ecocities

Rebuilding Cities in Balance with Nature

REVISED EDITION

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CHAPTER 10

Tools to Fit the Task

TOOLS SUITED TO THE TASK of reshaping cities for a far healthier future than the one we are fabricating now — greenbelt laws, for example — have existed for a long time and will remain important far into the future. Some of them, such as the transfer of development rights (TDR), are being used effectively in many places but should be used much more widely and may require redesigning to work better and replicate themselves more quickly. In addition, completely new tools need to be designed to fill out a whole toolbox for ecocities. One of my own inventions, building on Ian McHarg's mapping system in *Design with Nature*, is the ecocity zoning overlay map. There are many more. When Jaime Lerner told the people of Curitiba that environmentally healthy policies and practices were important and that they, the people, were important, he helped create a culture of acceptance and support for very substantial urban transformations from the foundation in land uses on up. Given a culture of support in which people take problems and solutions of the sort addressed in this book seriously, these tools can be used to change the world profoundly. Some of them, in fact, can be used effectively by a small number of people right away, and this can build momentum toward more general public support. Then healthy cities and a vital biosphere become possible.

Ecocity Zoning: Mapping the Future

Many planners consider zoning a great invention that lends structure and order to city building. A vocal minority says, in contrast, that zoning has divided the city and precluded the natural development of land uses in complementary relationship with one

another. The anti-zoning camp suggests that destructive segregation is intrinsic to all zoning. I don't agree. The problem, I think, is with the kind of zoning and the purposes it is designed to serve, and it can be largely solved by reshaping zoning itself — on the human measure. How, after all, will we talk about these complex things without a language, visualize them without images such as maps and graphically represented plans? Zoning provides these things, if not in an esthetically beautiful language, at least in words and images that can carry important meanings. Without words and pictures to represent human anatomy, it would be hard to understand and fix our flesh-and-blood physical equipment. So, too, for ecocities.

In support of zoning, it must be said that it does have a certain fairness in the sense that anyone who wants to play the real estate development game — or fight against it — knows generally what to expect. Zoning is simply a means of letting people know what they can build and where and what sorts of activities are allowed there. Many of the ecological and social disasters of ill-conceived and poorly applied zoning can be corrected simply by (1) planning for the city, town, and village walkable distances; (2) creating pleasant, inspiring pedestrian environments; (3) using not flat but three-dimensional thinking; (4) insisting on looking at whole-systems patterns; (5) long-term results. When these five major ideas are added to zoning for restoring natural open spaces; (6) agricultural open space, you get ecocity zoning.

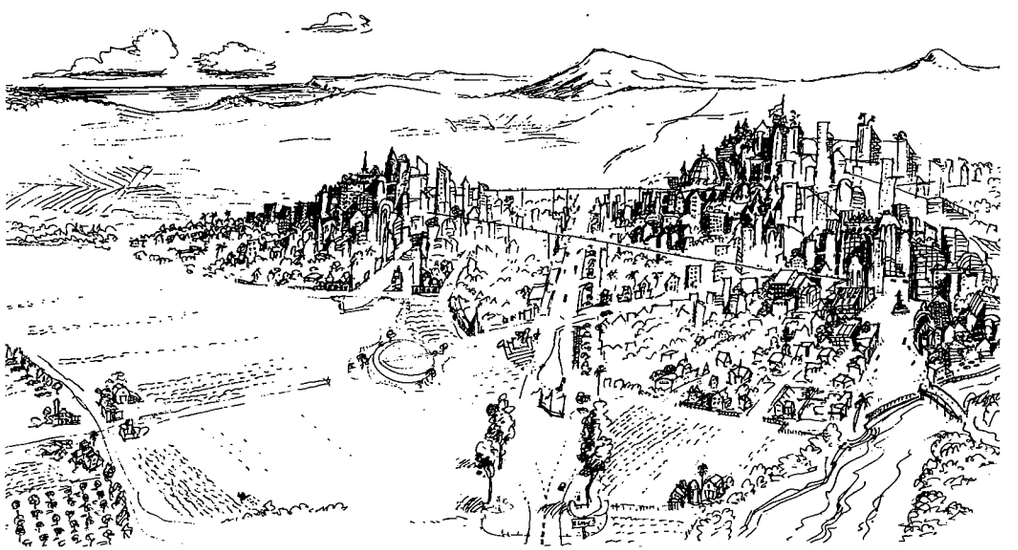
To create such ecocity zoning, first of all we have to acknowledge that the forces that gave us our present zoning are vested in the present system. They are personified, too. They include living, breathing people who are afraid of change in their neighborhoods, business people worried that customers might go away, people who just happen to like the way things are now, and people who know or care little about ecological collapse. Mostly, however, people just haven't heard about ecological planning, much less ecocity zoning. Many might see it as a good idea, including people who can make money on ecocity zoning — among them developers and business people in centers where density and activity increase.

There are people who will be interested in the greater cultural diversity possible with a shift of densities toward pedestrian/transit centers, and environmentalists these days understand that density and transit go well together. Of course they realize that restoration of nature is very important. The next step in their thinking is to realize that ecocity zoning makes their dreams possible as does nothing else. There are those who are unable to find housing near the town centers who want such housing — often desperately, as evidenced in a City Planning Commission meeting recently in Berkeley in which a University of California student said, "I'd be

happy with a prison cell downtown if it were available." It is difficult to gather support from this diverse crowd to outnumber those afraid of the kind of changes represented by ecocity zoning, but it can — and must — be done. In any case, we have to start work on ecocity zoning by simply doing it ourselves as concerned citizens. If it has the value I think it has, it can then be held up to public scrutiny and found to be a powerful and positive tool.

The objective of an ecocity zoning map is to open up landscapes covered by car-dependent development and recover agricultural and natural landscapes while shifting density toward centers. The new density should be in buildings with the sort of ecological features described here in this book and other ones not yet invented. At the same time, the objective is to move toward a far more balanced set of land uses with most aspects of life provided for in a small area in the centers. This means, generally, mixed-use development and very little commuting. It means creating the physical structure of the city so that architecture, technologies, nature, and healthy lifeways can harmonize. It represents — it is — the first step in the four steps to an ecology of the economy (see Chapter 8) and shows how we can put a green infrastructure under a green economy. As a reminder, those four steps are map, list, incentives, and people.

With basic ideas from this book and your own knowledge of the place in which you live, you have enough to get started on an ecocity zoning map. If you consult aware ecologists



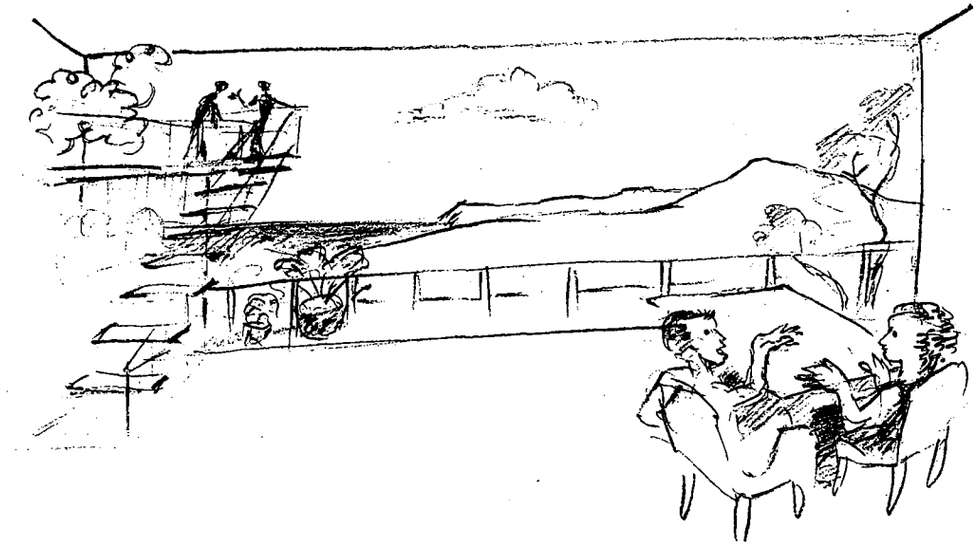
City of constructe
hills in perspectiv
For simplicity of expression, this ci has only three suc hills (compared to eight in the earlie illustrations). Towers can be see to be compacted the "dense" areas but separated mo widely for solar access deeper into the streets, on the sunny sides of the "hills."

and concerned citizens *en route* and then revise, you will produce a good preliminary document. Then you can take a break for a week or two — visit a place that is mostly natural and similar to what your town's location looked like 100 or 1,000 years ago and wander around your town a little to see what attracts your attention. Then return to refine the map. If you want the map to look more professional or attractive, you can find a local geographer, cartographer or artist to help. Then you can put a date on it and start using it. It will never be finished and final; such is the way of all maps.

These are the seven steps essential to producing a viable ecocity zoning map:

1) *Produce a local natural history map.* Visit your library, local college, or historical society to locate the earliest available maps of your town and learn about its natural history — native plant and animal species, weather, climate, soils — and its cultural history. Features from these old maps may include creeks, original marshes, seasonal ponds, springs, shorelines, outcroppings of rock, ridgelines, major animal migratory routes, types of plant cover, areas of steep slope, sunny and shady slopes, archeological sites, old historic buildings, neighborhoods that may now be gone, and so on. Put this information on paper — call it Map #1. It prepares you to assess the priorities for restoration and development and where these activities should take place. You may be going back thousands of years; the exercise will be fascinating. You might generate several maps: one of the natural environment, one of the early settlement and agriculture, one of the historic buildings and transit routes, and so on.

2) *Establish walkable centers.* On an up-to-date map of your town, which will be Map #2, locate the present city, town, and neighborhood centers and draw concentric circles indicating distances from these centers. These will look much like the concentric circles of a target. On about one-fifth to one-third of the land area of the town, in the zones closest to the centers, the density of development should be significantly greater than is the case presently. On about half to three-quarters of the land area of the town, in the zones farthest from the centers and most dependent upon automobiles, there should be much less density of development in the future and, ultimately, only natural or agricultural land uses. The lower the density of the whole town, the smaller should be the percentage in the increasing density area and the larger the percentage in the decreasing density area. Everywhere the mix of uses should become far more complex, even in the restoration areas on the future fringe; all sorts of diverse agriculture and networks and patches of nature corridors and zones can be established in time.



View from inside the city looking out over a terrace.

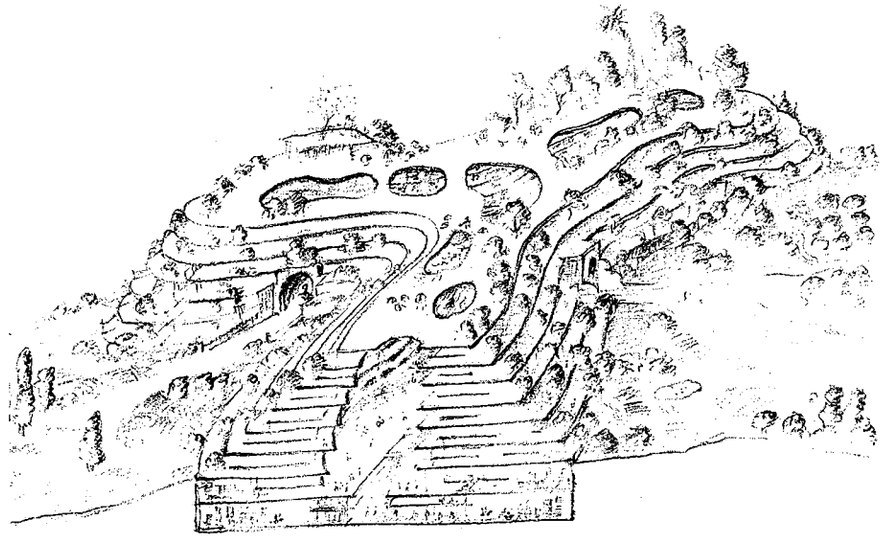
How many concentric circular zones — the bands of your "target" — you choose to draw and how wide they should be depends upon your own intuitions and experience. It also depends on the particular centers in question. Five to nine concentric circular band-like zones give enough definition to different areas to make it clear where more or less development should be happening. Using five zones, for instance, will mean highest density in the centers, second-highest density just outside that zone, a minimal-change area next, an area of reduced density outside that, and finally, farthest from the center, the areas of highest priority for "de-development," that is, for depaving and the removal of buildings, walls, streets, creek culverts, and other structures so that nature or agriculture can be reintroduced and their own regenerative forces be released.

The concentric zones around the centers should be generally larger for the larger centers and smaller for the smaller ones; their size will also depend on the total population of your town and the intensity of existing centers. Let me use Berkeley maps as an example here because this is a city I know well and have mapped in this manner. It is a town of 110,000 people that is, on average, approximately three-and-a-half miles wide, both west to east and north to south. The area around the downtown that should be up-zoned — that is, have its building heights and density increased — should be about three-quarters of a mile in diameter. The areas around the smaller neighborhood centers should be

upzoned for only about two blocks from their centers, give or take about a half-block (four blocks in diameter). Middle-sized areas should be upzoned for about three or four blocks from their centers (or six to eight blocks in diameter). The eventual total area of land covered with development, both thin and intense, depends on these decisions, too. As a starting point, no less than half of the land area should be returned to nature or agriculture. This can be reassessed later. If you take the time to redraw the map several times, it will start making sense and become more self-evident.

3) *Adjust the circular zones and draw them in relation to nature corridors and agricultural areas.* Decide on the best locations for nature corridors and agricultural areas and draw them on a third map. You are now prepared to adjust the concentric circles to create nature corridors and to lay out areas for creek restoration and other special purposes. Some of the concentric circles around the downtown, major centers, and neighborhood centers are likely to overlap, cutting off potential connections between restoration areas. You will need to compress their edges so that the nature corridors can be established. The circular band-shaped zones will thus become somewhat flattened on the sides closest to other circles. The restoration areas between the circles with somewhat flattened sides, together with other natural and agricultural areas including creeks and ridgelines, indicate the location of the future nature corridors connecting future natural zones. Creeks become another kind of nature corridor that can penetrate right into the middle of a center. Creek setbacks — the distance between buildings, streets, walls, and other structures and the creek itself — should be wide in areas far from the centers and narrower in the centers, where land is of very high social and economic value. But creeks should *not* be buried.

4) *Show the limits of discontinuous boulevards and the location of railroad right-of-ways.* Since urban development naturally concentrates around transit hubs (future walkable centers or transit villages) and along transit corridors, draw in higher intensity development areas along boulevards that connect centers. But, somewhere in or near or probably just outside of the minimal change zone, make boulevard development discontinuous — that is, identify the entrance to the center right there. After major land use shifts in the course of many decades, the boulevard turns into a country road at this point, and there is the potential to do something interesting, even spectacular, here. Call these places "gates to the city" or, if defined by large structures, "ramparts." Not just architecture, but arches, sculptures, and big trees could mark these entrances, too.



Hill towns of a special sort. *Gene Zellmer proposes towns with residence on outside terraces with views to nature and agriculture, inside streets sheltered by inside slope of the "hill" for public life.*

As the boulevard-become-country road enters the zone of highest priority for restoration or crosses any special nature corridor, it should rise up on a causeway-like structure or, preferably, plunge underground so that people and natural species can cross without undue disturbance of one another. Railroads should do this, and bicycle and foot paths, too. You can take advantage of hills, even very low ones, and valleys for burrowing under or rising over nature corridors.

Railroad right-of-ways should be featured on the map and if not active, saved for future rail lines or changed into bicycle paths. They should not be built on. Once sold off, this land becomes expensive and difficult to reassemble. Show all these features on Map #3. This becomes your ecocity zoning map.

5) *Prepare sample vertical cross sections.* To make clear the three-dimensionality of ecocity zoning, supplement Map #3 with drawings representing vertical slices through buildings and landscapes, which illustrate various arrangements of uses, ones on top of, as well as adjacent to, one another. Features such as rooftop cafés, bridges, elevators, and terracing, and the relationships of buildings to sun and views can be illustrated in this way to help explain the options for using the third dimension imaginatively and for ecological benefit. These images can be drawn in the margins of Map #3 or on a separate sheet.

6) *Provide keys for the maps in the usual way.*

7) *Add scenario maps.* To illustrate changes into the future, you might draw up several other maps representing different stages in the ecocity's development (Maps #4, #5, and so on.)

A refinement is needed here. You will notice the maps are "centers-oriented." This compares with general low-density "sprawl," which in the real world involves some zones of limited mixed use — hello 7-Eleven — but more prominently, CBD (Central Business District). That's the typical and not very healthy state of US cities. A third alternative general pattern is "corridors-oriented." Imagining these three basic patterns is useful for understanding in the most basic terms the nature of the land use issues we need to be dealing with.

The New Urbanists and people particularly focused on bus transit generally support building up density along corridors. Berkeley, my recent hometown, is loading up with corridors-oriented development as I write. Buses and streetcars stop every other block or so, so they tend to support corridors of development, and corridors of development, in turn, support buses and streetcars. Rail vehicles larger than streetcars stop less frequently and tend to work best with centers oriented land use patterns where larger numbers of people can get on and off at a single stop. Corridors are far better than sprawl, but when we think through ecocity zoning maps, the case has to be made that centers-oriented development is far better than corridors. First of all, New Urbanists and many people boosting buses who favor corridors frequently point out that shops on the ground floor with housing above up to four floors works well in Europe, so let's do it in the US, too. Problem! In Europe, the four-story corridor is typically backed by four-story housing extending perpendicularly to the corridor for several blocks, if not across the entire city. The US corridor, one building thick, backed by single family houses with front, side, and back yards, just doesn't have the density to provide customers for the corridor's ground floor businesses nor enough to make the bus system run without considerable subsidy. The answer: centers-oriented development with higher than four-story limits. Also, take the density back two, three, or more blocks behind the corridors in the area of the centers.

Another refinement: corridors of four-story development are dense enough (expensive enough in terms of investment) to effectively block opening the landscape for nature corridors and bicycle/pedestrian paths running along restored creeks. Therefore, here too, for the restoration of nature and its regenerative power, centers-oriented development is far superior to corridors.

Developing ecocity zoning maps is a challenge, but it is worth it. Doing it yourself will appear to take the initiative from the planners, competing citizen groups, and developers.

Once you've drawn a map, people will rage against your presumption in not having consulted them first (so they could stop you in your tracks). But if you don't draw one, it won't get done and no one will understand what you are talking about. It's damned if you do and damned if you don't, but worth the fight. Presenting two or three versions will help maintain flexibility of vision and invite better ideas. Someone has to exercise some imagination here and take some responsibility. When it comes to maps representing possible scenarios, many people will say they are unrealistic. They are not; they are simply long-range.

I am convinced that the entire ecocity map-making project has to be thought through publicly if it is ever to be adopted by the citizens of any city and serve as more than a fantasy exercise. Map #3 provides guidance. Maps #4, #5, and up, extrapolating into the future, help interpret that guidance. There all sorts of things can be featured, such as keyhole plazas, off-center parks and plazas providing urban views of nature, and quiet public spaces off main streets. "Lone-wolf buildings" — big buildings standing in restoration zones that don't make sense in the centers, scheme of things but have special economic or historic importance — should be saved. When they are relatively far from the centers, their uses may be changed to ones demanding little commuting. They may become very compact ecovillages or be remodeled to become part of very small arcologies. Transformed into factories that are incompatible with residential and social uses, lone-wolf buildings could appropriately stand separate from city centers, collecting workers daily with pleasant country bicycle rides where once there were one-story ranch houses, for example. Or a lone-wolf building's very existence could modify the ecocity zoning map. It could become the hub of a new neighborhood center, perhaps a small artist colony with a coffeehouse to which people could take the streetcar on a Saturday afternoon to watch the sunset and listen to poetry.

A usable ecocity zoning map in our hands provides broad outlines and a considerable number of details. It is essentially a "zoning overlay," as it does not represent the actual official zoning of a city. Its unofficialness is what makes it what I call "shadow zoning," an allusion to the "shadow ministers" of parties out of power in, for example, Australia's parliamentary system. Like shadow ministers, ecocity zoning maps stand ready to take over when there is a failure of confidence; in this case in relation to present zoning, perhaps in view of facts about peak oil, fear about climate change, and disgust with traffic jams. The rationale of ecocity zoning maps is impeccable, and it takes everyone in the Great Majority into consideration, including citizens of the future, animals, and plants. It does not have to wait for the future, either. It can be put to work immediately upon completion.

The ecocity zoning map is not as crisp, hard-edged, or directive as the actual zoning map, though it could be used to modify the existing one. Nor is it the "soft planning" of a regional metaphor like Frank and Deborah Popper's Buffalo Commons (see Chapter 3). It's somewhere in the middle, empowering the building in the physical world of something from the imagination.

The ecocity zoning map is an "overlay" in the sense that it can be imagined as superimposed on the existing map. It can then be used for influencing existing zoning and pushing its interpretation in ecologically healthy directions, encouraging more diversity and density in one place and restoration of natural habitat and agriculture in another while delineating ways to withdraw from automobile dominance everywhere.

The map can be used as a guide for activists. Many environmental organizations oppose, support, or comment on development

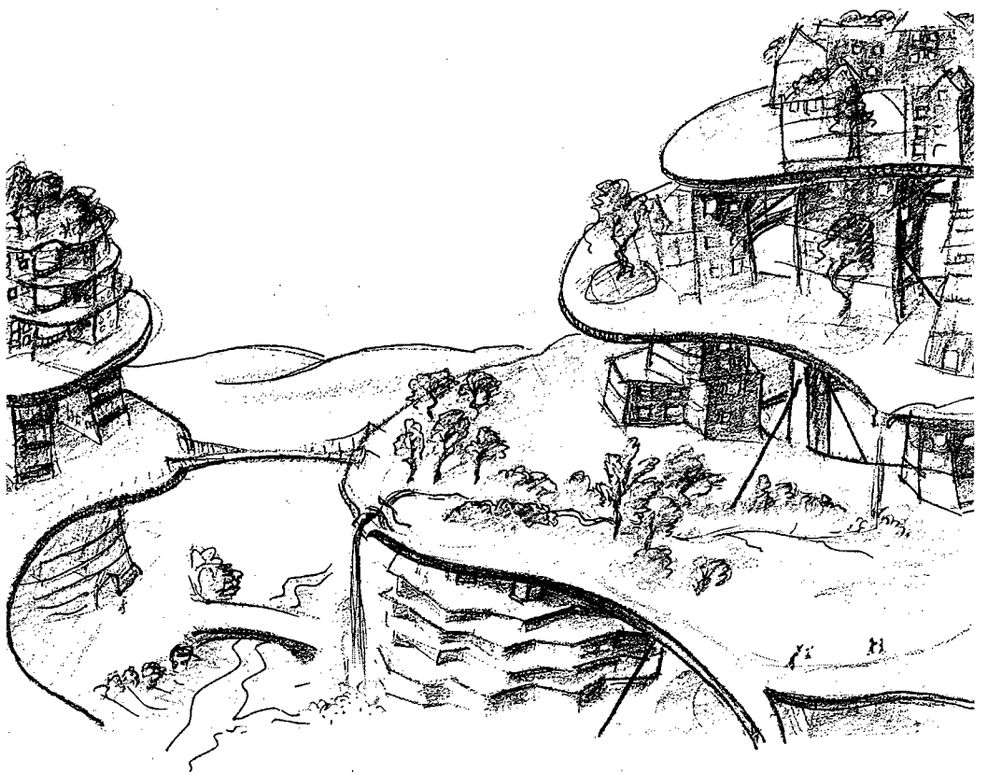


Table land 2. *The idea of building "artificial land in the sky" has been advocated but seldom executed in architecture. Would cost far less than a freeway system and would deliver access without motor transport, except for elevator — which would require far less energy than a freeway system.*

projects in their cities and counties. Ecological zoning maps clarify what should be supported and what should be opposed. As these maps are utilized, their legitimacy increases, and the chances of rebuilding cities for pedestrians instead of cars increases proportionally. Distributed to city council members, developers, and environmental groups, they let them know whether the map makers will support or oppose particular projects and why. It makes for a very fair game board.

Changing land uses in a major way may not yet be a traditional tactic for most environmentalists, transit boosters, creek fans, urban gardeners, energy conservers, bicyclists, and the disabled. But these activists will all discover that applying the ecocity zoning map provides the most powerful context for changes beneficial to their projects and positions that they are likely to ever find. The opportunity for the creation of a powerful coalition awaits their recognition of this potential. If they use the map and support its application, their work can become synergistically reinforcing, accelerating the effectiveness of all their various kinds of actions. This is one of the most powerful aspects of ecocity zoning: it clarifies what changes fit the whole, benefits all the groups striving for a healthier community, and avoids the pitfalls of placing a good development in a bad place.

Ecocity zoning maps help advance us beyond simplistic categorical thinking toward whole-systems thinking. For example, supporters of greenbelt initiatives who attempt to stop sprawl by placing land on the fringes in legally protected farms or nature areas call for infill development, that is, for filling in any vacant space available within existing cities. But if we are to restore nature in places where sprawl is now located, some vacant places should not be filled in. Buying a vacant lot for the restoration of nature or agriculture is far cheaper than buying a lot with a building on it for the same purpose and demolishing the building. Vacant land in or near existing centers should, in contrast, be filled in with appropriate development, in some cases with intensely utilized, big buildings. Ecocity zoning maps tell us where both open space preservation and infill development are best located and where unfill — removal of buildings, driveways, walls, culverts, etc. — should happen, too. Thus the slogan: "No infill without an equal and opposite unfill development!"

The ecocity zoning map can be a guide for developers and owner-builders as well as environmentalists and appropriate-technologists. Some developers would like to contribute to ecological health but don't know how. Ecological zoning maps can help them make decisions as to where particular projects may be helpful and, again, let them know in advance whether the map's supporters will be working for or against the approvals they are seeking from the city. The ecocity zoning map

can also let everyone know how the city's zoning code needs to change if ecologically healthy and imaginative projects are to be built. Often the zoning and incentives are against such projects, but if enough people realize this, the zoning and incentives can be changed.

Thus the ecocity zoning map can also be a guide for policy makers and legislators. These maps begin to establish the framework for a new landscape of ecological laws and regulations — step three of our four steps to an ecology of the economy — as well as, eventually, for the actual physical city itself. They provide an idea around which imaginative legislators can design incentives, disincentives, changed tax structures and codes, and, some day — hopefully sooner than later — official ecocity zoning. The ecocity zoning map puts a land-use/infrastructure foundation under legislators' healthiest ambitions. If they want to be the builders of a civilization designed for the 21st century and beyond, ecocity zoning is indispensable.

At first, ecocity zoning maps will not be enforceable descriptions of how a city should be developed, but they start from what actually exists and therefore are partially implemented already. Even car cities, after all, do exhibit an almost natural expression of the basic pedestrian access-by-proximity principle in their cores where density and diversity are highest, and malls struggle to recreate the pedestrian magnetism that the automobile has close to annihilated by physical distance. These would-be pedestrian centers are engines of economic prosperity that can be tuned up for high economic and cultural performance.

It is very likely, then, that some town and city governments will eventually hire planning firms or knowledgeable local environmental organizations to draw up ecocity zoning maps. Early on, though, we will likely see such firms, organizations, or even teams of urban design students producing ecocity zoning maps without the assistance of governments, their work being paid for by organization membership dues, foundation grants, or the professionals, activists, or students themselves. So far, to the best of my knowledge, Ecocity Builders in Berkeley and Urban Ecology Australia in Adelaide are the only organizations to have produced such maps. Some people may produce ecocity zoning maps just for the fun of it. Maybe the video game SimCity could be redesigned for real relevance and applicability. If the maps are good and pass the test of reasonable local scrutiny, city councils may just endorse them as overlays to help guide zoning changes.

In the meantime, we will see small pieces of the puzzle fall into place in very different ways. State legislatures, for example, may write mixed-use car-free condos and apartments into their housing incentives and require that such developments be located in or near existing transit centers in order to qualify for certain state benefits. City governments may raise the height limit in one or several of their towns' future walkable centers without yet making a commitment to creek restoration or — much better — retain existing height limits but allow much taller buildings if the developers utilize ecological features in their buildings and purchase transferred development rights. A developer may decide not to develop at a particular location, even though the city zoning would allow it, because the ecocity zoning map indicates it should not be developed and people who understand the map will oppose the project. A downtown businessperson may decide to build a multi-story residential addition over his or her store because of the logic behind the ecocity zoning map, namely that the added population means more customers.

It will probably take a long time to reshape any city with an ecocity zoning map. Major changes in density shifts will take a long time if they proceed at the rate of normal replacement for aging infrastructure and would be expensive and constitute a societal investment if accelerated. However, I believe they need to be accelerated if we are to face the challenges of our times. In any case, improvement can be expected immediately, and we can begin moving resolutely step by step in the right direction. Remember Jaime Lerner's comment that major changes can be accomplished in just two years.

The ecocity zoning map is an offering — a kind of illustrated discussion paper — rather than the product of an all-inclusive public process. Simply calling a forum together and asking people how they would like to see their city changed will barely inch in this direction unless someone works resolutely and insistently to insert ecocity principles into the discussion. Ecocity mapping is complex and novel enough that it will have to come from people who have been thinking about it for some time. One cannot expect healthy results by asking a random sampling how to proceed with a medical operation. A surgeon is needed. The city's body is in need of ecocity doctors to get the urban anatomy back together after a terrible accident — a car accident. If there is respect for ecological city design knowledge, the citizen in the street and the ecocity expert can work together. After the pioneers have taken the risks to get the ball rolling, an open political process can amend and adopt it.

Probably the ultimate card up the sleeve of ecocity zoning mapmakers is that the map is based on important information that present zoning fails to consider. With an ecocity zoning map in hand, supplemented by descriptive explanations, you don't need to worry about whether anyone supports you initially. What you are saying makes sense. All ideas and built realities start somewhere as a tiny seed. In this case you have the logic of the human body's needs and dimensions and the logic of ecology

on your side. You have good information about resources and ecology that conventional zoning has yet to deal with adequately if it has dealt with it at all, and your map is based on the spatial and ecological realities of your town. You can simply say, "I support this kind of project in this part of town and oppose this kind of project in this other part of town because these changes are needed to create a pedestrian, low energy, ecologically healthy city." You are in the world of development and city building like the intelligent consumer in the marketplace, and like that consumer you are in an extraordinarily powerful position. Just as the consumer armed with information on destructive companies and a list of green products can boycott or purchase new realities out of or into existence, the citizen equipped with an ecocity zoning map can change the physical structure of society. Starting in small but real ways immediately, by helping you support or withhold support from particular projects and from products and services offered there, the ecocity zoning map works.

A final important point about the ecocity zoning map: You don't have to wait for regional government; you can act now and act very effectively locally. Many thoughtful people promote the connection of land uses and transportation, encouraging higher density near transit and greenbelts. So far so good, but many of the best of them believe we can be only marginally effective until we create regional governments like Metro in Portland, Oregon — governments larger than the city and often embracing several cities and even counties. The idea is to gain the authority and power to rationalize transit, combine conflicting bus lines and commuter rail systems, coordinate schedules, devise greenbelts for whole regions, and select areas for future development. It's true that today's many separate municipal and county governments often create regional chaos in this regard, but it is not true that we can be effective only through regional government. In fact, the ecocity zoning strategy is safer because the intended specific results do not necessarily follow from setting up a regional government, which is almost as likely as a state government to support new freeways and acquiesce to pressure from sprawl developers and the more car-dependent drivers to continue their habits of highway building and car use.

Planning a recent trip from Oakland to Sacramento to see a friend and visit two government offices, I thought it would be fun to take the train. When I called the people I was planning to meet, I discovered that they were scattered all over the big flat town and I would not be able to visit all of them in the same day unless I went by car or spent the time to find a rental car when I got there. Sprawl at the other end of the intercity trip made the use of the train and local transit very difficult within what should have been a reasonable period of time. If Sacramento had been well along in the transitions proposed by an ecocity zoning map — finding its centers and shifting people to those centers so that its own transit system could work efficiently — I could have made the trip by train. What we do in the city we live in to make transit work with the land uses will enable people from far away to visit without bringing their cars. Thus if we act for ecocity zoning, we start to solve the regional problem locally — while reinforcing what a regional government should do when and if it is created.

Transfer of Development Rights

Transfer of Development Rights (TDR) is a real estate transaction tool established in zoning ordinances that makes it possible to buy and transfer the rights to develop from one piece of property to another. Most commonly, TDR is used to protect natural or open farmland from development or to save historic buildings. If the owners of real estate can sell their land for development, but there is good reason not to develop there, ordinances in some jurisdictions make it possible for developers to buy those rights and "sever" them from the deeds. The people selling the development rights get the money, but they and any future owners are prohibited from developing the property from then on. The developer who bought the rights, however, is allowed to shift those development rights elsewhere and build more than would otherwise be allowed by the local government. With the help of TDR, hundreds of thousands of acres of land and hundreds of buildings have been preserved in the United States that otherwise would have been developed in the case of open land, or demolished and then replaced with more development in the case of buildings.

Double TDRs are twice as good. They are a particular kind of TDR that removes the existing buildings, driveways, walls, culverts, or other such structures at the "sending site" (the location where the rights are purchased) as a condition of the developer being able to build more elsewhere at the "receiving site" (the location where the development rights are exercised and new development is built). South Lake Tahoe's TDR ordinance permitted and encouraged the removal of over 100 houses causing polluting runoff into the lake and the transfer of development rights elsewhere in the area. That is a lot of housing, but in Berkeley a single new apartment called the Gaia Building, eight stories high, houses twice as many people as those 100 plus South Lake Tahoe houses, and all on one sixth of a downtown city block. One hundred low-density properties in Berkeley translate into about twenty blocks of creek daylighting and ten community gardens, increasing in area the equivalent of two lots each in low-density areas. Density can do a lot in the right place and at the same time pay for the restoration of a great deal of open space, complete with creeks, ridgelines, farms, parks, and playing fields — whatever the community wants.

When we shift density away from car-dependent areas toward pedestrian/transit centers, it is important to create far more mixed-use development where the development takes place. The overall objective is to bring most people within walking or bicycling distance or a short transit ride of the places they need to be for a full range of their lives' important activities. For occasional pleasure trips, cultural and social involvements at greater distance, and relatively short commuting to jobs, they can use transit, but long-distance commuting is intrinsically a bad idea. Therefore development rights should be shifted so that if, say, there is mostly commerce, jobs, education, and so on near the centers but not much housing, more housing is created. That's often called "balanced development."

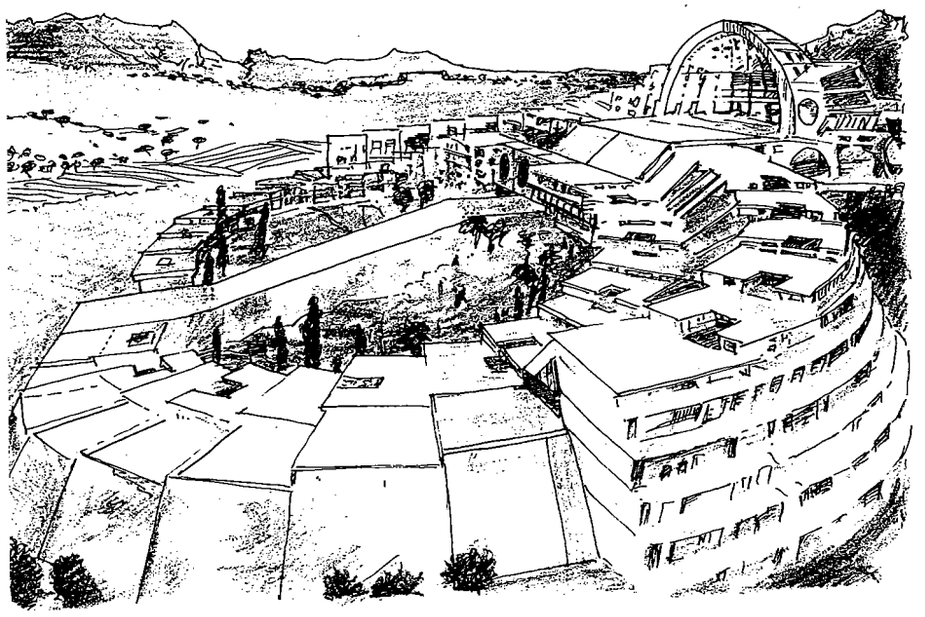
In addition, it's important to create the density in a way that is pleasurable and ecologically healthy. This book is replete with visions of terraces and rooftops buzzing with life. I am convinced that the meaning of a beautiful, fun, money-making larger building in the right place, with spectacular views to the local bioregion and associated natural features such as restored waterways, would be lost on no one. The fears that those projects arouse in distant neighborhoods would evaporate in the face of such successes. TDR can help build such projects and at the same time restore open space, thus benefiting the whole city.

The Double TDR functions because the developer is given a bonus in density when he or she pays for the transferred rights. One unit in a sending site might, for example, get the developer five in his or her new building — which is good for those who need housing — and, if built in the right place, greatly reduces commuting. It's important to hold standard height limits relatively low at the sites where the rights to build can be exercised, thus creating the incentive to trade upward to tall buildings as transferred rights are purchased and ecological building features are added. For example, a city might decide to limit buildings to five stories in its downtown but allow three more stories if TDRs are purchased in a particular quantity and another three stories if features such as bridges between buildings, terracing, public space on the sixth floor in a restaurant or café, promenade, or mini-park, or solar greenhouse are included. Each city would have its own formula depending on the climate, sun angles, history, and the hardiness of its population.

It should be emphasized that the Double TDR is a standard free-market exchange; it requires a willing seller and willing buyer. The idea is not condemnation, the compulsory purchase by eminent domain, or forced market value compensation. Instead, as a result of the design of the ordinances involved, the deal is attractive for all parties. If the new development is in the right place, of course, transit and bicycling work better, energy is

conserved, and local businesses thrive. The ecocity zoning map is the key tool for directing where the development rights should come from and go. A sense of the proportions of restoration and development can be developed by thinking through the relationships indicated on the map.

To encourage the transfers that open up nature while building the city in the right places and with the right mix, restoration tax credits would help greatly. Developers would apply for credits by demonstrating that the project proposed is in the right area (in or close to a transit center), will add density and diversity there, and will remove development to restore a creek, create a greenway, expand a community garden, or consolidate an interrupted railroad right-of-way. Any real estate within a hundred feet of the centerline of a creek in the outer zones of an ecocity zoning map, sixty feet in middle zones, and thirty feet in high-density inner zones, could be defined as an eligible sending site for development rights. Developers removing improvements there could total their expenses in purchasing the property, removing and recycling the improvements, and restoring the creek as restoration project expenses and be



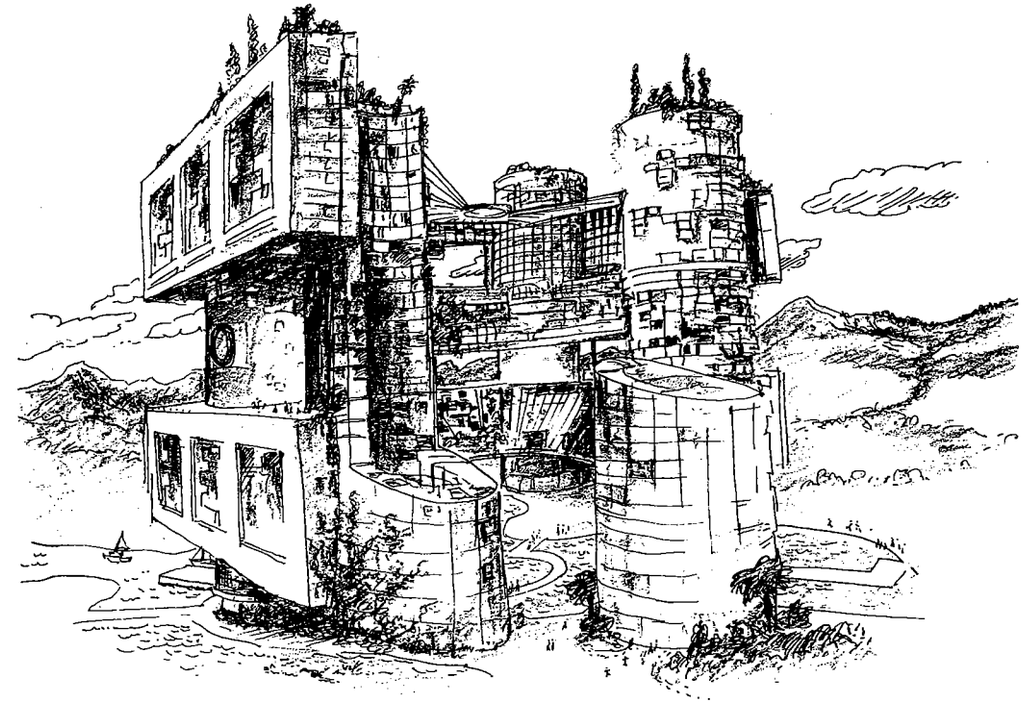
Soleri's "arcologies" (single-structure cities). *Architect philosopher Paolo Soleri has proposed architecture on the scale of ecological cities tuned to nature. In this illustration and the next we see drawings of two of his many models. Above, a proposed research town in a cool desert region that receives most of its heat from solar greenhouses on the sunny side, with the whole town accessible by foot, bicycle and elevator.*

awarded tax credit certificates by the state and or federal government. Developers with large tax bills might decide to use the tax credits to reduce them. Others might sell the tax credit certificates to a company that wanted them right away. Anyone who bought the tax credits would be helping the restoration project. Because the restoration would now be assured, the developer could be awarded the building permits for the restoration site work and approvals for the added height, density, and fancy features of ecological development at the project construction site. This is essentially how preservation tax credits work for development projects protecting historic architecture. It's time that waterways, hills, trees, and soils were considered as valuable as historic architecture and as worthy of restoration.

Here, then, with Double TDR and restoration tax credits, we have a means for significantly reshaping cities. In many cities there are constant complaints that there is not enough open space, not enough parkland, and not enough money to buy more land for them and pay for maintenance. But with Double TDR we have a mechanism for creating open spaces and parks while providing new housing and developing a larger tax base from the new higher-density development.

An important detail: the wider the setbacks for the creeks, the less maintenance work and expense per acre. This is because creeks then have enough room to meander back and forth a bit, causing nobody any problem, just eroding one way for a few years, then the other, and back. The normal level of erosion is a good thing since that means sifting out sand here, mud there, pebbles somewhere else, creating many different shifting environments for the eggs of different insects and fish and creating other beneficial micro-environments in and next to the creek. The whole idea is to let the streams be as natural as possible. If the creek corridor is wide enough, there can be a buffer zone of minimally managed landscape with perhaps a bicycle/pedestrian path or urban orchard of the sort we created at our restoration project on Codornice Creek. The creek itself and its banks can be almost completely wild. TDR and restoration tax credits make it feasible to purchase and maintain enough land to restore major natural and civic open space. In Berkeley, at the number of lineal feet per year daylighting is progressing, it will take over 5,000 years to open up the buried creek system. This is not an exaggeration or a joke. Simply divide the number of feet opened since 1982 in three small projects by the number of years elapsed, and you'll get the number of feet opened per year. Then divide that number into the number of feet still remaining locked in underground culverts, and it comes out to over 5,000 years. Real estate tools like ecocity zoning maps and Double TDR can speed that rate up many times over.

Rick Pruetz, who wrote a book on TDR called *Saved by Development*[1], says that a revolving fund is helpful for rolling back sprawl development through Double TDR. Any nonprofit or municipality can create such a fund to buy land and sell development rights so that the rights to develop can be shifted to other parts of town. They can call it a Double TDR Bank. Funds can be gathered from contributions from individuals, foundations, businesses, governments, or any combination of these, and the nest egg turns into land and buildings at the time of purchase. The seller gets the money from the bank. The building or buildings are then removed and the building materials recycled. Then nature, agriculture, or some other open space for other purposes is restored. At a later time when another developer buys the development rights for use elsewhere, the fund in the Double TDR bank is recapitalized with the developer's money and the land can be maintained or deeded over to the city, a land trust, community group, or some



Another Soleri "arcology." *Drawing of a model of a hypothetical town for about 20,000 built on an artificial lake on a natural river.*

other steward. This puts the bank in a position to buy more real estate for further transformation of the urban structure and further restoration. If major foundations or big donors to civic or environmental causes catch on to the potential, the fund might grow quickly and some truly magnificent projects might transpire.

We could think of this revolving fund as a "should-be open space acquisition fund." It would buy real estate where buildings are in the wrong place with regard to automobile dependence, floods, efficient urban structure, railroad right-of-ways ill-advisedly built upon, and so on. The municipal, state, or federal government could set up or contribute to such a fund and eventually come out ahead. They would save money by not having to build as many highways, and the city government would make more money in taxes from the new development. The developer who buys the transferable development rights will make more money, too, by being able to build more. The private individuals needing workplaces and housing will get just that, and in a place served well by transit and full of cultural benefits. And, in the most general terms, people and nature will thrive in an urban environment that is ever healthier and more vital.

The Ecological General Plan

Cities get their broad directives for zoning from a general or master plan. This document expresses the intended tenor of relations between citizens and their built and natural environments and is one of the most important instruments in shaping cities and their functioning for decades at a time. The zoning ordinance, which has the force of law, is based on the General Plan and is supposed to be consistent with it, though politics does produce inconsistencies as people and their leaders change their minds over the years. In its broadest definition, the General Plan is a framework for public decision making. It is made up of different elements: land use, transportation, public safety, open space, citizen participation, and so on. General plans and the zoning codes based upon them lay out a vision for the city and policy directives for actualizing that vision. The zoning ordinance gets precise about the details, down to specifying dollar fines for violations of the ordinance.

Citizens wanting to build and maintain an ecologically healthy city would do well to make sure that vision is explicitly stated in the introductory paragraphs of their city's General Plan. Then the document should follow through by spelling out policies and actions throughout. General plans draw general guidelines but can also get quite specific about what should go on in particular locations. One could argue that General Plans calling for the health and safety of its people would provide a policy context for ecological ordinances so that an ecologically healthy city can be built. But unfortunately, much contained in

General Plans, as in the zoning codes, too, gets in the way, such as calling for low height limits near transit which makes it impossible for transit to function efficiently, or calling for large quantities of parking for new buildings that guarantee a glut of cars.

In Berkeley, for example, there are "eco" elements in the General Plan, but some of the most important pieces are missing. Berkeley has good recycling and a Styrofoam ban supported by the General Plan and ordinances. Other policies that are at least somewhat encouraged in the city's General Plan include moderate but significant support for bicycle parking, bicycle paths, and bike lanes marked on streets; green building policies for nontoxic, energy-conserving, and recycled building materials; encouragement for at least one block of pedestrian street (though no such street exists at this writing); encouragement for traffic calming on residential streets such as the Slow Street; encouragement for creek daylighting and community gardening. But the degree of support in all these cases could be much stronger, and a long list of different and even more important policies would be required to qualify the plan for something heading towards an ecocity general plan.

In the summer of 2000, Ecocity Builders Program Director Kirstin Miller and Berkeley Planning Staff member Andrew Thomas suggested that concerned community members write a list of crucial policies we thought could nudge the General Plan toward becoming a real Ecocity General Plan. We would call them collectively the "Ecocity Amendment" and try to convince City Council to adopt them into the General Plan. We decided that there were four policies that had a fairly good chance to be adopted: encouraging centers-oriented development, establishing TDR, supporting an ecological demonstration project such as Ecocity Builders' Heart of the City Project (which we will look at in some detail later), and laying out some funding mechanisms for these policies. We could argue the policies' positive contributions and gather support.

To say Kirstin and I were methodical and perseverant is an understatement. One year later and after up to as many as four meetings with some of the boards of directors, we had assembled 103 organizations. We had bicycle and transit organizations, the Berkeley High School Ecology Club, University Coop Housing and the Student Union at UCB. We had the Berkeley Ecology Center and local Sierra Club chapter, two creek groups, gardening and park organizations, several architectural offices, the CoHousing Company, some businesses including two developers, and many other organizations signed on in support of the policies. Then, after meeting with council members individually, we went before City Council with thirty supporters in the audience to face the Berkeley Architectural Heritage Association (BAHA) and the Council of Neighborhood

Associations, an organization that tries to stop virtually all development everywhere in the city.

To put it charitably, our opponents, numbering less than half our supporters that night in Council Chambers, used distortion, fear, and anger. Council gave us a mixed but mainly very unhelpful bag, encouraging with weak language the ecological demonstration project and rejecting the other three policies. TDR lost with no specific debate on its potential or merits. That was the strong one, the policy that cold have made substantial progress in the city, from the land use foundation on up, toward transit efficiency, creek restoration and biodiversity enrichment, pedestrian convenience, more housing for people needing it, energy conservation, reduction of CO_2 output, lessening of automobile traffic and hazards, and more. Again, as in the case of car-free housing two years earlier, it was the City Council "progressives" voting no. Why? To maintain a left-wing stance against developers? To support a conservative no-change agenda? Threats?

I got a call from the General Manager of Chez Panise, the famous California/French cuisine restaurant that had signed on for supporting our Amendment. One of the officers of BAHA had called the restaurant and warned them they would be in trouble if they didn't remove their name from our list of supporters. "Do you think we'll get in trouble for signing that petition?" the manager asked me. "It's a free country," I said. "I don't see how you could." They stuck with us but it didn't convince City Council. I doubt that ultimately the threats really mattered; instead, the council members in question are among the leaders in keeping everyone comfortable with as close to no change as possible. Whether they believe it or not, and despite their claims to progressive sentiments, they lost a major opportunity in city design history and helped maintain the cultural denial of the growing environmental debacle. They also squelched a social justice policy of real strength, belying their espoused position on that issue as well. It was a tragic lost opportunity. Since then, Patrick Kennedy, the developer of the Gaia Building, has completed five more residential buildings in Berkeley. Four years earlier, he said, he would have been happy to buy TDR for an extra floor or two. If City Council had passed the TDR policy that night, we would have had twelve to twenty-four properties purchased for opening creeks — in other words, a lot. And I am convinced people would have been happy with the results. Several homeowners with houses over crumbling old creek culverts and no way to sell their endangered houses in a normal real estate market have wanted to sell for some time. City Council cancelled that option for them that night as well as dropped the ball for leadership in ecological city design and planning.

We need to be very clear about bad process, even bad "democratic" process. Berkeley has a reputation for giving its citizens repeated and substantive opportunity for participation in government, so much so I used to joke that City Hall needed a plaque over the door saying, "Process is Our Most Important Product." But when elected officials endorse what they know full well to be contrary to their own supposed values (in this case environmental and social justice values) and go against as many organizations as Ecocity Builders had assembled wanting to try out a set of ordinances that provide more, not fewer, free choices and options to their citizens, it should be known they are doing a disservice to democratic practice itself. One should not endorse people using misinformation, fear, and anger over those who go directly to the missions and values of a community's best organizations. In the meetings with the organizations that supported the Ecocity Amendment, real deliberation took place. Before City Council, the sum of that effort was clearly stated and yet, knowing the difference, the elected officials went with the approach that used disinformation, emotional extremes, fear, and anger.

Listening to the story later, an environmental activist asked why, with that sort of support in the community, we had not gone back to the community and fought it back before Council again. Answer: exhaustion. The community was exhausted with a contentious planning process and didn't want to revisit it after that final vote. On our own, a small organization making a gigantic effort like that, exhausted our resources — and that means a lot too. In addition, we had no confidence that the council members would be any more reasonable the second time around.

Regarding General Plans in all cities, we need to methodically shift from automobile-dictated development patterns to pedestrian-, bicycle-, and transit-oriented land uses and development — and to say so explicitly in the General Plan. There should be a policy to methodically reduce parking — a good model is Copenhagen, which is cutting back about two percent per year — while encouraging bikes and transit and, especially, while taking care to shift land uses toward balanced development. Any new parking built should be a temporary replacement for parking lost due to other changes in the city infrastructure, and it should be easily convertible to other uses — in short, convertible parking. Low ceilings and sloped floors must be avoided so that other uses can be easily accommodated in remodeling, for example for housing, shops, or, as in the urban permaculture example from Berlin, day care and nursery schools. Of course, any ecocity General Plan worthy the name would have to adopt an ecocity zoning map; a very major step would be the establishment of an Office of Ecological Development (which we will look at shortly) as part of an "International Ecological Rebuilding Program".

With an ecological General Plan in place, a city would have the written mandate to shape policies to manipulate the city's land use infrastructure and create the physical reality of an ecocity over, I'd estimate, two to five decades. Not for the impatient, but substantial benefits would start accumulating with the pursuit of such ecocity policies, as Jaime Lerner says, within two years.

Roll Back Sprawl

You've heard of "slum clearance." What we need is "sprawl clearance." Tools to roll back sprawl development exist. With strong interest on the part of legislators, we can strengthen them considerably, craft a few more, and make it profitable to implement and replicate them. With Jaime Lerner-like appeals to the people, we can create a culture of acceptance with its own imagination to shape the many unique places in this country, and in all countries. Millions of people lament the loss of better times and the better towns that went along with them. Here's a way to get them back and at the same time build better cores for our cities in ways that actually address the future. The strategy of a Roll Back Sprawl campaign is simply to identify means to remove sprawl and shift development toward evolving pedestrian/transit centers. Double TDR, supportive zoning, and city government commitments to purchasing and removing car-dependent real estate, foundation and investor support for the transition — all these can be facilitated and accelerated by such a campaign. It's first order of business should simply be to let people know that such changes are possible, that tools exist, and that we already know they can work well.

I spent several months in 1999 researching not just the possibilities for a campaign against sprawl but also means to reverse its spread, to roll back sprawl toward pedestrian/transit centers. I found that of the several larger environmental organizations I talked with, none wanted to join such a campaign unless other major organizations or foundations got on board first. The Sierra Club national office, which runs a campaign called "Challenge to Sprawl," was satisfied with action far short of working systematically to remove sprawl development and was unclear on the concept of urban ecological whole systems. Most Sierra Club members seemed to think they needed their cars to get out into the wilderness. Said one Sierra Club leader, "Our members say, 'sprawl very bad. Cars? Pretty good!'"

Once we could use trains, horses, and bikes to get out into nature — and if we design the right way, we still can. Sounds fantastic from inside the blinders of today's auto world, doesn't it? The Sierra Club's campaign against sprawl supports infill development along corridors up to about four stories but is fearful of talking about higher-density centers, convinced that higher density than that is politically unpopular. I question their assumption, since millions of people in the United States work and/or live higher up than four stories — hundreds of millions worldwide. There is the theoretical problem with filling up corridors with four-story development too. As mentioned earlier, it hardens the arteries and makes restoring natural zones and corridors that would cross such streets much more difficult to obtain. It perpetuates the pattern of low-density cities surrounding little islands of "park" and works against the centers-oriented pattern of cities as pedestrian islands in nature.

As we spread the word about ecocity design and planning and continue to refine tools for rolling back sprawl, the day may soon come when a Roll Back Sprawl campaign will make so much sense as to be easily organized. I am convinced that it could be among our most important tools for creating ecocities and building a healthy future. With the sort of demonstration projects I've been describing, people could begin to put two and two together — building right in the first place and also removing wrong. If the possibilities offered by reshaping our cities with these restoration/development tools can capture the attention of creative people and tweak their sense of the possible, an explosion of good projects could ripple, then roll in waves across the continents. The land under millions of acres of asphalt yearns to breathe free, and real community longs for expression — a Roll Back Sprawl campaign is the means to achieving both.

The International Ecological Rebuilding Program

We have now looked at several new tools designed specifically for ecocity building, but where is the institutional support for all of this? Where is the scheme, plan, or program in which the ecocity zoning map would work and we would design Double TDR, pass them as zoning, and apply them through everyday administrative practices rather than trying to improve, by making less pollution, the very infrastructure causing the problem? Perhaps ecological rebuilding could come about chaotically — a little here, a little there, in a pattern not too different from today's groping forward and backward and around in circles — but I doubt it. In a crisis like the one enveloping the biosphere today, it would be helpful if there were a concerted effort to build as if we thought building had something to do with a crisis like the one enveloping the biosphere today. If we set the goal of bringing society into balance with nature — and set out to develop a methodology for achieving that goal — we would have a context in which the transformation would have a far better chance of success. But we have not yet made such an effort.

In a crisis like the one enveloping the biosphere today, it would be helpful if there were a concerted effort to build as if we thought building had something to do with a crisis like the one enveloping the biosphere today.

Why don't the governments of the world have ecological development departments dedicated to a vision of an ecocity civilization unfolding? Are they not supposed to be working for the common good? Haven't there been enough discussions in

the environmental protection agencies of the world, enough environmental conferences, for people to have caught on to the necessity of a major rebuilding? There are serious international efforts to cut CO_2 emissions, but where is the work going on to create a treaty on ecocity development and restoration that would solve the problem at the level of its causes? The governments of New Zealand and the Netherlands are leading the way with their own national "green plans," but they are not focusing on the built habitat as centrally as they should be — they are not being quite so presumptuous as to call for a genuine rebuilding of our Western technological civilization. The US Green Building Council and the authors of the LEED (Leadership in Energy and Environmental Design) standards and certification process support better buildings but have no LEED standards for better whole communities and thus bestow high marks on buildings dependent on hundreds of thousands of gallons of gasoline every year so that people, in their cars can even get to the buildings. If there were a scheme for rebuilding civilization, it would sort out contradictions like that.

If there were a scheme for rebuilding civilization, its name would be something like the International Ecological Rebuilding Program. Al Gore had a similar idea in 1991 when he was writing his book *Earth in the Balance*. He developed the idea in some detail, addressing the need for a major reduction of pollution, a restoration of nature where possible, and an organized effort to promote technologies that conserve resources. "Human civilization is now so complex and diverse, so sprawling and massive," he writes, "that it is difficult to see how we can respond in a coordinated, collective way to the global environmental crisis. But circumstances are forcing just such a response; if we cannot embrace the preservation of the earth as our new organizing principle, the very survival of our civilization will be in doubt."[2]

Gore proclaims that there are "no precedents for the kind of global response now required" but does point to the Marshall Plan, which organized much of the rebuilding of Europe after World War II. He credits that plan with enormous success and proposes naming a new initiative after it, a Global Marshall Plan that would have five major goals: (1) population stabilization, (2) the development and sharing of appropriate technologies, (3) new global "eco-nomics," meaning ecological economics, (4) a new generation of treaties and agreements to accomplish ecologically healthy ends, and (5) a new global environmental consensus.

The chapter on "Developing and Sharing Appropriate Technologies" is as close to confronting the built civilization as Gore will bring us. Under the subheading "Building Technology," he calls for passive solar design and greater energy efficiency in buildings. In other places he speaks of the benefits of decentralized electricity generation and expresses some surprise and delight that wind electric energy is economically viable and promising for larger scale applications in many locations. He speaks of "emphasizing attractive and efficient forms of mass transportation."[4] He even makes one of the most stunning statements against automobiles I have ever seen: "We now know that their cumulative impact on the global environment is posing a mortal threat to the security of every nation that is more deadly than that of any military enemy we are ever again likely to confront."[5] (Where was he when we needed him during his eight years as head of the White House Office on Environmental Policy?)

Gore's Global Marshall Plan, however, says almost nothing of that created object in which most of us live, that invention for maximizing exchange and minimizing transportation that Jane Jacobs describes as the chief engine of industrial and cultural production and consumption, that thing that can be designed and physically rearranged to reduce demand radically and therefore add to energy efficiency like nothing else: the built community rearranged as ecocity, ecotown, or ecovillage. The city simply does not appear, much less serve as the foundation of the plan — even though it could and should.

More recently, in 2003, Lester Brown, founder of Worldwatch Institute and Earth Policy Institute, wrote a book called *Plan B*.[6] (Plan A is the conquer, exploit, and control approach while hoping for the technological fixes for those pesky environmental problems, commonly used by government). In his second edition of the book Plan B 2.0, Brown has a whole chapter on "Designing sustainable cities". In addition, he provides much of the kind of detailed information about the condition of the planet's resources that anyone interested in a systematic approach to reshaping our civilization needs to know. He knows that we need such a plan and that it needs to be pursued with the resolve of fighting a war for our defense and survival. Writing the book, he provided the germ of an idea that could coalesce the real thing. Now we need to get that idea out to people everywhere.

In 1991, I tried my own hand at an outline for an International Ecological Rebuilding Program and took it with me to the Second International Ecocity Conference in Adelaide, Australia, the next year. There it was amended and adopted. Two later versions were adopted at subsequent International Ecocity Conferences, in Yoff, Senegal and Shenzhen, China. The following paraphrases parts of the various:

1. *We must declare an emergency in human and environmental affairs and create programs specifically for ecological rebuilding in every country and in the United Nations.* The emer-

gency is not temporary. We are entering a period of permanent emergency, and we will cling to the edge of this precipice until we fall off or solve the problem.

2. *Energy policies must be linked to ecological development.* We need to recognize that energy powers *something*, and mostly it is the city, town, and village — the built human habitat. The ecologically healthy structure of the city is the foundation for energy conservation and should be item number one in any energy strategy.

3. *Because living systems cannot function well when they are effectively cut up into isolated chunks, we should establish Departments of Ecological Development on the national, state, and local level.* The United States and other countries have environmental protection agencies empowered to enforce environmental regulations for the prevention and amelioration of pollution, but these agencies don't build. There are, however, housing agencies and other departments that do build, using their own construction corps or directing grants, loans, and contracts to builders of machines, buildings, infrastructure, and products of all sorts. We need governmental departments or agencies that coordinate ecological objectives with actual construction. It is important to see that building right in the first place is at the root of environmental protection, and the Department of Ecological Development would be charged with just that. Under it there would be research wings such as the National Renewable Energy Laboratory and an Ecocity Research Institute that would assist projects from the small integral neighborhood scale up to whole new-town projects like Arcosanti and major ecological urban demonstration projects in cities of any size.

Departments of Ecological Development should initiate aggressive spending programs to develop renewable energy technologies and ecological community building as two coordinated facets of the same overall effort. They should transform defense programs and companies into builders of elements of ecocities and associated technologies and products and reward pioneering companies in these fields with profitable contracts. They should make federal, state, and local moneys available to ecocity projects as loans, grants, and research and development contracts. They could provide assistance and oversight to other governmental branches as well, so that in relation to ecological building and ecological policy in general the left hand would know what the right was doing. They could even build their own experimental projects. Whereas environmental protection agencies function appropriately on the federal and state level, there should be Departments of Ecological Development on the municipal level as well.

4. *We need ecological rezoning, complete with ecocity zoning maps.* We need programs to roll back sprawl and restore wildlife habitat and farmlands, withdrawing from tracts as large as the proposed Buffalo Commons and as small as narrow creek and wildlife corridors in the cities.

5. *We need economic restructuring, i.e., phased, steadily increasing taxes on pollution and energy waste.* A land tax could be designed to shift society toward ecocity development patterns. Taxes per square foot of developed usable floor space should be descending toward the centers, while toward the fringes, in automobile-dependent areas, taxes should be rising (except for natural habitat and agricultural land, which should pay no taxes in the city at all). Such taxing can work as powerfully as outright zoning change, and so can the restoration tax credits described earlier.

6. *We need not only to develop foot, bicycle, and public transportation, we also need to put transportation into the land use context.* Politicians and everyday citizens can use imaginative leadership and planning to allocate city, state, and national funds to nontransportation modes of access, a practice that was started in the US with the Intermodal Surface Transportation Efficiency Act. Building diversity at close proximity is the most effective route to the same end as efficient transportation: access. Therefore we need Departments of Access and Transportation on the federal and state levels that could still deal with conventional transportation strategies, but would emphasize providing access through ecological urban and architectural design and planning of the city layout.

7. *Automobile subsidies must be ended.* We can start with a steadily increasing gasoline tax and a tax on second cars, then add a tax on all cars, then increase taxes on all of them, and finally charge drivers for the smog damage to crops (money to be transferred to farmers) and to people with lung cancer and emphysema (money to the victims). Insurance companies could pay these victims and pass the cost along in higher automobile insurance rates. As a pedestrian advocate in my neighborhood suggests, we could require drivers to pay pedestrians for time wasted at traffic lights — hours every month — by redistributing part of the car taxes as tax rebates to non-drivers.

8. *We need to develop strong educational and economic incentive programs for the ecological rebuilding effort.* No one should be abandoned in the transition. Retraining workers and retooling industry following the four steps to an ecology of the economy to produce and operate ecocities is the plan.

The Ecocity Organization

The ecocity organization is a rather everyday type of association of people working together, chipping in dues, running fund rais-

ers, doing mailings, hosting events, promoting what they feel improves life, and so on, but it has an extraordinary mission: it's an organization designed specifically for exploring the theory of the ecocity as well as for experimenting, learning, teaching, and building ecocities. I know of very few organizations that are explicitly just that: Ecocity Builders, Urban Ecology Australia, Urban Ecology China, Ecocity Cleveland, and the Cosanti Foundation. If we included ecovillages, then the Global Ecovillage Network out of Denmark would also qualify.

There are many organizations that protect one aspect of the environment or another and a fair number that provide expertise on energy conservation and recycling to community groups. There are professional associations like the Congress for the New Urbanism that have theories on urban design and work to promote their ideas tending in an ecocity direction while benefiting their architect and planner members. There are public transport and greenbelt advocates, bicycle clubs and bicycle-promoting organizations, strictly anti-car organizations, "road ripping" and dam removing organizations, anti-oil industry groups, wilderness protectors and river and creek restorationists, and community gardening associations, and permaculture groups whose design principles are closely related to ecocitology's. There are academic institutions like Jeff Kenworthy and Peter Newman's Institute for Science and Technology Policy at Murdoch University in Perth, Australia, that study the structure and functioning of cities and advocate for pedestrians, bicycles, and urban transit anatomy over automobile land use infrastructure. There are city governments like Vancouver's and Curitiba's that are writing and executing policy while building features that help them convert their cities in an ecocity direction. They run in-house ecocity organizations, such as the Planning Department in Vancouver and Curitiba's IPPUC.

But we need a clear, specific focus on basic principles — a scientific approach that is not yet a popular preoccupation, but that is simply looking for the truth about the relationship of the physical community to ecology and evolution. We also need to involve millions of people, and therefore we need organizations in every city. We need organizations that try to put all the pieces together. Rusong Wang, host of the Fifth International Ecocity Conference held in 2002 in Shenzhen, China, and president of Urban Ecology China, has proposed an International Ecocity Society that would promulgate ecocities and consult on ecocity development around the world. To join in the real action in Vancouver or Curitiba, you'll have to be hired onto the government team. But you can also join one of the ecocity nonprofits (usually called non-governmental organizations, or NGOs in international circles) or start your own organization for similar purposes. With your supportive

thought, work, time, and money these organizations could do more than practically any other conceivable tool to transform our cities.

Arcology Circle, as it was turning into Urban Ecology around 1980, was probably the first real ecocity organization. It was not just taking on the theory and practice of the three-dimensional pedestrian city as was its predecessor, the Cosanti Foundation, but applying the ideas to existing cities. After all those years, all those minuscule budgets wrung from a few hardy and faithful souls and a small number of unusual foundations willing to take a little risk on a new idea, it is evident that our work is a genuine struggle. Some people congratulate us on doing exactly what has to be done but decline to join or help because we will do it anyway.

I've thought long and hard about why so few become involved in ecocity organizations and why most foundations decline to help us while telling us we are doing great pioneering work on one of the most important issues going. Now I think I know the answer. We point the finger at ourselves, and only a few are strong enough to face that truth in us. It's one thing to blame distant corporations, globalization, the loggers and industrial farmers, the greedy shareholders, power-hungry executives, vote-grasping politicians, and those other folks who drive their cars too much. It's quite another thing to see that we may all have to change — "We have met the enemy and he is us" — and not only that, but build something that has never been built before. The ecocity organization requires three rare things of its members: a willingness to confront our complicity, a great deal of creative imagination, and hope in the face of depressing facts about biodiversity collapse and climate change. A very small band of supporters from a diversity of perspectives — barely enough to keep things going — is all we have had for more than thirty years. But the point of greatest resistance, in typical paradigm shift theory, is also the place where we may well have the real breakthrough. Nobody said this would be easy.