment vehicle to be expressed and avoids the possible biases that payments vehicles can bring to CVM studies (Marzetti [11],p.17). In order to help frame this value, a VoE question should invite a comparison between the beach in question and alternative recreation sources. This also brings the respondent to consider the trade-

off between using the beach and the alternative sites. As Whitmarsh et al. ([10], p. 455) conclude, "By thus focussing on choice and sacrifice, it attempts to go to the heart of the problem of economic valuation." However, they also note that VoE results are not limited by people's income (ibid: p.461).

The most useful Mediterranean European data for the value of enjoyment from beach use appear to be those from Marzetti [11] and Camp Israel [8]. The former uses Value of Enjoyment surveys for four beaches, of which only two have usable survey sizes. The beaches are Lido Di Dante on the North Adriatic Cost near Ravenna and the Barcola Seafront in Trieste. The VoE method does not require a payment vehicle to be specified. Their mean daily use values are reported in Table 3. The Israel study combines travel cost and other revealed expenditure data to estimate the value of beach visits. Its results are discussed further below.

The Marzetti study results in Table 3 show that the figures vary considerably between the two sites. The Lido Di Dante has three relatively distinct areas, varying by the levels of development – the least developed end is the most popular. Spring/ Summer values are between €25 and €32 and Autumn/ Winter values are between €4 and €20[iv]. The standard deviations are large and do not exclude the possibility that the value may be zero for some individuals. Barcola is a crowded beach, and 'New Beach' is likely to be primarily used by locals. Values there are much lower – around €5 to €8 in Spring/ Summer and €5 to €6 in Autumn/Winter. Again the standard deviations are large.

Both sites have alternative beaches in the vicinity. We are not told the number of visitors to the Lido Di Dante, but we are told that there are 235,000 inhabitants of Trieste, and the survey found that 63.8 percent of residents visit the beach and that the beach is primarily used by residents, on

average 20.9[v] days per resident. This gives an estimate of beach use of 3.1 million beach visits per year. A greater proportion of the town visits the beach in autumn/winter than spring/summer but spends a shorter time on the beach.

Table 3: Mean and Std. Deviation of daily use values of Beach Use in Italy (€2003)

	Spring/Summer	Autumn/Winter	Length of Beach

Lido Di Dante
    Whole Sample
Developed
Area
    Semi-
developed Area
    Undeveloped
Area
	27.67 (27.67)
	25.41 (26.01)
	27.21 (27.21)
	32.44 (29.38)
		4.10 (12.80)
		16.38 (20.50)
		17.60 (22.65)
		19.62 (23.62)
			2.5 km.
			0.6 km.
			Not given
			Not given.

Barcola:
    Existing
Seafront
    New Beach
	5.24 (7.66)
	8.32 (10.84)
		5.25 (7.97)
		6.45 (9.14)
			2.4 km
			0.8 km.

Source: Marzetti (2003)

4.2.2 Travel Cost and CV Approaches

The range of values given above is comparable to those found in a wider literature. Whitmarsh et al. [10] provide a summary of their own and other studies of coastal recreation. Their valuations range from €12.42 to €15.98 for the UK and €4.27 to €52.98 per person per day for the USA (all adjusted to 2001€). The large figure in the USA was found using the Travel Cost Method for out-of-state visitors to Florida. The next highest US study found €15.17 per person per day. The studies give no indications of the size of the beaches or the numbers of people visiting.

Landry and McConnell's 2004 study [12] used travel costs to estimate the value placed on recreation at two beaches in Georgia, USA. The survey was carried out over three seasons with

over 2000 observations, and found valuations of €772-€9.16 for one beach and €17.01-€18.75 for a nearby alternative.

Sohngen et al. [13] studied visitors to two beaches in State Parks on the coast of Lake Erie, USA. One of the beaches is 1 mile (1.61km) long – the longest beach in Ohio – and both beaches have other recreational features nearby, such as hiking trails and fishing[vi]. They find that the beach with more features has a higher valuation (€31.53) thana site that is more beach-focussed (€19.09).

Polomé et al [14] summarised the literature on coastal defense, and in doing so, developed a benefit transfer function for beach recreation. They found shortcomings in the data arising from studies not presenting the total number of visitors to beaches and numbers of visits per visitor and on-site sample bias. They use 106 observations from 38 different sites in the UK, USA and the Netherlands. The studies were mainly from the 1990s but went as far back as 1975, and were predominantly VoE studies. They find that the average value is around €16 for UK beaches and €22 for US beaches (p.837, both figures have been converted to €2001). There were not enough studies to obtain a value for the Netherlands. However, there is still large uncertainty about these figures. They give the overall average value of informal recreation to be approximately €20 (€2001) per visit (p. 839). They also find that the date of the study makes little difference to the valuation, i.e. studies in the 1970s give similar valuations to later studies. On the other hand the concept of value used such as VoE, WTP etc, is highly significant in determining the result. This could mean that the benefit transfer is flawed, since different types of valuation give different results, or it could be that the differences in value are genuine – the USA studies typically used Consumer Surplus measures whilst the UK typically used VoE.

The CAMP study in Israel [8] provides some useful additional material from another Mediterranean littoral state[vii]. Surveys of vacationers were carried out in 1982 and 1994. Based on these the researchers estimated that the 13 million annual beachgoers spent NIS98 million on travel to the sites, 25 million on entry fees and 8 million on parking. In addition another 18 million persons visited areas close to the beaches, spending NIS79 million. To this total of NIS210 million they added a consumer surplus of 70 percent, making a total willingness to pay of NIS357 million[viii] in 1999 prices. Converting to 2001 prices, and euros we get a figure of €3.5 per visitor. This is considerably lower than the EU/US values presented previously but then Israel has a lower per capita income than the countries from which the other values were obtained.

The Israel study is also valuable as it is the only one that provides an estimate of the non-use value[ix]. A 1999 survey asked households what they would be willing to pay to prevent further construction on the coast. The value that emerged was NIS31/year, or around €9.4 in 2001 prices. This is significant as it applies in principle to the whole group from which the sample was drawn – i.e. the 1.6 million households in the country. Thus the gross annual WTP amounts to €15 million. Some more guesswork is involved in converting this to a value per kilometre of coast. Of the country's 188 km coastline 50 kilometres are used for national infrastructures and defence uses and are closed to the public. The remaining coastline has been designated as follows: 59 kilometres as municipal shores (adjacent to urban settlements), 43 kilometres for preservation as nature reserves and national parks, and 36 for open space (free of all infrastructures and facilities). Thus at present about 79 kilometres are undeveloped. The WTP then amount to €0.12 per household per kilometre per year.

4.3 Other Non-valuation Approaches

Some information on the value of landscapes affected by development can be gleaned from other landscape studies, not related to coastal landscapes. Arriaza et al [15] carried out a survey requiring participants to rank the best and worst pictures in a series. The first few pages summarise the theoretical/ philosophical literature on what landscape is and methods of describing and comparing different landscapes. 226 people were shown 10 panels, each with 16 randomly assigned photographs of the landscape in question (Andalusia, Spain). The photos were chosen to capture the relevant features of that landscape, with and without other features (e.g. olive trees with and without other herbaceous cover, with and without 'pretty' buildings, with and without industrial buildings). The best 4 and the worst 4 pictures in each panel were scored from +4 to -4. These scores were used as the dependent variable in a regression. A panel of researchers assigned each picture a score based on the pictures contents e.g. amount of water, presence of positive man-made elements, and degree of wilderness according to a strict scoring system. They found that the degree of wilderness and positive man-made features have the biggest impact upon a view's desirability. The next most influential factors are the area of water and the colour contrast. This seems to suggest that positive building, for example houses in keeping with the area, can increase the attractiveness of a view.

This study uses a methodology and is well grounded in the theoretical side of landscape evaluation. However, it is unlikely that the results will be very transferable to coastal areas, since people value different landscapes for different reasons, e.g. positive manmade elements may be valuable in some agricultural landscapes such as Andalucía or the Cotswolds, but on coastlines they would be less welcome.

Another approach to valuing landscapes is that of Dramstad et al. [16]. They used the Norwegian national monitoring programme for agricultural landscapes (the 3Q programme) as a case study, focusing on biodiversity, cultural heritage and human experience of the landscapes. A total of 1474 sample squares of 1km x 1km distributed over the country in proportion to the amount of agricultural land. These are taken on a 5 year rotation, so changes are recorded after 5 years. The first round was in 1998.

Dramstad et al looked in particular at heterogeneity in landscapes as a common variable in analyzing biodiversity, cultural heritage and human experience. Heterogeneity of land types is found by dividing the 1km square into 100 sub squares and seeing how many sub squares are different in land type to their neighbours. This forms the heterogeneity index. Preferences for landscapes were found through asking people to rank photographs and text descriptions of the landscape within each square. Photographs were used to represent clearly defined levels of openness. Increasing heterogeneity was found to be a positive change for all aspects of the landscape-based values. This partially supports the Arriaza et al. finding that landscapes with some human construction can be deemed attractive, but it does not provide data directly relevant to coastal zones. Nor does it indicate which kinds of development are desirable. Nevertheless the results are a useful warning that one should not regard all man-made development as 'bad' and that in some cases it can enhance the value of a landscape. More work is needed on the valuation of coastal landscapes using this promising framework.

As far as coastal landscapes are concerned a couple of studies have been conducted in the UK and one in Turkey using non-economic approaches. Morgan and Williams [17] asked coastal managers and students to rank 70 beaches in Wales. They found that the number of people on the beach did not significantly affect the scores given to different beaches, but undeveloped beaches

scored better than those where anthropogenic structures were present. Beach commercialization had an impact only on the rankings of the students.

The other UK coastal study evaluated beach litter, to see which items were most offensive and which were less so (Tudrof and Williams [18]). Not surprisingly people found items that were potentially harmful as the most offensive (syringes, gas canisters), followed by sewage related debris (sanitary towels, condoms). Least offensive were items of natural origin, such as seaweed and driftwood.

The Turkish study (Ergin et al. [19]) develops measures of coastal scenery based on scores derived from a fuzzy logic analysis. The methodology considers 26 coastal scenic assessment parameters which cover physical and human factors. They find top preferences for beach goers in Croatia and Turkey were absence of sewage, water colour and absence of noise and buildings. Access to the beach and landscape features appeared fifth and sixth respectively in Croatia.

These kind of rankings could be linked to values of these different features of a beach but that has not been done as far as we can see.

4.4 Conclusions on Valuation of Coastal Views and Access

The value of beach access vary according to the services provides and degree of crowdedness. There appears, however to be range of between €5 and €30 per visitor per year for European studies and €5 to €15 for US studies, if we exclude some outliers. In Israel, representing a lower income country values are also lower, at about €3.5 The Israel study also provides the only non-use value of conservation of €9.4 per household per year.

While the numbers obtained above are useful, they leave a lot or questions unanswered. We do not know the value of an uninterrupted beach view when simply visiting a coastal area, and how this value is affected by coastal development or other factors relating to the beach. Some of the non-valuation studies provide useful information but it still remains to link it to monetary values. We also do not know the impact on beach visits when access to the nearest beach is impeded. Do individuals go to another beach further away (thus losing welfare) or do they go the same beach but incur a higher cost?

5. Modelling Coastal Developments And Comparing Benefits And Costs

In this section the data on values of landscapes are used to evaluate different policy options. Two alternatives are considered: the first is the option of allowing a beachfront to be developed versus maintaining it as an undeveloped area and the second is the option of developing a whole area of coastline against a smaller area that is more intensively developed (i.e. 'ribbon' versus 'cluster' development). In each case a large number of assumptions have had to be made to give the problem enough structure so that it could be analyzed numerically. The main lessons, however, are, more general than the specific models generate. These lessons are drawn out at the end of the section.

5.1 Coastal Development Versus Conservation

In this example a beach of length X km is taken. In one case houses or hotels can be built along it of varying intensity. Each house or hotel completely blocks the view of the beach from the road and visually dominates the beach. The occupants of the properties have a complete unobstructed view of the sea and can access the beach at zero cost. Other potential users and visitors to the region currently have unimpeded access to the beach and a clear view of the sea. With the construction of housing or hotels they could face total restriction, partial restriction or no

restriction. In each case they will have a reduction in the benefits of the use of the beach, either because a visit now is more costly in time or because they have to go to another beach, further away.

The coastal zone benefits of any development to the new occupants will now be:

$$T = H.V.N \tag{1}$$

Where H is the price of a house with frontage X/N, or the rate for the occupancy of a room in a hotel with such frontage, V is the percentage price premium for a coastal location and N is the number of homes or hotel rooms built along the front. If H is proportional to the size of the frontage (a house or hotel with twice as much land as another has twice the basic price) the total benefits will be independent of the number of homes built[x]. Note that these benefits are a flow over the lifetime of the building. To compare with the costs it is necessary to convert them into annual benefits at a certain real discount rate r (i.e. the actual discount rate less the rate of inflation).

The loss to existing users will be:

$$L = B.P - B^*.P^* \tag{2}$$

Where P people use the beach before development, with an average benefit of €B and P* people use the beach after development, with an average benefit of €B*. For the moment other beneficiaries, such as those who benefit from the view but do not visit the beach are ignored.

In addition there will be a loss of non-use value to people who do not visit but who prefer to see the coastline preserved un developed.

Giving numbers to these values is difficult but some orders of magnitude are possible. The ranges given in Table 4 can be considered plausible. Two ranges are presented, one representative of housing development in a country such as Italy or France and the other in a country like Israel, which has lower use values for access to beaches. In the first case we assume the development is housing for personal occupation and in the second it is hotels with much higher density of occupation.

Table 4: Values or Numerical Analysis of Development Vs. Conservation Option

Variable	Label	Value Range	Comment
Case A: Higher Use Values and Personal Housing Development			
Cost of Basic House	H	€400,000	Value is illustrative for house of 200M2
Premium for Beach View	V	25-80%	Taken from literature. This makes sea front house have a price of €500,000 to €720,000. APPLIED TO 50M. FRONTAGE
Amenity from Using Beach Before Development	B	€20	Taken from literature
Number of Users Before Development	P	3 million/year	no. of visitors at Marzetti for a 2.5km beach near Trieste were 3.1 mn.
Case b: lower use Values but also include non-use value and Hotel Development			
Cost per hotel room	h	€80,000	Illustrative value FOR HOTEL WITH 3 FLOORS AND 30 ROOMS

Premium for Beach View	V	40%	Taken from literature. This makes sea front hotel room have a price of €80, with a 60% occupancy rate, and 'other' costs of €50 per day of occupancy. APPLIED TO HOTEL WITH 50M FRONTAGE
Amenity from Using Beach Before Development	B	€3.5	Taken from literature
Number of Users Before Development	P	3 million/year	Base on Israel study with 31 mn visitors over 24 km.
Loss of non-use value	NUV	€0.3/km/yr	applied to 2 million households basedon isreal study
GENERAL PARAMETERS THAT APPLY TO BOTH CASES			
Length of Beach	X	2.5 km	Values are illustrative and not important to results
Expected Duration of Dwelling	T	40 years	Plausible value from literature
Amenity from Using the Beach After Development	B*		Results are quoted in terms of B* and P*
Number of Users Before Development	P*		Results are quoted in terms of B* and P*
Discount Rate	R	5%	Typical real rate used in EU.

The results are shown in Table 5. They are presented in terms of the percentage loss of benefit for existing users. In Case A we assume a lower density development of owner occupied housing. In this case if the present users lose 5 percent of their benefits, the total loss is €3 million, which is between 6 and 20 times the benefits to the new owners. If the benefit loss is as high as 20 percent the social costs of the project exceed the benefits by between 25 and 82 times. The 'breakeven' percentage – i.e. the percentage loss of benefits to existing users at which costs and benefits are equal – is 0.2 percent in the low case and 1.4 percent in the high case. The actual loss is not known and would be complicated to calculate, needing a model of household travel costs, increases in costs of access to the present beach and alternative beaches available. But one can gain some idea from the relative numbers in Table 5. A 5 percent decline in benefits is well below that shown in Table 3 for the Lido Di Dante, where the difference between a developed area and an undeveloped area is 28 percent. A breakeven value of 0.8 percent (the average of the two values in Table 5) would imply a loss of €0.16 for a person with a net value of €20 for a visit to the beach. If someone was earning €10 per hour, the value of leisure time could be taken as €3 (a 30 percent of the gross wage is often used as the value of leisure). In this case the increase in time costs imposed by the development would have to be only 3.2 minutes. This is a very low additional cost and makes the case for conservation, with these values, very strong. One should also recall that the losses of benefits to those who do not use the beach but are visually impacted by it are ignored. Including these would make the case even stronger.

Another sensitivity test would be to see how many beach users you would need to make the case for conservation. In the above example the annual number of visits is taken as 3 million (from the Italian Lido Di Dante study). With a loss of 5 percent of beach benefit from the users (which is very modest) one would need only 146,000 visitors a year. More than that and the losses of the

users would be greater than the gains from the developers. A number of that magnitude would imply around 1200 visitors a day in the high season (July and August) and 600 visitors a day in the shoulder season (May and June, September and October).

Table 5: Benefits and Costs of Beach Development Vs. Conservation

CASE A	Low	High
Benefits	€291,000	€932,000
Costs		
With 5% loss	€3,000,000	
With 10% loss	€6,000,000	
With 20% loss	€12,000,000	
Breakeven % loss	0.5%	1.6%
CASE B		
Benefits	€2,800,000	
Costs		
With 20% loss	€2,700,000	
With 30% loss	€3,800,000	
With 50% loss	€4,800,000	
Breakeven % loss	25.2%	

In Case B, where we assume a high-density development of hotels along the entire 2.5 km, the calculations are less favourable for conservation. The value of the development is now much higher, with the greater number of occupants (around 657,000 occupants assuming double occupancy and a 60 percent occupancy rate). The losses of benefits to present users have to be around 25 percent for the conservation option to apply. We have assumed a loss of non-use value here of €600,000, based on the figures given in Table 4. Taking these out of the loss calculation leaves a required loss to users of €2.2 million, or €0.7 per visitor. We assume a WTP of 3.5 per visitor, which means the required use value loss is around 20 percent of the present benefit, which is less than the difference between the value of a developed area beach and an undeveloped area

beach in Italy. Doing a calculation of the time cost such a development might impose let us assume an hourly average wage of €4 per hour and thus a value of time of €1.2 (using the same 30 percent value of leisure time). Then the beach development would have to impose an additional cost of 35 minutes to get to the nearest beach, which is plausible. The other sensitivity test is to see how many visitors to the beach we need for the losses to exceed the gains to the hotel developers. With a loss of 40 percent of beach use benefits the number of visitors would have to be at least 636,000. Again, in the examples looked at, this would be a modest number for many situations.

5.2 Ribbon Versus Cluster Development

Another alternative option to consider would be to compare a 'ribbon' development along the entire coastline with a 'cluster' development, where a limited amount of coastline is taken up in an urban development and the rest is left untouched.

Using the same basic data as in Case A one can assume that the development of the entire coastline of 2.5 km. is replaced by a cluster development that takes up only 500 meters of the coast and extends back to the mainland for a depth of 5 dwellings. So the number of units constructed is the same as in the ribbon development but they are clustered.

The differences with respect to the previous ribbon development are the following:

1. Houses with a restricted view of the sea, in the second tier of houses will have values that are 8-27 percent of the value of houses in the first tier, declining linearly to zero by the last (5th tier). This reflects the fact that they would have limited sea views and would be further from the sea.

2. Losses to beach users will be lower. Assuming the development is at one end of the beach, losses will be the same those as in the ribbon development for those who used that part of the beach before, and will reduce linearly down to zero for those 2 kilometres from the development. Figure 2 shows the assumed loss of value from the development

Figure 2: Loss of Benefit from Cluster Development
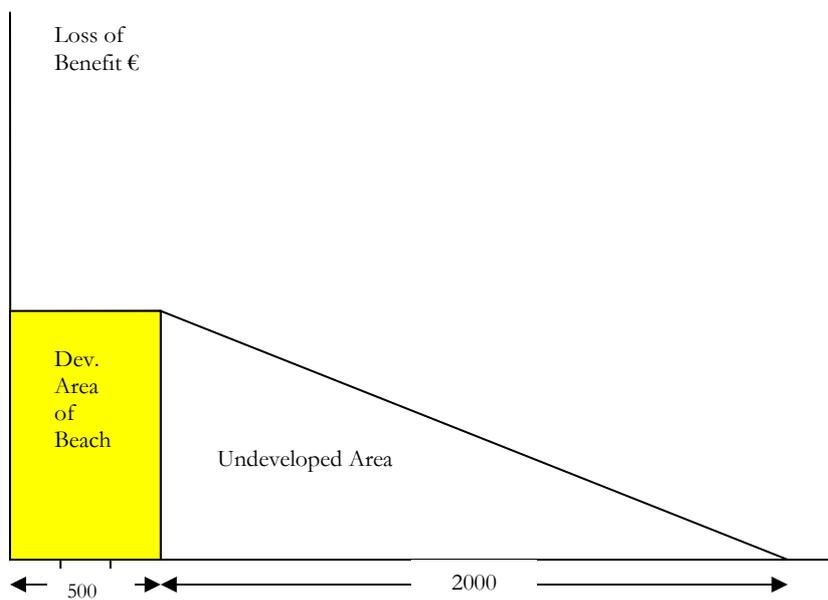
The results are shown in Table 6. The loss of benefits is much smaller with a cluster development than it is from a ribbon development – 60 percent lower in this example. Similarly the generation of benefits is also smaller to owner/occupiers – down by about 67 percent. The conclusion remains, however that even this kind of cluster development has lower benefits than costs. The smaller losses to other users still leave a larger potential loss than the gains to the owners/ occupiers.

Table 6: Benefits and Costs of Ribbon Versus Cluster Development

Ribbon development	Low	High
Benefits	€146,000	€776,000
Costs		
5% loss	€3,000,000	
10% loss	€6,000,000	
20% loss	€12,000,000	
Cluster Development	Low	High
Benefits	€49,000	€155,000
Costs		
5% loss	€1,200,000	
10% loss	€2,400,000	
20% loss	€4,800,000	

6. Conclusions And Recommendations For Regulation

This paper looks at the growing pressure on coastal resources from 'artificialization' or conversion of natural habitats into man-made ones. This pressure has been increasing steadily, at least since 1970 and probably from before then. Even since the 1990s when the problem has been recognized and attention devoted to tackling it, the rate of urban development along the coasts has continued to increase in most countries.

The paper surveys briefly the regulations for coastal zone management and finds that integrated management, along the lines being discussed and proposed by researchers working on ICZM, is rarely effective in its implementation. Legislation is now in place in several countries that purports to provide the right regulatory framework, but it is being hampered by a lack of coordination between the regulating authorities (e.g. those responsible for land and sea and those responsible for different levels of government). The presence of specific coastal legislation does not appear to guarantee a better performance in terms of coastal protection. Lack of compliance is a problem, although the full extent of it is not known, except for a few countries. Illegal

construction is a frequent phenomenon and is encouraged by modest fines, the granting of amnesties for dwellings that have been in place for a number of years and the practice of applying a statute of limitations on legal proceedings against violators.

It is not possible from the data available to establish how effective the different instruments such as setback policies and other regulations have been in protecting coastal zones. A detailed assessment of the extent of violation of the setback rule therefore is needed. But even that would provide only a fraction of the information that should be collected. With a small setback area, at most a few hundred meters, a policy of intense development close to the sea is feasible and can result in a coastal zone that is substantially developed. Thus a wider assessment of the effectiveness of regulations by measuring outcomes is required. Some limited evidence that is presented is not encouraging – it does indicate continued and increasing pressure on coastal natural resources.

The experience so far indicates that a stricter regime is needed to protect overdevelopment of coastal resources. The practice of amnesties for illegal construction must stop and illegal units should be more frequently subject to demolition. The use of normal planning regulations for land use needs to be buttressed by special conditions that apply to littoral zones that extend beyond the common range of 100-200 metres. In these zones construction should be completely banned. A second zone, perhaps up to one or even two kilometres, should be subject to special permission from an authority that is responsible of ICZM and that supersedes other planning authorities. Decisions on permitting development in this zone should be part of a strategic plan, in which the external costs and benefits as discussed in this paper are fully taken into account.

One possible regulatory tool could be the use of transferable development rights. An authority that restricted development in one area would compensate those who lost value as a result of such a restriction by allocating rights in other areas. Such systems have been an effective planning tool in municipalities and districts in the US and elsewhere. Alternatively authorities that were given coastal development rights could share the benefits with those where the rights were denied. Such a system applies in Italy (the so-called 'perequazione urbanistica'). The system has allowed areas to be protected by arranging the transfer of benefits from other areas from as long ago as the early 1980s. (See Box 2).

Box 2

Box 2: Perequazione Urbanistica in Italy

The idea behind the Perequazione Urbanistica is to share the benefits and costs of changes in land use status across communities and individuals. So, if one community or person is given the rights to develop land from agricultural or recreational use to use for dwellings, and another community is restricted not to develop land in this way, the two communities may share the benefits from the increased development.

The scheme works by allocating to *all* residents in a given area the right to develop *a part* of their land. Then planning laws are introduced which in effect prohibit the exercise of this right in some places. These laws also define certain areas of land for public use – roads, parks etc.

Those who cannot exercise their right by virtue of the planning regulations can sell these rights to others so that they can develop more of their land than their right allocation allows. Where the state needs to acquire land for public use, it does so at the agricultural value of that land, but this still allows the owner to sell the rights to development to another person who needs more than he or she has. In this way no one suffers from a planning restriction.

The scheme has been applied in Italy specially to acquire land for public services with resorting to compulsory purchase under an Eminent Domain law or its equivalent. But it has also been applied to ecologically oriented uses. An example is the case of Cantù (near Como) where it has been used to stop the urbanization of some Greenfield areas. Another is the case of Chiavari (near Genoa) where further development of the hills above the resort town have been deprived of development rights, but these can be exercised elsewhere.

Another important instrument that can protect coastal development is land taxation. It may be possible to tax increased land values when development rights are accorded for coastal areas and use the revenues for the protection of other areas, including transfers to these areas to make up for restricting development. This serves a similar purpose as the perequazione urbanistica in Italy, except it uses a tax instrument.

In general the authorities should seek to use fiscal instruments such as the above where possible. Given the difficulties in policing development, and the very strong incentives that individuals have to break the law by undertaking building in violation of planning regulations, it makes it much easier for the authorities to achieve their goals if costs of conservation are shared equitably. That said, some degree of protection of the coasts will always be needed. This can only be achieved if the political will is there.

In any plan for coastal protection there will be positive and negative externalities to account for. The data available are limited and more needs to be collected on the value of beaches with and without development, the value of coastal landscapes without development and with different types of development, the costs of limited access to beaches and the ways in which beach users respond to increased development. As this paper shows, however, the evidence is strongly in favour of conservation for plausible cases. The benefits to owners and developers of beachfront developments are often smaller than the plausible losses to beach users. Taking account of important non-use values will make the case for conservation even stronger. Finally we note that the losses are much greater from ribbon development than for cluster development. All these results need, however, to be strengthened with further research.

Acknowledgements

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ENDNOTES

[i] The only littoral states that have not been covered are Albania, Greece, Libya and Lebanon and Morocco. Greece was excluded for reasons of time and the others because of a lack of information.

[ii] There is no unique definition of coastal zone. The European Environment Agency (EEA, 2006) offers the following: The coastal zone is interpreted as the resulting environment from the coexistence of two margins: coastal land defined as the terrestrial edge of continents, and coastal waters defined as the littoral section of shelf seas. Together they constitute a whole, which needs a specific methodological approach and dedicated management methods. Coastlines are determined from the Corine land cover data base (CLC). The terrestrial portion of the coastal zone is defined by an area extending 10 km landwards from the coastline. Where relevant, assessment of the basic coastal zone is enhanced by comparisons between the immediate coastal strip (up to 1 km), the coastal hinterland (coastal zone between 1 and 10 kilometre line) and the non-coastal national territory, called inland. The marine part of coastal zone is defined as a zone extending 10 km offshore (i.e. as in Natura2000 coverage analysis) or a variable zone of shelf sea depending on the issue analysed (e.g. navigation routes, territorial waters, fisheries, coastal dynamics). The generic term used is coastal zone, but coastal area, coast, coastal space and coastal systems are used synonymously to better accommodate the particular context.

iii Notes for Table 2:
Algeria. The 100-300 m limit is in built up areas. Otherwise the limit is 0.5 km between settlements that are of 3km coastal length.
Croatia. The sea limits for development are 300 meters.
Turkey. Laws applying to coastal zones include the Shore Law of 1990 (modified in 1992 and 1994); Fisheries Law of 1971; Harbours Law of 1923 and Special Protected Areas Law of 1989.

[iv] The study makes no comment on the somewhat curious result for the Whole Sample of Lido Di Dante in Autumn/Winter, which is out of line with the other results.

[v] The average number of days spent on the seafront in Spring and Summer is 23.5 and in Autumn and Winter is 18.3; assuming these are equal numbers visiting in both seasons the average days per resident spent on the beach is 20.9. The report does not give clear indications of how the number of residents visiting the beach per season changes, but it does tell us that 73.5 percent visit the seafront in autumn and winter, suggesting it is if anything higher in winter.

[vi] The two beaches are Headlands and Maumee Bay. The Ohio State Parks websites for them outline their key recreational features and are found at
http://www.ohiodnr.com/parks/parks/headlnds.htm and
http://www.ohiodnr.com/parks/parks/maumeebay.htm.

[vii] Discussions with Israeli researchers revealed considerable doubts about the quality of this study. Nevertheless we include it as one of the very few that provides orders of magnitude estimates from a Mediterranean state.

viii The study also adds local expenditures by the municipalities to provide cleaning services etc. of NIS145 million a year. In our view, however, this is not appropriate. These outlays are a cost of providing the services that the visitors enjoy, in which case it should be subtracted from their expenditures to arrive at a net willingness to pay. Since other estimates are not net values we have not made such a correction but equally we have not added the municipal expenditures to the visitors WTP.

ix Given that the Israeli study is not published in a peer reviewed journal we must not place too much weight on it. Nevertheless it is useful as a gudie to what are probably plausible values.

x T is now given as: $T = \alpha(X/N).V.N$, where is the proportionality factor for a basic house. The resulting value is then $\alpha .X.V$.

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