Environmental Protection and Sustainable Local Development in the United States of America

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Abstract Federal, state/provincial/district and local environmental protection regulations form some of the key frameworks within which sustainable local development must occur. Not only does that framework govern the locations and impacts of physical land development, but they also impact the types of new economic activities that can be targeted, the locations where they can locate, and the costs of developing those economic generators. In some countries, there is a strong top-down framework of laws in which local actions are largely constrained by norms and standards established by higher levels of government. In the United States, however, federal environmental controls are largely limited to protection of clean air, clean water, and endangered species and prevention of soil erosion and flooding. Local governments retain much flexibility to adopt additional environmental standards and requirements, and there are significant lessons in how they choose to exercise those authorities. This chapter will review the legal framework of environmental regulation in the United States and the seven types of local environmental regulations that are regularly chosen to supplement higher level controls. Key topics reviewed include regulations to address greenhouse gas emissions, renewable energy/energy conservation, water conservation, urban agriculture/local food production, connectivity/walkability/ public health, waste recycling, and resilience to the impacts of climate change.

Keywords: • environmental regulations • greenhouse gas emission • renewable energy conservation • water conservation • urban agriculture • public health • waste recycling • climate change • resilience • United States

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1 Background

The United States' federal system of government provides very wide latitude for local city and county governments to regulate land use and development. There are very few federal governmental laws that restrict local initiatives in this area. One significant exception to this general approach is environmental regulation, where both the federal government and many state governments have enacted laws that are binding on local governments and the land development projects that they approve.

Key areas of regulation where the federal government restricts local city and county development activities include:

- The Clean Water Act (CWA), 33 U.S.C. §1251 et seq. (1972), which prohibits pollution into the "navigable waters of the United States", which has been interpreted by the courts to include smaller upstream tributaries whose waters flow into the "navigable waters". This Act requires the creation of city and county stormwater management systems to ensure that rainfall onto developed areas does not flush pollutants into navigable waters. A very substantial amount of local government time and money is spent complying with the Clean Water Act, and it imposes significant expenses on many development and redevelopment activities.
- The Clean Air Act (CAA), 42 U.S.C. §7401 et seq. (1970), which regulates acceptable levels of air pollution. Over time, the private sector has responded to this Act by developing newer and cleaner technologies and equipment that can perform commercial and industrial activities in compliance with the Act. At this point, the major impact of the Clean Air Act is to pressure city governments to restrict or discourage automobile commuting in order to reduce related greenhouse gas emissions.
- The National Environmental Protection Act (NEPA), 42 U.S.C. §§ 4321 *et seq.*, which requires that any project using federal government money perform an Environmental Impact Assessment that evaluates the environmental and social impacts of a proposed project against alternatives (including the impacts of not doing the project at all). There is no requirement that the local government choose the alternative with the least impacts; simply that they take a "hard look" at those impacts through a public process before making a decision. Since many expensive infrastructure projects in the United States rely on federal grants or loans, the preparation of Environmental Impact Assessments has become a consulting industry, and substantial time and expense is required to comply with the Act. Some local governments respond to the Act by trying to avoid the use of federal funds, but some of the 50 states have adopted state-level versions of NEPA that apply whenever state government monies are involved.
- The Endangered Species Act (ESA), 16 U.S.C. Sections 1531–1544, which prevents development projects that would "take" species of animals that have been listed as "endangered" by the federal government. In practice, the prohibition of "taking" a species means that the project cannot damage or reduce the habitat for that species

(with some exceptions) unless there is adequate mitigation through enhancement or creation of additional habitat. The ESA affects land use in rural areas of the United States more than urban areas.

All local governments must comply with these four federal Acts. In addition, some of the 50 states (notably the most developed and populated states on the East and West coasts of the U.S.) have adopted additional environmental regulations that are binding on local governments. Other states have adopted no additional regulations.

1.1 Local regulations to promote environmental sustainability

With few exceptions, U.S. cities and counties do not adopt additional restrictions to protect clean water or endangered species; they consider compliance with the federal and state acts in these areas to be adequate. Instead, local regulations for environmental sustainability focus on the following key areas where local zoning and land use regulations can make a significant difference:

a. Greenhouse gas emissions;
b. Renewable energy and energy conservation;
c. Water conservation;
d. Urban agriculture and local food production;
e. Connectivity, walkability, and public health;
f. Waste recycling; and
g. Resilience to risks created by climate change.

Reduction of greenhouse gas emissions

Although the federal Clean Air Act imposes national standards for air quality, many citizens want their local governments to do what they can to reduce emissions of greenhouse gasses that contribute to climate change even if their community already complies with Clean Air Act standards. This is one area where local land use zoning can make a significant contribution to sustainable development in three different ways. First, many local zoning ordinances are being revised to allow more mixed-use development – development that allows a mix of residential and commercial uses. Allowing a mix of "living" and "working" uses in medium and high intensity development areas allows citizens to choose to live closer to where they work, and an increasing number choose to do so. Second, many zoning ordinances are being revised to allow a wider range of home-based business activities, which can significantly reduce the need for commuting to work. Finally, local land development regulations are being revised to require more connectivity within and between neighborhoods (discussed in more detail below).

Renewable energy and energy conservation

The United States is in the middle of a change to reduce the use of fossil fuels for the generation of electricity, and many newer zoning regulations are being drafted to encourage that change. Some regulations are being revised to require compliance with

the U.S. Leadership in Energy and Environmental Design (LEED) standards for energy efficiency, while others offer development incentives that allow larger buildings or higher lot coverage for projects that comply with LEED standards. Still other local zoning regulations are being revised to require or encourage east-west orientation of blocks and buildings to increase solar access or pre-wiring homes and businesses for future installation of solar energy devices. Many local codes are also being revised to authorize the installation of (1) geothermal energy facilities in any required open yard area, (2) solar energy panels in rear or side yards or on rooftops, and (3) wind energy facilities in side or rear yards of multi-family and non-residential development (but generally not low-density residential areas because of the significant equipment heights required for efficient electricity production). In addition, many newer regulations are broadening the definition of allowed automobile fueling stations to include alternative fuels, and others are encouraging or requiring the installation of electric vehicle charging facilities in larger development projects.

Conserving water

While some parts of the United States have ample water supplies, others – particularly in the West – have arid or semi-desert climates and too little water to support anticipated future populations. In dry areas of the country, water utilities are increasingly requiring the installation of water efficient appliances and fixtures. In addition, local governments are increasingly adopting zoning regulations that restrict the amount of irrigated landscape areas in order to conserve available water supplies for drinking purposes. Other local codes establish a "water budget" for different types of development and charge significantly higher water rates for developments that exceed those budgets. Finally, a few zoning and development codes are being revised to encourage the installation of grey water recycling systems that allow the reuse of once-used water for purposes other than human consumption. Progress towards implementation of gray water systems in private development has been slow because of the significant additional costs of installing a "two-pipe" system, but some larger public projects have absorbed those costs in order to demonstrate the feasibility and water savings that can result.

Promoting urban agriculture and local food production

A fourth area where local zoning and development regulations are encouraging sustainable development is in the promotion of local food production in urban areas. While backyard gardening has always been allowed as a secondary use of land, new zoning codes often now recognize community gardens and urban agriculture as a primary use of land. Often, urban agriculture uses are allowed in almost all zone districts, the size of the activity is limited to about the size of a city block, and the amount of the site that can be covered by structures (greenhouses and storage areas) is limited. Increasingly, these regulations allow for the sale of vegetables and crops grown on site, and a slowly growing number allow for minor food processing activities to occur on the same site. In many communities, interest in local food production is so strong that these food processing and sale activities are permitted even in residential zone districts, where the

conduct of commercial activities is (in theory) supposed to be strictly limited. In addition, many newer zoning regulations allow permanent or temporary farmer's markets in a wider variety of locations in order to encourage the wider distribution of locally grown foods.

Strengthening connectivity, walkability, and public health

As noted above, many cities and counties are revising their zoning ordinances to allow for a mix of uses that will allow their citizens to live closer to where they work. In addition, many local regulations are being revised to require that development and redevelopment be designed with smaller blocks, or with mid-block pedestrian passages, or increased connectivity both within the development and from the new project to existing surrounding development. The primary goal of these regulations is to shorten the potential walking, bicycling, and driving distance between two points in nearby areas so that more citizens decide to walk or bicycle between those destinations, and so those who choose to drive a vehicle will have a shorter drive (with fewer related greenhouse gas emissions). In mature urban areas, some of these regulations require that new projects extend and connect with the street and block structure of the surrounding area. In developing areas they sometimes require the use of a "connectivity index," which counts the number of street sections and intersections (points of connection) in a proposed development and requires at least a minimum number of connection points that can offer alternative routes and shorten travel times. A second goal of these regulations is to promote public health by making it easier to walk or bicycle between neighborhood destinations. As a corollary, many local regulations are being revised to eliminate exceptions to a general requirement to install sidewalks each time a new development or redevelopment project occurs. Still others regulations now require that convenient pedestrian-friendly walkways and bicycle-friendly routes be provided through or around larger parking lots so that those lots do not discourage those who would otherwise walk or bike to the establishment from doing so.

Recycling waste

In order to encourage recycling – rather than disposal – of waste a growing number of new zoning ordinances are requiring that multi-family, commercial, institutional, and industrial sites be designed to include a location for waste recycling containers that are easily accessible by service vehicles while also minimizing impacts on surrounding development. Because construction waste makes up a high percentage of waste deposited in landfills, a slowly growing number of local regulations are encouraging or requiring that a percentage of construction waste be transported to a construction waste recycling facility if one is located with a stated distance of the site. While many areas do not have such a facility nearby, regulations such as these may help create a market that will make construction waste recycling facilities more economically feasible in the future.

Resilience to risks created by climate change

Finally, a growing number of local zoning and land development regulations are being revised to encourage or require development to be located or designed to minimize the risks related to climate change. Along the East and West coasts of the United States, and in Hawaii, these regulations focus primarily on sea level rise. In the arid Western U.S., they often focus on increased risks of wildfire on the vast areas of public lands located near major population centers. Throughout the country, they are also beginning to address the likelihood of increased flooding from rivers and streams as trends toward more frequent and more intense storms combine with increasing populations in flood-prone areas. An increasing number of regulations are based on available (but admittedly imperfect) modeling and mapping of areas affected by sea level rise, wildfires, and flooding, although arguments about the accuracy of the models and maps are common. A second type of regulations requires buildings to be designed so that humans and equipment are located higher in the building (and further from potential tides and floodwaters). A third type of regulation requires that buildings with human occupancy be located further from wildfire risk areas than they were in the past. Some jurisdictions are also revising their approach to development in flood prone area to require not only the raising of structures higher above anticipated flood levels, but to require that any construction in those areas not result in upstream or downstream impacts on other properties.

2 New York City's responses to super Storm Sandy

In 2012, New York City was battered by one of the most intense storms in its history. Fifty-three people lost their lives and an estimated $19 billion of property damage was sustained. Rebuilding of the South Ferry subway station by itself cost $369 million, making it one of the most expensive subway station projects ever undertaken by the city. One positive outcome of the Super Storm Sandy tragedy was that New York City invested heavily in research to determine what could be done to avoid similar damage in the future. Much of this research was aimed at understanding and promoting "resilience" – a community's ability to rebound quickly from shocks while reducing the risk of future similar events.[1]

Among the basic strategy discussions in all projects to improve the resilience of urban areas is the question of "retreat" versus "harden". Strategies to harden urban areas include investments in seawalls or other constructed barriers to keep tide and floodwaters and other environmental hazards away from people and important buildings, and they tend to be very expensive. Strategies to retreat from risks include regulations to increase setbacks from waterfront, riverfront, and high fire risk areas over time, and sometimes also include programs to relocate people away from at-risk areas. Retreat strategies also tend to be very expensive, but sometimes less expensive than hardening strategies. Many communities that have this policy discussion decide that a combination of retreat and hardening strategies need to be considered, and that hardening strategies can only be

afforded when the value of existing buildings and improvements and the number of people living and working in at risk from climate change is very high. Because of the very high population density and property values in Manhattan and other areas, New York decided that hardening approaches were justified in some cases.[2]

In addition, however, research revealed that there were a number of strategies that could have limited property damage and risks to human life without investing in expensive public infrastructure to harden the city. Potential strategies to minimize and mitigate damage from predicted serious storms in the future include:

- Increasing the "freeboard" – i.e. the elevation of the building ground floor above the water levels indicated by flood modeling – above the current federal standard of one foot to two or three feet.
- Requiring "compensatory storage" – i.e. requiring that for each one cubic foot of floodwater that will no longer rest on your land because you raised the elevation of the land or created new improvements, you must buy and donate one cubic foot of floodwater storage capacity somewhere else in or adjacent to the floodplain.
- Designing public parks and required open spaces so they can act as water storage facilities ("flood parks") during severe storm events, as the City of New Orleans has begun designing after the damage from Hurricane Katrina.
- Designing ground floors of structures in or near floodplains so that they do not contain key electric, water, or sewer equipment and so that water can flow into (and out of) them during severe storms without weakening the structure supporting higher floors of the building or interfering with the use of those higher floors.
- Ensuring that all key building system equipment for hospitals, nursing homes, and other facilities with sensitive or less mobile residents are located on upper floors of the building, so that inundation of the ground floor does not affect light, electricity, water, sewer, or communications services to the rest of the building.
- Designing integrated flood protection systems along coastlines with "tiers" of flood defenses so that areas generally usable by the public (i.e. walkways or landscaped areas) only get inundated with water during the most severe floods.

Obviously, all of these solutions cost money, but the incremental cost of implementing many of these changes as individual buildings are built or rebuilt, and as public improvements are constructed, can help reduce the need for even more expensive hardening structures or retreat strategies, or can delay the dates on which some of those more expensive strategies will need to be implemented.

3 Conclusion

Within the United States system of land development regulation, local governments retain much autonomy to regulate the environmental and sustainability impacts of land development. There is no national building construction code, land use zoning ordinance, or land subdivision law. Federal law does establish and enforce minimum standards for clean air, clean water, protection of endangered species, and environmental analysis of projects that use federal funds. Some state governments have parallel systems or additional controls, but many do not.

While only a few local city and county governments have duplicated these federal and state controls, a number have gone beyond the topics covered by federal law to promote more economically and environmentally sustainable development. More specifically, U.S. local governments are increasingly using their land use zoning and regulatory powers to promote:

- Reductions in greenhouse gasses, primarily through allowing more mixed use development;
- The use of renewable energy, and conservation of energy in general;
- Water conservation;
- Connectivity between developments, and walkability/bikeability in general;
- Local food production;
- Waste recycling; and
- Improved resilience to risks created by climate change.

While innovations in each of these areas is occurring throughout the country, the vast volume of research conducted by New York City following the extensive damage of Super Storm Sandy has been particularly helpful in understanding how cities and counties can act to respond to the anticipated impacts of climate change.

Notes:

[1] See, for example, Lessons from Sandy: Federal Policies to Build Climate-Resilient Coastal Regions.

[2] See, for example, Vision 2020: New York Comprehensive Waterfront Plan, New York City Department of City Planning, March 2011.

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