

that may be highly effective in

these different planning and management-effective local, coastal management of these different categories

Order of Perceived Effectiveness^a

	Average effectiveness rating ^b
	3.85
	3.71
	3.69
ize risk	3.67
	3.59
azard areas	3.58
azard areas	3.55
	3.53
n hazardous to	3.46
or	3.43
d areas	3.33
prehensive plan	3.33
	3.24
	3.16
	3.06
	3.00
es	2.98
	2.94
estate transactions	2.93
enic easements	2.88
	2.53

Development Management Tools and Techniques

Conventional Zoning

Conventional zoning ordinances control the type of land uses allowed in particular parts of a community (e.g., residential, commercial, industrial) as well as their intensity (e.g., bulk, height, floor-area ratio, setback provisions). Zoning ordinances can be very useful, then, in accomplishing a variety of local goals, for instance, to prohibit or reduce development in environmentally sensitive coastal lands (e.g., coastal wetlands, aquifer recharge zones, wellhead protection zones, maritime forests). These ordinances can be used to prohibit or restrict development in high-risk hazard zones, thus reducing exposure of people and property to hurricanes, riverine flooding, and other coastal hazards.

In addition to identifying permissible land uses, zoning ordinances also frequently stipulate a variety of performance controls or standards. These include, among others, setback standards (e.g., side yard and front yard setbacks), height restrictions, restrictions on the extent of impervious surfaces, and stormwater management requirements. In many ways, there has been a substantial "greening" of traditional zoning ordinances in recent years with greater attention paid to managing development in ways which minimize environmental degradation. For instance, open space and recreational uses may be the most appropriate activities to be permitted in high-risk areas, such as ocean erodible zones and NFIP V zones. Restricting such areas to commercial or public recreational activities would substantially reduce the amount of property at risk and in turn the property losses to accrue from future hurricanes and storms.

Zoning, with its emphasis on separation of uses, predictability of land development, and regulation of building height, bulk, and land area is the most common regulatory device for guiding coastal development. Zoning has been upheld as constitutional and a legitimate exercise of the police power since the U.S. Supreme Court decision in *City of Euclid v. Ambler Realty Co.*, 272 U.S. 365 (1926), but the application of specific provisions is still subject to challenge. In North Carolina, for instance, the Supreme Court has held that a zoning ordinance is valid unless "it has no foundation in reason and is a merely arbitrary or irrational exercise of power having no substantial relation

to the public health, the public morals, the public safety, or the public welfare in its proper sense."

Zoning can and has been very useful to many oceanfront communities in reducing or keeping density down in high-risk shorefront locations. The town of Nags Head, North Carolina has changed beachfront zoning to reduce the extent of high-density development, hence reducing the risk to lives and the tax base.

Setback Requirements

The concept of a development setback has long been a part of zoning and is an especially important regulatory element in many coastal communities. Setbacks are used in urban settings to ensure that sufficient land is available for future roads and other public improvements and to ensure adequate light, access, and separation of structures. Setbacks in coastal hazard areas are an extension of this zoning technique and have become relatively common as a means of minimizing the impact of development on beach and dune systems and reducing exposure to storm hazards (e.g., Kusler et al., 1982; University of North Carolina, 1984). Such setbacks may be state-mandated or local option. As we have seen, North Carolina's CAMA requires small coastal developments to be located landward of the first line of vegetation, a distance of 30 times the annual rate of erosion for that segment of coast. In the case of multifamily structures and structures of more than 5,000 square feet in size, the setback is 60 times the annual rate of erosion.

The city of Myrtle Beach, South Carolina, is a good example of such an oceanfront setback. It has adopted a retreat policy and has delineated a 50-year erosion line to implement the policy. Only certain limited uses are allowed seaward of the line (e.g., sun decks, patios, gazebos, walkways).

Community Character

Zoning ordinances are also used by many coastal localities to protect community character. The town of Canon Beach, Oregon, for example, has included in its zoning ordinance several provisions intended to preserve the community's image as an artist colony and to protect the small-town coastal feeling that attracts tourists each year. Among other things, the town's zoning code specifically prohibits drive-in and "formula food" restaurants. The latter are defined in the

code as any restaurant "required by contractual or other arrangements to offer standardized menus, ingredients, food preparation, interior or exterior design or uniforms" (Beatley et al., 1988). Excluded, then, are the likes of McDonalds and Pizza Huts. The town has also created a special design review board which imposes certain design standards on new development. (Hilton Head, S.C., imposes similar design standards.) The town of Nantucket, Massachusetts, is another example of a coastal community imposing architectural design standards in an effort to protect the integrity of the town's historic architecture.

Subdivision Ordinances

Subdivision regulations govern the conversion of raw land into building sites and the type and extent of improvement made in this conversion. Subdivision regulations can control the configuration and layout of development. They can also establish effective requirements and standards for public improvements, including streets, drainage pipes, sewer outlets, and so forth. The requirement of minimum lot size, although usually done in the zoning ordinance, can reduce the amount of new development exposed to storm hazards. Site plan review and other requirements of subdivision approval can provide the opportunity to encourage the location of development sites in ways which minimize storm risks. For instance, subdivision regulations may require that new single-family dwellings on lots in hazard areas be sited so as to maximize the distance from high-hazard oceanfront areas.

Dedication or reservation of recreation areas adequate to serve the residents of the immediate neighborhood within the subdivision is often required. Dedications of a specified amount of land (usually for parks or schools) or money in lieu of land force the developer of the subdivision to provide for needs generated by the subdivision. When the developer is allowed to pay in cash instead of in land, the community is given additional flexibility in meeting the needs of the subdivision. If, for example, a good park site is not available on the land owned by a developer, the cash contribution can allow the local government to purchase a nearby park site for the neighborhood.

Subdivision approval might also be made contingent on mitigation actions such as the protection of dunes, wetlands, or natural vegetation. For instance, subdivision provisions may require that structures be located a sufficient distance from protective dunes. Subdivision

approvals may also be made contingent upon the planting of certain vegetation and the restoration and repair of existing dunes. Another promising alternative is to preserve the option of moving a structure back from the ocean by requiring lots which are sufficiently deep for this purpose. The additional depth could be considered analogous to the "repair" areas often required for septic tank use. If necessary, a structure could then be moved to the landward portion of the lot, in a safer location.

While traditional zoning and subdivision controls are in relatively common usage in coastal areas, as Table 8.1 indicates, there are major concerns about their ability to effectively promote local sustainability. In the following sections we describe some of the limitations of traditional land use controls and more recent trends and innovations which respond to these concerns.

Critique of Conventional Zoning and Subdivision Control Traditional zoning and subdivision controls have come under increasing criticism in recent years. "Euclidean zoning," in its traditional effort at classifying and sharply separating different uses, is increasingly seen as inflexible, rigid, and promoting inefficient and undesirable land use patterns. Fixed in early thinking that certain noxious commercial and industrial uses (e.g., the tannery or noisy factory) must be kept separate and isolated from residential uses, conventional zoning has created land use patterns which virtually require automobile use, work against pedestrian orientation, and reduce social interaction and the integration of uses and activities viewed today as important ingredients in the livability of cities and towns. Such rigid land use controls, moreover, discourage creative land development and design.

Conventional zoning and subdivision controls are also criticized for how they function in newly urbanized and suburbanizing locations. In many coastal localities it is common to require 5- or 10-acre-minimum lot sizes. The objective is to protect the coastal character and to minimize the need for public facilities and other public investments. What often results, however, is a wasteful consumption of coastal land, allowing or requiring that such areas be carved up that much faster because of the minimum lot size.

In many coastal areas, however, larger lots may be legitimately mandated for environmental protection reasons—for instance, to reduce

the amount of nonpoint source runoff and the number of on-site septic tanks, etc.

It is perhaps paradoxical that in such sensitive environmental locations keeping density down through such large-lot requirements may lead to a pattern of unsightly development, wasteful land consumption, and loss of coastal open space. This is a trade-off that local coastal officials must grapple with. It is important to recognize, however, that even where density must, for environmental or ecological reasons, be kept to a minimum there may well be other land use control techniques available that do not create such development patterns—for instance, development clustering, acquisition of sensitive lands, and transfer of development rights (all discussed below). It is also important to understand that it is not the tool *per se* that produces desired or undesired results, it is how that tool is used.

Urban Growth Boundaries A common criticism of American urban growth patterns is that there is usually no sharp or clear separation between urban and rural areas. Urban development sprawls into the countryside and important agricultural and natural resource areas. Commercial development tends to follow highways and major roads, leading to the pejorative description "strip commercial." As we have seen, traditional land use controls may not prevent coastal sprawl, and indeed may facilitate it.

A few cities and towns around the country are experimenting with the use of urban growth boundaries (UGBs), which limit the spatial extent of urban development and growth and seek to promote a more compact and contiguous urban growth pattern. As yet there are few notable examples of coastal communities that have employed the UGB concept, but the state of Oregon mandates the adoption of UGBs by all incorporated communities. Under Oregon's statewide growth management system (Senate Bill 100), cities must delineate an UGB (through negotiation with counties) that includes a sufficient supply of land to accommodate approximately 20 years of growth. Major public facility expenditures (e.g., for sewers and water) can only occur within the UGB, and major residential development projects are not permitted outside UGBs. One example of a coastal community employing the UGB, in combination with other management tools, is Canon Beach, Oregon.

The UGB concept can be an important tool, then, for coastal localities seeking to promote more efficient, less land-consumptive development patterns. In redirecting growth and activity inward, such a technique may also have the advantage of helping to reinvigorate existing towns and communities and provide a critical cross of people and development to support a variety of cultural amenities, businesses, vibrant and active public spaces, etc.

Some coastal communities have sought to use these and other techniques to support and sustain traditional village growth patterns. The island of Nantucket is an example of such an effort, only somewhat successful, however. The island town experienced a major real estate boom in the mid- to late-1980s. Much of this growth occurred in a large-lot, sprawl fashion. The town's *Goals and Objectives for Balanced Growth* (1990) states its desire to control this pattern and the resulting destruction of open space. It is the objective of the town

To create a land use management system designed to guide future development into or near designated "growth areas" consistent with the Island's historical settlement pattern and within reach of infrastructure, while discouraging development in designated "low-growth areas." (p. 16)

Coastal localities may need to consider a host of other related changes in policy to help bring about growth containment, if this is a desired goal. Sufficient and necessary public services, facilities, and other public investments must occur in designated growth areas, and restrictions on any substantial building outside of these areas must also be enacted. Other policies might include eliminating the prohibition (quite common) on accessory units (or "granny flats") in residential areas, identifying existing vacant infill development sites and promoting new development in these areas, permitting and encouraging adaptive reuse of sites and buildings in already existing towns and communities, and allowing for and promoting the mixing and integration of different land uses (e.g., commercial, residential, etc.).

Redirecting growth back toward existing city and town centers has many potential payoffs, including increased economic vitality, a greater supply of affordable housing, more efficient provision of services and facilities, creation of more vital and livable urban spaces, and protection of coastal open space and sensitive lands. Efforts of older

port communities to revitalize their waterfronts and rejuvenate their downtowns represent positive moves toward coastal sustainability. Baltimore's Harborplace is one of the most successful examples of such an effort.

Clustering or "Creative" Development Another increasingly mandated requirement is the *clustering* of development. Clustering may either be required generally or be presented to developers as an option. Applied either way, these provisions do not affect the overall density permitted on a particular site but instead seek to concentrate or cluster a higher density of structures on portions of the site. By directing density to a particular portion of a site, clustering can both permit and encourage development to locate on the less-hazardous portions of a site, while preserving hazard-prone or more sensitive areas in an undeveloped state.

A prime opportunity for accomplishing such a reorientation of development could occur during reconstruction following a damaging storm. For instance, post-storm development regulations could encourage clustering new development on the landward side of the ocean highway, with parking and recreational open space areas on the seaward side. Undeveloped beachfront areas may typically include features such as wetlands or vegetation, which in themselves serve to protect against storm forces. Clustering may also encourage the construction of buildings that are more structurally resistant to storm forces. Clustering can also economize on the public facilities, such as sewer, water, and roads, which must accompany development, in turn reducing the amount of property at risk.

Traditional Neighborhood Development Considerable attention has been paid in recent years to revisiting the qualities and characteristics of the traditional American town, and attempting to encourage new development which embodies and reflects these characteristics. Among these qualities are an orientation toward walking (and less emphasis on the automobile), a mixing of different uses (i.e., residential, commercial), incorporation of a public or civic realm (e.g., public squares and open space, civic buildings), and clustering of development around town centers. Architects Andres Duany and Elizabeth Plater-Zyberk are often credited with popularizing the notion of "neotraditional"

planning, and have been instrumental in designing a number of neotraditional communities, the best known among these is Seaside, Florida.

Proponents of neotraditionalism (recently relabeled by some as "new urbanism") are critical of traditional American zoning and development codes, which often impose rigid and inflexible development standards. Such codes typically require the sharp separation of uses (so-called Euclidean zoning), mandate minimum street and parking requirements favoring auto use, and encourage large-lot conventional (cul-de-sac) style development patterns. Increasingly, to overcome such rigidity, localities are adopting traditional neighborhood development (TND) ordinances, which allow greater flexibility in the layout and design of projects.

Neotraditional towns also have substantial potential to protect the natural environment and minimize the consumption of land in the development process. In the design of Seaside, for instance, most of the town is set well back from the Gulf of Mexico, with a wide strip along the beach preserved in an undeveloped state as open space. The pedestrian orientation and mixing of uses have the potential to substantially reduce auto usage, with accompanying reductions in air pollution, energy consumption, etc. In scaling back on the width and extent of roads and parking lots, such development patterns have the potential to be much less costly.

Bonus or Incentive Zoning Bonus or incentive zoning allows developers to exceed limitations, usually height or density limitations, imposed by the zoning ordinance in exchange for developer-supplied amenities or concessions. For example, a builder may be permitted to exceed a height restriction if he or she provides open space adjacent to the proposed building. Incentive zoning has been used for some time in large urban developments. In New York, for example, a developer may obtain a 20% increase in permissible floor area for projects which incorporate a legitimate theater. Density bonuses have been given to encourage the incorporation of low- and moderate-income housing into development projects (Fox and Davis, 1978). In the case of coastal hazard areas, developers may be granted additional development units if projects incorporate hazard-reduction features. These features may include the dedication of sensitive coastal lands, for example, or the

provision of design features that increase the ability of structures to withstand storm forces.

Hilton Head, South Carolina, has employed density bonuses for several years in exchange for dune restoration, beach access, and improvements in neighborhood drainage (Beatley et al., 1988).

Critics of density bonuses sometimes express concern that the traded mitigation and design amenities do not make up for the negatives of increased density. While an oceanfront development project may provide, for instance, additional drainage improvements, it can be argued that the increased number of people and property now at risk to a coastal storm make the outcome a questionable one. Density bonuses will tend to be the most successful where the added density occurs in especially desirable locations (e.g., an existing town center where additional density may even be seen as a positive contribution).

Performance Zoning Performance zoning sets standards for each zone based on permissible effects of a development rather than specifically enumerating the types of uses, dimensions, or densities permitted. If the prescribed standards are met, any development is allowed in the zone. This technique has been extensively used in industrial zoning to set limits on noise, dust, noxious emissions, and glare. More recently, the technique has been used in broader applications, with standards keyed to demands on public services such as water supply, wastewater treatment, and roads. Application may involve protection of the environment by specifying maximum levels of permissible stress on natural systems. For example, a community may specify the amount of permissible disturbance of vegetation in a given zone, and any use would have to meet that standard before development could take place. Performance controls for sensitive lands may work as a system to protect natural processes in environmentally sensitive areas, such as wetlands, floodplains, and dune systems.

Planned Unit Developments A number of coastal jurisdictions have adopted special provisions to allow planned unit developments (PUDs). PUDs combine elements of zoning and subdivision regulation in permitting flexible design of large- and small-scale developments which are planned and built as a unit. Specific plans for the development are required in advance and must be approved by the

administrative body. This concept eliminates the lot-by-lot approach common to zoning and subdivision regulation and can be used as an incentive for better development by enabling complete development proposals to be planned and approved.

In its simplest form, planned unit development takes the shape of cluster development. An example might involve a developer with 100 acres of land, which he could divide into 400 quarter-acre lots as a matter of right according to existing local ordinances. Cluster zoning would give the developer the alternative of clustering units closer together in one part of the site, provided that the overall number of units does not exceed 400. The open space saved by clustering is left for the common use of the residents. From this simple "density transfer," planned unit development builds into complex forms. In its most advanced stage, PUD allows a variety of housing types as well as commercial, agricultural, and industrial uses. Typically, developers are permitted to develop under PUD provisions when the proposed development exceeds a minimum specified number of acres or housing units. Planned unit developments are usually subject to zoning ordinances, although they are not actually mapped, and must therefore comply with the use restrictions within the zones where they occur. Increasingly, however, some mixing of uses and expansion of density are permitted.

The PUD technique provides flexibility because the final design is a matter of negotiation between the developers and the planning authorities. PUDs are generally attractive to developers of large tracts of land. These projects can often be provided with urban services and facilities more economically than conventional development. They also allow environmental protection of sensitive areas while providing for residential and commercial development. PUD project design can enhance storm hazard reduction requirements when the developer's plans incorporate features such as protective land and vegetation buffers and the provision of on-site storm shelters.

Carrying Capacity

The possibility of tying permitted new growth to the capacity of a coastal locality and its residents to respond to a storm hazard is a well-known use of carrying capacity. Such an approach has been employed in the growth management system adopted by Sanibel Island, Florida.

Shortly after the island was incorporated, a comprehensive plan based explicitly on the capacity of the island's natural and built environments to sustain new growth was developed. Evacuation of the island was calculated to take five hours, assuming 12 hours of warning and subtracing from that a four-hour hazard cutoff time (beyond which evacuation is not possible) and a three-hour mobilization time (i.e., time required for warning, preparation of residents, and for establishing an evacuation system). The capacity of the island was thus the number of people who could evacuate in that time.

Carrying capacity means the natural and manmade limits to development beyond which significant harm will occur. Carrying capacity can be used to assess the effects of development on such natural factors as groundwater supply and wetlands productivity and manmade factors such as sewage treatment and roadway capacity. This concept has been applied in practice to a number of coastal localities. Several implications for storm hazard reduction arise from the application of carrying capacity analysis. The first is that, as in Sanibel, carrying capacity is particularly relevant to assessing evacuation capacity. Second, natural and manmade limitations on coastal development may provide a rational means to regulate the location and quantity of new growth, which in turn may serve to reduce storm hazards. Carrying capacity objectives, in other words, may be used to reinforce and complement efforts to reduce storm hazards generally.

Land and Property Acquisition

The acquisition of land and property, or interests therein, may in many cases be a very effective approach to achieving a variety of coastal objectives, from hazard reduction to reduction of nonpoint sources to conservation of coastal open space. Several acquisition approaches are discussed here: (1) fee-simple acquisition of undeveloped land, (2) acquisition of less-than-fee-simple interests in undeveloped land, and (3) fee-simple acquisition or relocation of existing development.

Fee-Simple Acquisition of Undeveloped Land Fee-simple acquisition involves obtaining the full "bundle of rights" associated with a parcel of real property. With respect to local sustainability, land acquisition may have several functions. The first is to secure for the public certain lands, especially those that are sensitive, vulnerable, or

hazardous and which should not be developed. A large-scale public acquisition of land can serve to influence the direction and timing of development in a locality. Urban land banking programs, particularly popular in Europe, have attempted to regulate growth by preventing development in some locations while strategically releasing other land more desirable for development. Land acquisition can also be used to secure, in advance and typically at lower prices, land that will be needed at some point in the future for public facilities and services.

The use of fee-simple acquisition as a coastal management tool poses a number of practical questions. Perhaps the most significant problem is the cost and means of financing acquisitions. Outright purchase of land in coastal areas experiencing moderate or high levels of market demand will tend to be very expensive—prohibitively so for many localities.

There are several examples of coastal communities that have successfully employed fee-simple acquisition. Nantucket's Land Bank is one of the best examples. Created in 1984 in response to a growth boom and the attendant loss of open space, the bank is funded through a 2% real estate transfer tax (paid at closing by the buyer). This funding source has proven to be an effective way of generating a sizable level of funding, and is probably much more politically feasible than many other possible sources (e.g., raising local property taxes).

The Nantucket Land Bank is independent of the town and is governed by a commission. In addition to its power to impose the land transfer tax, the bank also has the power to float bonds, which it has recently done, in order to acquire as much land as possible before it is lost to development. The acquisition program will do much to help the island preserve its natural environment (e.g., the moors and hearthlands) and may prove to be one of the most effective growth management tools for promoting more traditional village-oriented growth patterns.

The positive Nantucket experience has spawned land acquisition initiatives in other locations (e.g., Martha's Vineyard, Mass.; Little Compton, R.I.; and Hilton Head, S.C.).

Acquisition of Development Rights Where the fee-simple purchase of hazardous lands is, for various reasons, not feasible, the purchase of less-than-fee-simple interests in land may work. One such approach is to acquire just certain rights to develop environmentally sensitive,

high-hazard, or other lands that should not be developed. Under this arrangement, rather than fee-simple title, a local government would pay the landowner the fair market value of just those rights in exchange for agreeing to leave the land in an undeveloped state for a specified period of time (but often in perpetuity). The transaction is usually accomplished through a restrictive covenant attached to the property.

As with fee-simple acquisition, a number of practical questions arise. First, in what manner are development rights to be acquired? Does the jurisdiction use its powers of eminent domain or does it simply negotiate with willing sellers on the open market for the development rights? This question may have significant implications for the ability of the purchase of development rights (PDR) to protect large blocks of sensitive coastal land. For instance, relying on voluntary sales may permit, even encourage, substantial development in an adjacent undeveloped sensitive area, thus doing little more than shift new development from some parcels to other parcels within the area. Through the use of eminent domain over the entire area, this potential "checkerboard effect" can be prevented.

There is, as well, the question of exactly which development rights are being purchased by a locality. The greater the economic use that stays with the property owner, the greater will be the parcel's remaining fair market value and hence the less costly will be the development rights. Exactly which uses are permitted after development rights have been purchased may also influence overall property at risk in other areas. For instance, if private recreational activities are permitted, this may in turn induce further residential and other development in adjacent areas where development rights have not been purchased. These types of development influences and side effects should be considered when defining the rights to be purchased and the types of uses and activities that will be permitted.

PDR can be used effectively in collaboration with development regulation. On the one hand, restricting development in a particularly sensitive area of the jurisdiction may prevent the checkerboard effect that sometimes results from a voluntary PDR. In turn, PDR may serve to soften the economic effects of development regulations and reduce as well the political oppositions typically engendered by regulatory programs.

While not widely used, the prime example of PDR has been in protecting farmland. Suffolk County, New York, King County, Washington, and the state of Connecticut have used the PDR concept to protect farmland (Duncan, 1984).

As an alternative to the purchase of development rights, a coastal locality could encourage the donation of scenic or conservation easements. Landowners can be encouraged to make such donation in large part because of the income tax deductions permissible under the Internal Revenue Code.

Transfer of Development Rights One potentially effective approach to managing coastal development patterns is the transfer of development rights (TDR). TDR is an innovative approach to development management which is being used in only a few places in the country (Carmichael, 1974; Costonis, 1973; Rose, 1975; Merriam, 1978). The basic concept underlying TDR is that ownership of land includes a right to develop the land, a right which may be separated from other ownership rights and transferred to someone else. For example, under a TDR system, an owner may sell this development right to another property owner, who under the TDR system must collect a specified number of development rights before developing his or her property at the desired density.

Commentators have theorized that the use of TDR can substantially eliminate the value shifts and inequities of zoning by allowing the market to compensate owners who under a normal zoning scheme would have the development potential of their land restricted with no compensation (Rose, 1975; Merriam, 1978). A TDR system can be either voluntary or mandatory. Under the latter, a locality would simply zone open space or sensitive coastal lands so that development would not be allowed, and the owner of land within this zone would then be permitted to transfer all or some of this unused development density to parcels in designated development areas or to sell the development rights on the open market to others who own land in areas designated for development. The locality would then permit increased levels of development in the receiving zone as a result of possessing extra development rights, thus creating a natural market for the transferable development rights. A voluntary approach would simply present the transfer as an additional option for the landowner—a way of main-

taining the land in its undeveloped state if the landowner wishes. The landowner in this case would still have the option of developing his or her land or selling it for development purchases.

The TDR approach raises a number of sticky practical issues. First, there are several alternative institutional arrangements for operating a TDR program. On one hand, the transfer of development rights can be left entirely to market dynamics, with the locality only involved in designating sending and receiving zones and determining the number of rights to be transferred. Whether a selling landowner receives a fair price for his or her rights will depend simply on what the market will provide. While there are policy decisions which must be made in the initial allocation of rights, the local government adopts an essentially hands-off stance once the system is created. An alternative institutional structure would have the jurisdiction play a more direct and active role in the development rights transaction itself, perhaps serving as a broker—buying and selling rights as needed. This in turn helps to ensure that an adequate price is obtained, thereby overcoming short-term market fluctuations. While the latter approach would permit greater control over the price and quantity of rights sold, it would also require greater government expense and oversight. An intermediate position might permit the local government to enter the market at occasional critical points while leaving the bulk of development rights transfers to the dynamics of the local market.

Another difficulty is devising a methodology for assigning rights. They might be allocated strictly according to acreage (e.g., one right per acre) or to the market value of the property. Eventually the question will arise as to whether additional rights should be allocated. If new supplies of development rights are needed, a practical and fair procedure for allocating additional TDRs must be devised.

The locality must also decide how rights transferred from sending zones can be used. If a developer purchases 10 development rights from land in a sensitive area and seeks to apply them in a receiving zone, what rights is he or she entitled to? Each additional TDR, for example, might translate into a certain amount of additional floorspace or square footage allowed in the receiving zone. In the case of residential development, these additions may be measured in terms of additional dwelling units or bedrooms.

The use of TDRs can also be viewed as a form of compensation

when restrictions are placed on development in storm hazard areas. For instance, although an oceanfront landowner may be prevented from developing his or her land (by an open-space or recreational-zoning classification), he or she may be able to realize a portion of its development potential by transferring allocated development rights to areas of the jurisdiction less environmentally sensitive or important. Viewing TDR as primarily a form of compensation raises several questions; chief among them is the extent of compensation deemed to be desirable or equitable. At what point will the market value of a development right be unacceptably low as a form of compensation? If full or substantial compensation is a goal, this may require a more active role for government in the development rights market, say, by entering the market to buy rights at times when demand is low.

A large-scale TDR program requires extensive information and knowledge about local market conditions and land development trends, and this can represent a major limitation. For example, how large should the receiving zone be, and by how much should the locality raise permissible densities to ensure an adequate demand for development rights? How readily will landowners in sending zones sell their development rights and under what conditions? One reasonable approach to these empirical limitations is to develop a modest TDR pilot program, with relatively small receiving and sending zones which can be monitored closely over time.

Taxation and Fiscal Incentives

The specific management provisions included in this broad category are designed primarily to affect indirectly the quantity and type of development to occur in sensitive coastal lands. In contrast to the public acquisition of land, a taxation policy might seek to reduce development in certain areas by decreasing the holding costs of open space and vacant land, in turn reducing the opportunity costs of not developing such lands for more intensive uses. While taxation and fiscal policy can encompass numerous specific tools and mechanisms, attention is primarily focused on differential property taxation and special assessments and impact fees.

Differential Taxation The use of differential taxation is based on the theory that, by reducing the property tax burden on undeveloped

parcels of land, pressures to convert the parcels to more intensive uses will be reduced by decreasing holding costs and increasing the profitability of current uses. Almost every state now has provisions for some form of preferential assessment (Coughlin and Keene, 1981; Keene et al., 1976). The uses which are typically eligible for property tax relief are farm and forestland, open space, and recreational uses.

Three basic variations of differential assessment are currently in use: pure preferential assessment, deferred taxation, and restrictive agreements (Keene et al., 1976). Under the first type of program, preferred land uses are assessed, for local property tax purposes, not at their fair market value (i.e., the potential development value) but rather at their value in their current uses. If the land is in farmland, for instance, it is assessed according to its agricultural use value, usually based on a state-determined capitalization formula. If after several years of receiving the lower assessment, the benefited landowner decides to develop the land, he or she is still permitted to do so without having to repay the property taxes foregone as a result of the use-value assessment. In contrast to this pure approach is that of deferred taxation. The difference here is that the landowner changing the use of his or her land is required to repay a portion of the tax benefits received. However, the recapture period is typically not very long, with five years perhaps the average. In addition, most states using this approach require the landowner to pay interest on the recaptured fund, usually at a below-market rate. A third approach, the use of restrictive agreements, is best exemplified by California's Williamson Act (Gustafson and Wallace, 1975). Here, in order for qualifying landowners to obtain lower tax assessments, they must be willing to enter into written agreements to keep their land in its current use for a minimum period of 10 years. This contract is a "rolling-front" agreement which is self-renewing each year unless the landowner explicitly notifies the locality of an intention to change the use. There are also provisions which permit the landowner to break the contract subject to certain penalties.

While differential taxation has been used in most states as a technique to preserve farmland, its effectiveness at retaining land in undeveloped uses is generally found to be low. Preferential assessment may indeed reduce holding costs somewhat or even substantially, but in the face of high market prices, and thus high opportunity costs of maintaining land in open space, the pressures to develop will generally far

outweigh the tax incentives (Dressler, 1979; Duncan, 1984). Consequently, differential assessment is likely to be most successful in situations where development pressures are slight to moderate and where landowners are actively interested in maintaining the present undeveloped use of the land.

Differential assessment will also be a more effective tool when used in collaboration with other approaches, such as the regulation of new development, the fee-simple purchase of land, and the transfer of development rights. For instance, reducing the permissible development density in a hazardous location, together with preferential assessment, may reduce opportunity costs to the landowner enough to reduce actual conversion of hazard lands to developed uses.

To maximize the effects of these tax benefits, a locality could consider establishing mechanisms for funneling tax benefits to those lands with the greatest protection or conservation value. This might entail, for example, the reduction of local assessments/rates of taxation in excess of what is provided under uniform state differential assessment provisions, thus providing greater tax benefits for parcels of open space, forest, and farmland of special value.

Special Assessments and Impact Fees People who build in and inhabit sensitive coastal areas (e.g., high-risk hazard zones) often impose substantially greater costs on the public than those who dwell elsewhere. These costs are realized when a hurricane or coastal storm strikes or threatens to strike a locality. Here there are public costs of evacuation, search and rescue, temporary housing, debris clearance, and the reconstruction of public facilities such as roads, utilities, water and sewer lines, and so on. One public policy approach is to acknowledge that additional public expenses will be entailed by permitting development in certain hazardous areas and to assess those who will ultimately benefit from the expenditures. This approach can be accomplished through several means.

One technique is to attempt to tie more closely benefits received and costs incurred through the use of special benefit assessments. A special assessment, while not technically a tax, is a method of raising revenue in which all or part of the cost of a facility (such as a road improvement, sewer, or water system) is charged to a property owner who is so situated in relation to the facility as to derive a special benefit from

the improvement. The tax charged each property owner is usually proportionate to the frontage along which the facility abuts his or her property, the area of the land served by the improvement, or the value added to the land served by the project. Special assessments are typically confined to a geographical district in which property owners are determined to receive a direct and substantial benefit in excess of the general benefits received by the public at large (Hagman and Mischynski, 1979).

To apply the special assessment concept to storm hazard management, a locality would designate an area in which "special storm services" are provided and in which residents would be subject to the special assessment. This approach raises a number of issues. The first is how the extent of the special assessment is determined and justified. Imposing a special assessment may require a number of assumptions, and rather rough estimates, about exactly what public costs are associated with an actual or potential hurricane. The magnitude of these costs will, of course, depend on the assumed size and severity of the storm event, among other things. It would also be difficult to determine what special storm services would be needed, on whom the special assessment should be levied, and on what basis the assessment is calculated—an *ad valorem* property tax or a levy on the number of dwelling units.

A variation on the theme of requiring private parties who impose public costs to pay for them is the *impact fee*, which are increasingly popular with local governments around the country. In theory, the impact fee levy is designed to recoup and mitigate the overall "impacts" of a project or development on the community at large—impacts that may extend beyond the immediate environs and requirements of a discrete project or development. For instance, while a special assessment may be levied to cover the immediate costs associated with the flood-proofing of sewer and water service, an impact fee would cover broader and more diffuse consequences of development in a hazardous area that are less clearly related to services or benefits received directly by a specific site or development. An impact fee is not designed to cover the costs of a specific improvement by which a particular development will reap a special benefit, but it is designed to require the developer (and future residents who purchase these properties) to compensate the public for the additional costs of these consequences.

The impact fee may be instituted as a separate instrument or, more typically, attached to the exactions process during development review and approval (Hagman and Mieczynski, 1979). In some states, the impact fee may also represent a way of getting around legislative and court-imposed limitations on the extent of exactions permissible (e.g., restricted to the installation of roads, sewers, and other facilities, or the donation of open space, school sites, and other land) (Stroud, 1978). The impact fee holds promise as a formal procedure for calculating and assessing impacts which may present a greater level of certainty for developers than currently exists under the highly negotiated exaction process. Adjusting the expectations of the development community and creating a relatively clear and consistent set of public safety and environmental management obligations may well be an important local objective.

Capital Facilities and Public Infrastructure Policy

Coastal development—its type, location, density, and timing—is highly influenced by capital facilities such as roads, sewers, and water services. Such public investments have been aptly termed “growth shapers.” In this section we will briefly review the potential role to be played by the location, type, and timing of capital facilities in managing coastal development. Issues relating to the financing of these facilities have been discussed in a general way in the earlier section on taxation and financial incentives. The use of particular pricing policies may also significantly affect patterns of development, but this strategy is not discussed here.

Policies to Prevent Location of Public Facilities in Sensitive or High-Risk Areas There are two primary dimensions of public investment in capital facilities which have implications for local management; one is geographical, where capital facilities are placed, and the other is temporal, when they are put in place. With respect to the first dimension, a locality can develop an explicit set of capital facilities extension policies designed, for instance, to avoid high-hazard areas, thus reducing the amount of development and property attracted to the area and the potential threats to lives and property. This approach can only become an effective deterrent, however, if development in such areas is dependent upon (or deems highly attractive) the exis-

tence of public facilities. If, as is often the case in resort areas, coastal development is able to obtain water through individual site wells and dispose of wastewater through septic tanks, a reorienting of sewer and water facilities by the locality will do little to impede growth in undesirable locations. It may then be necessary for the locality to foreclose other service/facility options available to developers by, for example, restricting the issuance of septic tank permits. But without valid health reasons, foreclosing such alternative options for development may be legally problematic.

The use of public infrastructure policy in order to restrict or direct the growth of a city, however, may be subject to a variety of legal challenges. Within the city limits, a city may be required to provide equal service to all its residents once it provides a service to any of them. The city may extend utility services beyond the city limits, but only within reasonable limits and for the public benefit. The city, when considering the extension of services beyond its limits, must consider the amount of territory to be serviced, its distance from the city, and the effect that the extension will have on customers' rates and the city's capital debt structure. If the city extends services beyond the city limits, it has some discretionary power to condition the provision of the services. The agreement to provide extraterritorial services is contractual in nature, subject to the usual rules of bargain and contract. Rates may be higher for extraterritorial customers.

Redirecting capital facilities, and the development which accompanies them, into safer or more desirable areas of the locality can be facilitated through several means. One is the clear delineation of an urban services area in which the jurisdiction agrees to provide certain facilities or services. The service district might also entail a temporal dimension, including sufficient land to accommodate 10 or 20 years of future growth under various assumptions (as discussed in the earlier section entitled Urban Growth Boundaries).

The urban services area technique has several advantages. It provides a long-term perspective on growth and development and permits developers, residents, and the local government to visualize where and when public facilities will become available in the future, and where they cannot be expected. This, in effect, modifies long-term expectations about where future development will and will not be acceptable to the community. Development pressures may tend to shift naturally

as a result of this public designation, as developers, landowners, and others realize that certain facilities will be made available outside the designated areas. However, restriction of public facilities, which curtails the overall amount of development that take place in a community, may raise suspicions of "no-growth" objectives. Consequently, the local government should make a good faith effort to designate a service area in safer, less sensitive, and more desirable areas within the locality sufficient to satisfy growth demands, so as to enhance the political and legal acceptability of the urban service area approach.

In more intermediate terms, the locality needs a policy instrument by which to systematically identify, finance, and sequence specific capital improvements. This is generally the function of a capital improvement program (CIP). Ideally, the CIP follows closely designated service boundaries, as well as the comprehensive plan, zoning, and other regulatory and planning provisions. The CIP provides a specific framework for making short-term (annual) decisions about which improvements to make and where. Avoidance storm hazard areas can easily be incorporated into this instrument and decision framework as a specific CIP policy.

A close connection between the designation of service areas, the capital improvement program, and the overall planning process (including the local comprehensive plan) in a jurisdiction is essential. Such a close function linkage will tend to enhance the combined effectiveness of each policy or technique in advancing overall local objectives and will emphasize their authority. From a practical standpoint, the concept of guiding growth through capital facilities should be closely linked to the objective of reducing the public costs of such facilities and the extent of public investment at risk to coastal hazards. The latter consideration is, by itself, a legitimate argument for denying facility extension into hazard areas and provides a sound legal rationale for a hazard-sensitive capital facilities extension policy.

Several recent hurricane hazard mitigation planning efforts illustrate the potential role of capital facilities in guiding growth into less hazardous coastal areas. The Surf City, North Carolina, hurricane hazard mitigation plan suggests the use of sewer service extensions as a means to divert growth to less hazardous areas of the locality:

The Town should actively encourage development in the southern section of the town. Specifically, it is the area where

future high density development should be concentrated. Additionally, if an actual sewer system is developed in the near future, it should be designed to serve these areas rather than another section of the community where development in hazard areas would be encouraged by such a system. (Town of Surf City, N.C., 1984)

The hurricane hazard mitigation and reconstruction plan for the town of Nags Head contains similar recommendations, particularly in an attempt to discourage further growth in an incipient inlet area:

In the short term, the Town will explore the possibility of limiting future water service extension in the largely undeveloped area in the Whalebone incipient inlet area. While this does not preclude future growth, it ensures that the town will not be a willing participant in placing property at risk. (Town of Nags Head, N.C., 1984)

It should be remembered that public investments encompass more than sewers and roads, and include numerous structures and buildings from town halls to schools to police and fire stations. Again, it may be possible to locate these investments in areas less susceptible to storm forces, in turn serving to reduce the quantity of actual public property at risk and discouraging the location of other private development, and in ways which achieve other local objectives. By locating public structures in specific strategic location, and by constructing them to certain specifications, it may be possible to use them as storm shelters.

Relocation or Strengthening Capital Investments after Disaster

Events Opportunities may exist after a hurricane or coastal storm has occurred to implement a community's capital facilities objectives. It may be possible, if the facilities are sufficiently damaged, that roads and sewers can be rebuilt in areas less susceptible to damage from the next storm. Even if the facilities are not relocated, they may be repaired and reconstructed in ways which make them stronger or less susceptible to storm forces. Roads and sewers can be elevated, for instance, and sewer and water lines can be floodproofed. Also, placing power and telephone lines underground after the storm will help ensure safer evacuation when the next storm threatens.

It may be possible as well that public facilities can be reconstructed in ways that not only reduce the possibility of their own damage but which reduce other storm-related hazards. As before, the presence of certain public facilities will influence development patterns. If certain facility repairs are not permitted to occur after a storm has hit, this may preclude or discourage the private redevelopment of the area. This technique was used subtly in the Baytown, Texas, case. The option of selling out and leaving the Brownwood Subdivision was made much more attractive to homeowners because they were uncertain that sewers and roads would be restored or maintained.

A similar approach might be taken with the rebuilding or reconstruction of damaged public buildings such as town halls and fire stations. If sufficiently damaged, it may be logical to move these structures to safer sites in the community. After Hurricane Camille, for instance, the Pass Christian Town Hall was rebuilt on higher ground and consequently was much more protected from future storm damage than if it would have been rebuilt in the same location. When structures are not relocated, it may be possible to repair or rebuild them in ways that reduce their susceptibility to future storm damage, such as through elevation. It may be desirable as well to rebuild public structures in ways which permit their usage as storm shelters.

Information Dissemination

Classical economic theory supposes that the more informed consumers are, the more rational and allocatively efficient their market decisions will be. This implies an additional set of local management strategies which aim primarily at supplementing and enlightening individual market decisions regarding the hurricane and storm threat. Several approaches can be taken in this vein.

The first approach is to seek mechanisms and processes which effectively inform potential buyers of the risks and physical characteristics associated with a particular area. Hazard information could be provided in several ways. Legislation might require that real estate agents inform prospective buyers about the potential dangers or risks. Prospective owners might be required to sign disclosure forms as a condition of receiving a development permit.

Whether such real estate disclosure provisions truly have any influence on the decisions of coastal developers or homeowners is ques-

tionable, however. This disclosure technique has been used in California in an attempt to inform prospective homebuyers of the risks of living near earthquake fault lines, and some evidence about effectiveness is available here. Under the Alquist-Priolo Special Studies Zones Act, a real estate agent or individual selling property must disclose to the prospective buyer the fact that the property lies in a "special studies zone" (earthquake fault zone). A study by Palm (1981) indicates, however, that this requirement has had little measurable effect on the market behavior of housing consumers. Among the problems identified are a tendency for homeowners to place a low priority in the earthquake threat, the issuance of the disclosure in the latter stages of a home purchase, a downplaying of the importance of the earthquake hazard zones, and a disclosure technique (a single line that says simply "in Alquist-Priolo zone") that conveys little or no real information about the earthquake risk. As Palm (1981, p. 102) observes, "At present, real estate agents are disclosing at the least sensitive time in the sales transaction, and are using methods which convey the least amount of information about special studies zones."

Consequently, if similar disclosure requirements are to be applied in coastal areas, the disclosure must be provided early in the sales transaction, preferably during the initial agent-purchaser meeting, and the disclosure must convey real and accurate information about the location and nature of coastal hazards. Not only should the disclosure form or process be labeled in a meaningful way (i.e., the home is in a "storm hazard zone" or "high-risk erosion zone," as opposed to an ambiguous "special studies zone"), it must provide a full description of the nature of the coastal risks. More passive types of hazard disclosure might also be useful. Included in this category are requirements that coastal hazard zone designations be recorded on deeds and subdivision plats and that public signs be erected indicating the boundaries of erosion or flood hazard areas (and perhaps the location of past storm damage). A number of coastal states and localities have used such passive approaches (and indeed is required under the NFIP).

Community Awareness Programs

A different approach is to institute programs which attempt to directly educate the housing consumer about coastal hazards. These programs might take the form of brochures and other materials distributed to

new and prospective residents of the community, informing them of the nature and location of hazard zones and information about what to look for in a new home or business structure (such as elevation and floodproofing). For existing residents, this approach may be one of educating them about actions they can take to enhance the integrity of their existing structures (such as installing "hurricane clips") and reducing future property damages.

A locality might also attempt to disseminate hazard information on the "supply side." This technique might take the form of construction practice seminars for coastal builders and developers, introducing both conventional and innovative approaches to building and designing structures and to siting and planning the orientation of buildings in vulnerable locations. The success of such a strategy, however, depends essentially on the integrity of builders and developers, and those who are conscious and conscientious about storm threats are probably already planning their projects accordingly.

Impediments and Obstacles to Effective Local Management

While there is tremendous potential for effective coastal management at the local level, it is not always easy to develop, enact, and implement such programs. Table 8.3 presents further results from the 1984 study, specifically citing in rank order the perceived obstacles to the enactment of development management measures to address hurricane and coastal storm hazards in high-risk localities. As the table indicates, coastal localities will confront a host of impediments, including general conservative attitudes toward government control of private property rights, general feeling that the community can weather the storm, lack of financial resources, the existence of more pressing local problems and concerns, opposition of real estate and development interests, and lack of trained personnel. Similar problems of enforcement and implementation were highlighted in the survey results (Table 8.4).

Local officials will also likely confront several arguments against development management, including that such requirements will increase the costs of development, will dampen the local economy, and are illegal or unconstitutional (see Table 8.5). Local officials may also

TABLE 8.3
Obstacles to the Enactment of Development Management in Order of Frequency Cited

Obstacle	Frequency	Percentage	Importance index ^a
1. General conservative attitude toward government control of private property rights (N=359)	319	88.9	3.38
2. General feeling that community can weather the storm (N=357)	309	86.6	3.09
3. Lack of adequate financial resources to implement mitigation programs (N=347)	296	85.3	3.41
4. More pressing local problems and concerns (N=351)	291	82.9	3.28
5. Opposition of real estate and development interests (N=355)	286	80.6	3.06
6. Lack of trained personnel to develop mitigation programs (N=345)	278	80.6	2.91
7. Lack of incentives or requirements from higher levels of government (N=345)	278	80.6	3.02
8. Opposition of homeowners (N=338)	252	74.6	2.64
9. Opposition of business interests (N=337)	241	71.5	2.60
10. Absence of politically active individuals and groups advocating hurricane/storm mitigation (N=339)	242	71.4	2.85
11. Inadequate or inaccurate federal flood insurance maps (N=342)	215	62.9	2.49

Source: Godschalk et al. (1989).

^aBased on a five-point scale.