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# COMMUNITY DESIGN BY INTRICATE OPPOSITIONS

Randolph T. Hester

Cities are increasingly shaped by alienating governments and their corporate sponsors networked in a global economy that moves fast enough financially that enduring metropolitan structure seems inconsequential.[1] From this world view of transitory financial networks, large parts of cities are destroyed and recreated almost overnight. Their inhabitants are simply used, abused and abandoned once useful resources have been depleted. Justice is hollow, history is dead. Biological and cultural diversity are equally unvalued.[2] Attachment to place is irrelevant.[3] The corporate designers who serve these interests operate all over the world. They have recently overtaken Asia like a mutant plague directed by virtual capital, bigness, speed, and mobility. Their hosts are fueled by short-term profits, "modern" specialization, status seeking and homogeneity.[4] The result is ecological and cultural devastation as well as instant cities whose residents suffer environmental anomie, rootlessness and loss of place identity.[5]

A minority world view--including community designers--argues that the city has no enduring structure, even if it has a robust economy, unless it is ecologically sound.[6] It cannot be ecologically sound unless that ecology is sensed, understood and stewarded by actively participating inhabitants and its nation state.[7]

The forces of ecology and grass-roots activism offer both creative resistance and visionary alternatives to economies that are hostile to biological, cultural and place diversity, but only if they are combined. This is the essence of community design. In concert, ecology of place and deep grass-roots action form a glocal approach that can powerfully influence city design, the way we dwell, our place identity and the form of governance by focusing on the local with an aware eye on global trends. I have described these in detail in *Design for Ecological Democracy*.[8] Here I explore the factors that emerge from the marriage of ecology and democracy, particularly ones that influence how we see and design the community.

Ecology and democracy share the importance of sense of place, phenomenology of the locality, slowness, and responsibility for the commons in the broad sense of land, water, food, transport, education and economy.[9] But there are extraordinary conflicts between ecology and participatory action. Deep democracy governs from the grass roots up--a populist neighborhood perspective; ecology governs entire systems from the top down--a federalist or global capital view. And there are dozens of other equally vexing oppositions. Like global capital, ecology requires bigness to function, especially for core habitat, hydrology and interior species; participation seeks smallness for face-to-face deliberation. Ecology is based increasingly on remote science and abstract theory; participation attends to near knowledge and first-hand experience. Ecology champions professional specialists; participation champions native lay people. Ecology requires a long-term view; in this regard participation is more like virtual global capital, which fulfills short-term desire and status seeking. Ecology demands personal sacrifice and living with less of many resources; participation protects existing everyday lifestyles and is consumer driven. These are oversimplifications. There is much recent theory addressing nuanced trends, but the conflicts between ecology and participation are deep and abiding.

The interplay between their opposing geometries produces significant tension and creative energy for reshaping cities and world orders.[10] The seemingly exclusive geometries can inspire incremental reformation of communities if designers embrace the complex paradoxes and intricate oppositions of ecological and participatory geometry.

Design relies on geometries--two-dimensional areas, three-dimensional space and/or time. In community design, social geometries vary from personal space of insiders and traditional architecture to the territorial requirements of street gangs and ecotourists. Similar patterns can be drawn for water and air quality, river function and wildlife habitat. Recombining, while not compromising these geometries across disciplines and scales can best shape distinctive and resilient cities.

## The Unique Geometries of Our Time

Every era has inherent geometries that make up the way we see and organize the world, place ourselves in it, and share our habitation. The prospect refuge necessary for survival of early *Homo sapiens*, the combined profile and frontal elevation of Egyptian art, the single-point perspective of the Renaissance, the centrality of the earth before Copernicus, the astronauts' view of our home planet from space, gaia and *feng shui* provided distinctive visions and patterns of habitation, each unique to its time and incomprehensible to other times.[11]

Community designers today shape cities on the basis of spatial languages translated into simplified form, like Kevin Lynch's nodes, paths, landmarks, edges and districts, Ian McHarg's overlay maps of natural systems, or Chris Alexander's pattern language.[12] The geometries of ecological democracy must be simply and precisely drawn if they are to influence metropolitan form.[13] But they often appear as mutually exclusive binary opposites. They require minds that can hold two or more contradictory ideas at the same time. This is difficult to do, especially for community designers whose work has often been defined by resistance to the dominant paradigm. That approach encouraged simplistic binary thinking needed in a protest society.[14] To reform cities, community designers must expand their geometry.

Take the critical case of cleaning storm water and reducing flood damage in ecologically sound ways along the Los Angeles River. Thinking far beyond traditional engineering solutions, habitat created for the redwinged blackbird can be used to reduce pollution and flooding; additionally, that habitat provides nearby nature. Because their breeding geometry is small, thousands of eighth-of-an-acre leftover parcels can be converted to multi-use prime habitat. This would restructure neighborhood landscapes. In the case of Canoga Park, one of the densest and poorest valley neighborhoods with a population that is 78 percent renters and 62 percent Latino, the restructuring would provide parks and open space where none exist.

Using Cal Trans surplus property along the Ventura Freeway at Valley Circle in another affected neighborhood as an illustration, a dozen breeding pairs of redwinged blackbirds and half an acre-foot of flood detention could be provided.[15] Because redwinged blackbirds are not very demanding, the geometries that result from this complicated, multilayered analysis are easily translated into design: social spaces to capture water, linear swales to clean it, and triangular depressions to store and filtrate it. Vegetation is controlled by seasonal water levels.

This geometry combines storm water management, flood control, water-quality improvement, wildlife-habitat creation and neighborhood recreation space. But it only works when informed by other geometries. Are there local neighborhood groups who will use and steward the habitat? Do they want natural parks? What birds do they most want to attract? That's why it is essential to map power, environmental injustices, activity patterns, and other social forces simultaneously and at the same scale.[16] This multilayering muddies the water, so to speak, but recombining these social and ecological geometries is the basis of designing for ecological democracy.

**Science Versus and/or Combined with the Experience of Sunset**

The key to a recombinant vocabulary is to rethink the most basic assumptions of how we see and structure our world. A matter as simple as the sunset illustrates, according to the keen insights of Paul Krapfel. From experience we know the sun sets, yet we know equally well that the sun does not set; rather, the earth rotates away. One is physical, scientific fact; the other is phenomenological or experiential fact. They are, it seems, irreconcilably opposed.[17] But when combined they reach the same "end point," albeit from two opposing perspectives. The fact that they come to an agreed-upon outcome following two separate logics is the key principle to recombinant geometries. It offers a new way of seeing, a new multifaceted process, and a new way to structure design decision making.

Combining rationality and passion, as well as reason and primitive sensuality has created a more powerful geometry in the effort to establish an urban wilderness greenbelt in and around Los Angeles. Planners have had to continuously combine scientific studies, such as the island effects of freeways, with phenomenological experience of the landscape.

The most critical scientific factor in creating this "Big Wild" greenbelt was conservation biology--connecting enough continuous terrestrial habitat to maintain a viable population of top predators. In this case, that predator was the mountain lion, which it was thought at the time would require 640,000 acres for a genetically healthy population.

Conservation biology science suggested that several core habitats of 10,000 acres within the city, connected by substantial corridors to each other and surrounding national forests, could provide the necessary acreage.[18] But this was impossible to achieve without reversing city policy regarding freeway construction and development that would sever habitat and lead to local extinctions. So planners organized bus tours to introduce residents of Los Angeles to the places of most critical conflict over wildlife habitat. Only when people hiked the canyons, saw endangered wildlife, and felt and smelled the urban wilderness did they support the creation of the greenbelt. They did so even when it caused traffic and density inconveniences. Not until scientific fact and the phenomenology of touching the land began working together did the "Big Wild" become reality.

**Big Versus Small Geometry**

Will Wright, the inventor of "Sim City" and "The Sims" is creating a new game, "Spore," that connects "the almost inconceivable universal scale" of galaxies "to the deeply personal" and tiny scale of microbes.[19] "Spore's" parallels with ecological democracy are not coincidental. The making of the future city and the playing of "Spore" share common geometeric threads. The big-scale focus of ecological science and the small scale of grass-roots democracy give rise to another set of seemingly exclusive geometries.

For nearly fifty years community design resisted bigness. The manifesto urged, "Break down bigness" in response to freeway construction and large urban renewal projects that displaced minorities and destroyed their neighborhoods.[20] To counter destructive bigness, community designers used civil rights tactics--big protests coupled with small design at the household, block and neighborhood scales. The designers recognized that political action required large numbers but dwelling improvements depended on everyday smallness. As an example, in the effort to save the Chavis Heights community from urban renewal clearance, the designers divided the entire area into dozens of micro neighborhood blocks. Each block was analyzed for unique housing conditions, social patterns, physical structure and nature. This created distinct designs for each neighborhood, stopped the wholesale urban renewal clearance and saved the African-American cultural landscape. Community designers then and preservationists now decry monster projects that uproot residents, destroy history, and kill ecologies. Today, successful structuring of the city requires that community designers shape both big and little scales simultaneously. This is nearly impossible for most designers. A good garden designer gets bigger and bigger commissions and eventually a whole city in China. The city is seldom a garden, especially in a different culture. The designer is puzzled why his dream city turns into a nightmare. Big- and small-scale thinking requires special ability and practice.

In her strategic plan for the Los Angeles River, Marcia McNally worked at multiple scales together, focusing on the approximately 20,000-acre subwatershed (there are twelve along the Los Angeles River) and the one-quarter-mile-radius neighborhood (there are 125 neighborhoods in each subwatershed, on average). No discussion of one was concluded without linking it to the other--in this case with regard to the geometries of 444 riparian bird species, 183,000 cubic feet per second of peak flood flow, and the recreation needs of neighborhood-bound people, especially children, the elderly, and others without cars.

Through surveys McNally found that 41 percent of residents presently feed birds or otherwise attract them to their homes; 49 percent wish to attract birds. This suggested an opportunity to implement the watershed geometry via a strategy to create microscale bird habitat. Within twenty years a regional plan could be completed, working neighborhood by neighborhood within the guiding structure of a connected and functioning ecosystem defined by the main riparian corridor of the Los Angeles River with fingers extending up along its arroyos to the Big Wild terrestrial greenbelt.

The plan for the westernmost watershed of 20,000 acres shows how the structure emerges in time. First, key acquisitions of underused lands are made along the main stem of the river. These allow for floodwater retention and immediate pockets of bird habitat. Then, smaller acquisitions and easements connect larger habitat patches and create a recreational trail system. Each neighborhood chooses target birds suitable for its location along the river--shore birds at Long Beach, warblers in the middle reaches, and raptors at the upland headwaters. Microgeometries of the target species and neighborhood layout direct plans for the smaller parcels in each neighborhood. Designs for larger parcels are guided by flood retention capacity, flyway geometries and the needs of endangered and endemic species. The river planners constantly telescoped and microscoped back and forth between global flyway, regional watershed, subwatershed, and neighborhood geometries.

In developing successful neighborhood strategies, McNally found that the geometries of the private domestic and tribal space are essential because the structure of local nature varies considerably, depending on subdivision and street layout, parks and street trees, lot coverage, and use of yards. In order to attract desired birds, several dozen households on a block (often referred to as the tribal scale or microneighborhood) could create a plan to manage backyard vegetation cooperatively, and provide the complete habitat that would otherwise not be present. One neighbor, for example, might make a small pond; another, fruit trees; another, thick layers of vegetation. Acting in concert, they can thus attract birds that single-yard owners acting in isolation would not ever see.[21]

Habitat planning at this scale is also usually compatible with carefully designed floodwater retention, again meeting multiple regional objectives by crisscrossing scales. And if we add geometries of private domestic space and tribal space to global, regional, subwatersheds and neighborhood, we have the six essential scales for microscoping and telescoping from small to big, and vice versa, in metropolitan landscape design. The neighborhood and subwatershed are likely most critical in city design, but the others cannot be ignored. McNally is fortunate. Her client, the Santa Monica Mountains Conservancy, supports her problem-solving across multiple scales.

Most decisions are restricted by small land ownership, narrow vested interests and/or non-connectedness thinking. For example, all three have conspired to create catastrophies in waiting in the Sacramento-San Joaquin River deltas near San Francisco. In one particularly unfortunate action, Stewart Island, at the mouth of the San Joaquin River, has been designed by a leading firm to be a suburb of 30,000 people. Beautifully formed, this suburb will bring profits to owners and tax revenue to the city, but it will destroy the most essential riparian route for threatened fish, birds and the endangered brush rabbit and diminish any sense of community in existing small towns. Most critically, by not considering its regional context beyond its site confines, the designers indirectly contribute to flood risk for a disaster far greater than New Orleans. Thinking back and forth across scales could have prevented this. Attaching authority for approval and liability for flood damage to the same level of government might also help prevent disaster.

**Remote Versus Near Knowledge**

Similarly, remote and near knowledge may be profitably recombined. As an example, consider the effort to save the black-faced spoonbill (*platalea minor*) from extinction and preserve the jobs of Taiwanese fishermen working in the same wetlands where the birds forage.

The debate regarding the black-faced spoonbill--one of the rarest birds and the most endangered spoonbill in the world--raged for more than a decade until remote and near knowledge were combined. In an EIA for a proposed petrochemical plant near the wintering grounds of the spoonbills, Taiwanese scientists concluded in the late 1990s that the spoonbill inhabited only a 1,000-acre area along the Tsen Wen River, well out of the impact zone of the petrochemical facility.[22] This finding prevailed for three years. But, just as the EIA was about to be approved, Dr. Malcolm Coulter, a scientist and co-chair of the IUCN Specialist Group on Storks, Ibis and Spoonbills, noted that other species of spoonbills travel up to 30 kilometers to forage.[23] If the black-faced spoonbill traveled similarly, the proposed petrochemical plant and associated urban development would send the spoonbill into an extinction vortex from which it could never recover.

Following Coulter's warning, a team of international scientists challenged the EIA for the industrial complex. About the same time a natively wise local fisherman, Uncle Gao Ong, formed as association to save the wetlands that would be destroyed by the industrial project. He was concerned about the loss of fishing jobs. He loved this landscape and knew the place intimately.

As one of the team of international planners, I always visited Uncle Gao Ong when I was in his village. For us to communicate required multiple translators, so we often drew pictures to "talk" directly. One day he drew a map of places he had seen spoonbills, usually at early morning or dusk. It extended nearly 15 kilometers beyond the area indicated in the EIA. Uncle Gao noted where and when he most frequently saw birds feeding in the lagoon, tidal flats, tributaries and fish ponds. His map suggested that spoonbill foraging didn't extend as far as Dr. Coulter predicted, but both Dr. Coulter's remote and Uncle Gao's near information contradicted the EIA scientists.

Spoonbills roost in large flocks in midday, but at night they fly to distant foraging areas. It later emerged that the EIA scientists had presented only the daytime roosting geometry. They had either done superficial field research or consciously limited their analysis to present conclusions the government wanted.

Dr. Coulter's and Uncle Gao's testimony exposed this bad science. But puzzling differences remained between their maps. Overlaying Dr. Coulter's 30-kilometer theory with a map of suitable tidal shores and fish ponds, however, explained one difference--that suitable foraging habitat extended inland only 10 to 15 kilometers, at which point it transitioned to upland farming and urban areas unsuitable for spoonbills. Coulter's distant theory thus was cut short, but only when suitable habitat ended.

It was also the case that suitable foraging habitat extended far north and south of the area Uncle Gao delineated since his native wisdom was confined to the area he fished.[24] Field studies later confirmed Dr. Coulter's theory in coastal areas beyond Uncle Gao Ong's home territory, but Uncle Gao Ong's map matched precisely the field science data gathered within the area he knew.

In this example, neither remote nor distance knowledge was sufficient in itself, but when combined, their authority was extraordinary, providing the first accurate picture of the habitat needs of the black-faced spoonbill. When added to similarly derived geometries for profitable aquaculture, oyster fishing, and projected patterns of tourism, a whole new way of seeing emerged, leading to the development of a place-appropriate local economy within a distinct metropolitan pattern.[25] Urban growth is now directed to Tainan City, other medium-sized cities, and small villages at the edge of the spoonbill habitat where local entrepreneurs are developing ecological tourism.

At the near scale, clarifying the differences in bill shape between spoonbills and other wading birds was necessary to save the species from hunters and guard dogs.[26] The remote knowledge of Dr. Coulter was likewise broadened. He hypothesized that stepping-stone habitat within 30 kilometers might lead to metapopulation expansion into new habitat. This has occurred, just as he suggested, and in the precise geometry that University of California planners modeled based on habitat quality and spoonbill behavior.

In this case we see all six scales, from the geometry of bill shape to multinational flyways, operating simultaneously.[27] Today regional development is taking form within a framework of natural processes suggested by Dr. Coulter and Uncle Gao Ong, the remote and the near in concert.[28]

**Most Essential Geometries**

There are dozens of major geometries and thousands of minor ones developing in every city region.[29] Which are most critical to create enduring and joyful metropolitan structure?

Three geometries have repeated in every healthy city and at every scale I have studied: center, boundary and internal particularness.[30] The centers are complex, and there are not very many in any neighborhood or region. The boundaries are permeable but clear, containing consistently sized populations that suggest cell division, not supersized amoebas. Particularness is exhibited in built form and local identity. There is compelling evidence that every project within a region should contribute to these three geometries grounded in both ecological science and democratic impulse.

For American cities, the recombinant geometry of center and boundary addresses one of the most vexing issues of urban form. The dense urban core--the primary center--depends upon core terrestrial habitat for boundary. Without boundary there is no center. Without increased density in the urban core, sprawl violates the edge.

Urbanity depends upon core habitat to delineate and shape human habitation. The surrounding wildlife habitat likewise depends upon dense human habitation, otherwise core natural habitat is lost to low-density sprawl, and at the edges cats and other domestic predators diminish the remaining wildlife except edge species. This leaves urbanites with no access to nature. They seldom see native birds and other wildlife and lose native wisdom of natural processes. The geometry of the urban core is dependent upon core wildlife habitat and vice versa.

**Practical Applications for Wicked Problems**

Similar spatial thinking with other geometries of ecological democracy could shed useful light on many wicked metropolitan problems. Issues include the double squeeze on wetlands from coastal urban expansion and sea level rise, the conflicts between water's edge as both center and boundary of urbanity, and the utility of island effects to redesign aging, incomplete suburbs.

There are other oppositional geometries that might productively be explored as well. Although not as related to ecology and participation, the tension between center and boundary, community and privacy, and insider and outsider might be recombined. Within community design mutually exclusive paradoxes, like passion versus compassion, professional versus laypeople, and vision versus technical skill could provide creative reciprocal and/or recombinant geometries.

Although all of this is tentative, there is something useful in these geometries. First, the form of ecology and grass-roots democracy is more powerful in concert. Second, this simultaneous spatial precision solves many conflicts that can't be solved abstractly or ideologically. Third, paradoxical geometries inspire new ways to approach design. The oppositions direct us to seek out the core problems, not symptoms. The tension helps us ask the right questions, like how can I create a community instead of how can I build the tallest tower. In the case of the Los Angeles River, the oppositions ask multiple key questions simultaneously. Fourth, these geometries can provide an enduring and joyful structure that help people inhabit science and relate to how people live their lives. Fifth, these geometries tell us what actions are most essential to take and which can be left alone. In these ways they provide us a meaningful metropolitan structure.

Presently few city designers have the capacity to think simultaneously across disciplines, at different scales, and in different modes. Steven Johnson points out that our brains did not evolve to "understand the scales of microbes or galaxies," and certainly not both simultaneously.[31] That is part of our difficulty. Another is our education and economic system that rewards narrow, specialized expertise with rigid rules about professional modes and styles of thinking. The segregation of reason from sensing compounds the problem. In city-making, the separation of policy from site design and construction adds to the difficulty. All of this requires a dramatic restructuring of how we make metropolitan places and how we educate place-makers. Simply put, we must learn to see, to sense, to think, and to design from a different perspective that holds, at the same time, multiple contradictory ideas in our mind's eye and shapes them into one. All this must be done without losing sight of the primary purposes of community design. Resistance remains the strategy of last resort.

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