Preventing the Ghost Town: What Rural Communities Need to do to Survive in the Modern Economy

Land Use and Sustainability: Is there Hope for Rural America?
John Nolon Plenary Address[1]
University of Kansas Law School
Kansas Journal of Law and Policy Symposium

February 21, 2014

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I. Buy and Dry in Colorado

I grew up on a ranch in Southwestern Nebraska and watched the development of center-pivot irrigation over the Ogallala aquifer, the formation of Natural Resource Districts, and the gradual tightening of water restrictions as the groundwater level declined. Land owners grew conservative in their water use, but my small home town still thrives due to the economic activity of irrigated cropland. Through the Land Use Law Center, working with Western Water Resources along the front range of the Rocky Mountains in the fall of 2013, I learned about a phenomenon they call "buy and dry" in that drought-stricken region. In order to get their building projects approved in most Colorado cities and counties, developers have to "prove up" a future supply of water. One of the resources tapped for this is the groundwater underlying farms and ranches, which – without this resource – are relegated to dry land crops and pasture, diminishing their future market value and reducing the country's food supply. This achieves a much different result than I experienced in Nebraska. I ran across this radio interview, which aptly explains the buy and dry movement:

[1] The author is Professor of Law at Pace Law School, Counsel to its Land Use Law Center, and has been Adjunct Professor of Land Use Law and Policy at the School of Forestry and Environmental Studies at Yale University since 2001.

Adapted from Community Radio for Northern Colorado; October 13, 2013 City Demands, 'Buy And Dry' Put A Target On Agricultural Water - By Maeve Conran **KGNU**

- “It’s been a good deal for me,” one farmer said. But, he added, “It takes a lot of water to produce a ton of alfalfa, so it makes it easier for cities and municipal and industrial users to buy agricultural water and dry up agricultural land.”
- That’s been the fate of thousands of acres of agricultural land in the state. Agricultural water rights in some parts of Colorado can fetch thousands of dollars per acre-foot.
- As Jim Pokrandt explains, for some farmers struggling to make ends meet, it’s a bittersweet deal that’s often too good to pass up.
- “It’s a double-edged sword,” said Pokrandt. “The rancher wants to be able to sell his or her water right but then there’s also the concern in the ranching and farming community that we need to keep land in production.”
- It’s that long-term impact on farming that has many people concerned. Buy and dry has been more prevalent on the Front Range where most urban development is happening. In the 1980s, the city of Aurora bought water rights to dozens of farms in the Rocky Ford area leaving dried up farmland in its wake. Similarly, in the northeast, Thornton bought 120 farms in the region for their water rights in 1986.
- Brian Werner with Northern Water has been following the buy and dry phenomenon for 30 years. He says the Thornton water grab raised some alarm bells in the local agricultural community.
- Werner sees economics as the primary reason farmers sell their water.
- “The price of water in Northern Colorado has doubled in 2013,” Werner said. “So it comes to a point where the farmer says, ‘Boy do I sell it at this price and go to Tahiti for the year or retire comfortably, or do I still struggle with trying to produce a crop with everything that Mother Nature has to offer whether it’s drought or flood?’ ”
- "Agriculture has a big target on it."
- Approximately 80 percent of the state’s water goes toward agriculture, but that number is declining.

As part of our work in Colorado, we did a survey of western states’ water plans, which reveals that land use is yet to be meaningfully incorporated into management of water resources. The buy and dry experience in Colorado shows the clear connection and urgent connection between land use planning and water planning, but the two policy realms are essentially disconnected in existing state water plans and in the practice of land use and water planners at the local level. Many of the state water plans have been prepared and established without a substantial consideration of land use plans. However, many of the water plans do recognize the benefit that future involvement of land use and planning agencies can provide. They discuss the need for coordination between local, regional, and state planning agencies to manage water resources. Additionally, they encourage local governments to use land use regulatory tools for objectives such as protecting wetlands, establishing reservoir sites, and preserving floodplains. The water plans mostly have a view toward the future in which

they will include land managers in the decision-making process but for now, they contain few land use references.

Fire is a menace along the front range joining drought as a critical challenge in both Colorado and California. Water planning is key to this issue as well. In the fire code of Rancho Santa Margarita, CA, for example, states that:

> "Water demand in this densely populated area far exceeds the quantity supplied by natural precipitation; and although the population continues to grow, the already-taxed water supply does not. California is projected to increase in population by nearly ten million over the next quarter of a century with 50 percent of that growth centered in Southern California. Due to storage capacities and consumption, and a limited amount of rainfall future water allocation is not fully dependable. This necessitates the need for additional and on-site fire protection features. It would also leave tall buildings vulnerable to uncontrolled fires due to a lack of available water and an inability to pump sufficient quantities of available water to floors in a fire."

II. Land Use and the Climate Bubble

The Great Plains states are suffering from a decline in population in rural counties that is a result of natural progression. Sons of farmers returned from World War II and took over their fathers' farms. Those who succeeded bought the farms of others and achieved efficiency through consolidation. While the number of dairy farms declined by half over the last decade, milk production increased by 20 percent. Although economic output may have increased, the number of farms shrank, schools consolidated, banks, restaurants, and farm implement dealerships closed, talent left the community, and many of the people who stay need food stamps, Medicaid, and residential assistance. Many rural communities are aging out. Today, Great Plains states have the highest median age in the country. This trend is being exacerbated by the decline in water tables and soil profiles.

Things could get worse. The corn-belt is moving north. Richland and Cass Counties in North Dakota used to be the only places in that state where corn grows successfully. Now it grows all the way to Manitoba. For the first time farmers in North Dakota are having trouble getting their corn to market, there is just too much of it to be moved on the existing system of roads and rails. Climate scientists point to climate change, constantly increasing heat in the summer, and drought as the cause of this northern migration of the corn-belt, some predicting that eventually corn may not grow in Kansas. In the short-term, record high temperatures in Kansas lower crop production where water is scarce, increase the cost of crop insurance, and lower the sales price of farmland. Long-term, corn-belt towns dependent on agriculture will experience a precipitous decline of business and property values. In response, in early February of 2014, the White House announced the creation of seven regional "climate hubs" to help

farmers and rural communities respond to the risks of climate change, including drought, invasive pests, fires and floods. Secretary of Agriculture Velchick put this current challenge in perspective. He said, "For generations, America's farmers, ranchers and forest landowners have innovated and adapted to challenges. Today, they face a new and more complex threat in the form of a changing and shifting climate, which impacts both our nation's forests and our farmers' bottom lines."

Kansas and the Great Plains states are not alone. Real estate prices in many parts of the country are beginning to fall due to the real and perceived effects of climate change on land use. What is happening on the land is an indicator that a climate bubble is forming. The probability of it bursting is increasing -- in some places at breakneck speed. On Friday, state water officials in California announced that they will stop supplying local water agencies that serve 25 million residents and three quarters of a million acres of farmland. The price of that land will inevitably be affected – and severely. In cut-off communities, the specter of living on water delivered by trucks will slow the pace and lower the price of home and business sales. The need to prove water supplies into the future to secure land use approvals in Colorado causes developers to buy water rights from farms and ranches, greatly diminishing their productivity, property values, and the nation's food supply.

Along the Atlantic coast in Virginia, past storm surge damage and recent inundation due to sea level rise are affecting the price of shoreline residences and businesses and causing port facilities and military installations to consider the costs of relocation. Rebuilding along the New York and New Jersey coast is delayed because of the difficulty of collecting on flood insurance, the slow pace of delivering federal assistance, the high cost of elevating new buildings under newly released FEMA flood plain maps, the reluctance of lenders to invest, and the fact that many of these properties are nonconforming uses under local zoning. These factors and the still-frightening recollection of the damage and despair wrought by the nightmare called Sandy are slowing sales and lowering prices in many neighborhoods, giving new meaning to "underwater" properties.

Until Congress restored subsidies for flood insurance last week, the climate bubble in newly designated FEMA high risk zones nearly popped. Homeowners experienced significant increases in flood insurance premiums, in some cases ten-fold. For many, this meant a choice between paying for insurance or their mortgage. For sellers, this means that the remaining buyers not frightened away by the prospect of future storms need higher incomes to be able to qualify for mortgages where incomes need to be high enough to cover principal, interest, taxes, and insurance. Last week's amendment to The Biggert-Waters Flood Insurance Reform Act may have simply forestalled the inevitable.[2] Biggert-Waters greatly reduced federal subsidies for flood insurance in vulnerable coastal areas in an attempt to save the nearly bankrupt federal flood insurance program by transferring the cost of insurance from taxpayers to property owners. The program is nearly $25 billion in debt due to the damage caused by

[2] *See Flood Insurance Reform Act of 2012*, FED. EMERGENCY MGMT. AGENCY (Feb. 2, 2014), http://www.fema.gov/flood-insurance-reform-act-2012.

Katrina, Irene, Isaac, and Sandy. The amendment, which rolls back or delays premium increases, drives the insurance fund precariously close to bankruptcy, which -- when it comes -- will surely prick the climate bubble.

A countervailing federal action was taken in February, 2013 when the nonpartisan Government Accountability Office (GAO) added climate change to the list of issues that pose the greatest risks to the U.S.[3] The GAO noted the potentially huge costs to the taxpayers of paying for damage to physical infrastructure, insurance costs, and disaster relief. This GAO initiative was followed in October with the announcement of a year-long study entitled Risky Business that will report later this year on the economic risk of climate change on various private sector businesses and geographic regions in the United States.[4]

Meanwhile, at the local level, communities are struggling to amend their land use regulations and to develop processes that discourage or prevent building in vulnerable areas. Their efforts to create no-build zones in the riskiest areas[5] are muted by the threat of regulatory takings actions under *Lucas v. South Carolina Coastal Council* where the U.S. Supreme Court held that regulations that take all value are *per se* takings requiring just compensation.[6] Whether this 22-year-old case is still viable given the new knowledge of climate change is uncertain. Local efforts to tighten up on regulations that currently allow building in highly dangerous areas communicate to buyers that building and rebuilding in threatened areas is, indeed, risky business and should be avoided as sea levels rise and temperatures spike. Under the age-old concept of *caveat emptor*, buyers may soon enough learn not to invest in properties in threatened places. If they don't the bursting of the climate bubble will certainly change their minds. Even Congress may then get the message and reconsider its inaction on cap and trade and carbon tax initiatives and begin helping local governments develop best practices to guide and encourage new development and redevelopment into areas adaptable to the certain effects of climate change that lie ahead.

III. The Buffalo Commons: Myth, Metaphor, or Mistake?

Two professors from eastern universities wrote an article in *Planning* magazine, published in 1987 by the American Planning Association that discussed the cycles of decline and recovery in the Great Plains and proposed a "restoration project" returning much of the land to native grasses and restoring buffalo herds as a leading economic activity. This proposal, called the Buffalo Commons, angered many, but provoked a quarter-century long discussion about the economic future of middle America. The following description of their proposal is excerpted from the *Buffalo Commons as*

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[3] GOV'T ACCOUNTABILITY OFFICE, HIGH RISK SERIES: AN UPDATE (2013), *available at* http://www.gao.gov/products/GAO-13-283.

[4] *The Economic Risks of Climate Change in the United States*, RISKY BUSINESS (2014), http://riskybusiness.org/.

[5] John R. Nolon, *Land Use & Climate Change: Lawyers Negotiating Above Regulation*, 78 BROOK. L. REV. (2013), *available at* http://papers.ssrn.com/sol3/papers.cfm?abstract_id=2109616.

[6] Lucas v. South Carolina Coastal Council, 505 U.S. 1003 (1992), *available at* http://scholar.google.com/scholar_case?case=6591687215177500 79&hl=en&as_sdt=6&as_vis=1&oi=scholarr.

Regional Metaphor and Geographic Method, as it appeared in the Great Plains Restoration Council newsletter, by Drs. Deborah E. Popper and Frank J. Popper

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Lying between the Rockies and the tall-grass prairies of the Midwest and South, the Great Plains extend over large parts of ten states, from Montana and North Dakota in the north to Texas and New Mexico in the south, and into Manitoba, Saskatchewan, and Alberta in Canada. The Plains produce significant quantities of cattle, wheat, cotton, sheep, coal, oil, natural gas and metals. They are America's steppes—windswept, nearly treeless and largely semiarid. Their expanse is mostly rural; the region's 1990 total population of 6.5 million —barely that of Georgia— scatters across about a sixth of the United States.

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In 1987 we read the region's history as showing a basic cyclical pattern that in effect combined growth and decline: population ebbed and flowed into and out of the region. Periods of high rainfall and federally subsidized settlement initially induce a boom, next overgrazing and over plowing erode the soil and lower the water table; a bust ensues, with heavy depopulation, especially in the region's most rural areas. Two such economic/environmental cycles have already occurred.

The first began with the 1862 Homestead Act that gave a pioneer family 160 acres of free federal land if it could farm it for five years. The cycle reached its zenith in the atypical heavy-rain years of the 1870s. Its nadir hit in the 1890s with widespread starvation and large convoys of fully loaded wagon trains headed east, out of the Plains. The second upswing began in the early 1900s with new homesteading laws that allowed settlers up to 640 acres of free federal land. It reached its height during World War I when American wheat replaced European production lost to the battlefields. It bottomed in the 1930s with the Great Depression, drought, the Dust Bowl, the abolition of homesteading, and John Steinbeck's *Grapes of Wrath*: Okies driving, hitchhiking, or rail-hopping west to California. As a cumulative result of the two cycles, many deep-rural Plains towns and counties had their largest populations in 1930 or 1920 or even 1890 and have declined steadily ever since.

In 1987 we suggested that a third great cycle was well into its bust phase. The top of the cycle, from the 1940s to 1970s, had featured first the introduction of large-scale federal agricultural subsidies and then energy-development ones. But the mid-1980s found large parts of the Plains' farm, ranch, energy and mining economies in near-depression as the national economy, federal policies and global markets shifted. Population losses had accelerated; young people in particular had left. Soil erosion approached Dust Bowl era rates. The Ogallala Aquifer, the source of agricultural and urban groundwater for much of the southern two-thirds of the Plains, was dropping fast. The Interior Department's Bureau of Reclamation no longer built the big dam and irrigation projects that underwrote large chunks of Plains economic development. We

imagined that public policy for the Plains would eventually have to respond to all these third-cycle pressures by creating a huge reserve, the Buffalo Commons.

The Buffalo Commons as a possible future

We conceived the Buffalo Commons in part as a literary device, a metaphor that would resolve the narrative conflicts —past, present and most important, future— of the Plains. In land-use terms, the Buffalo Commons was an umbrella phrase for a large-scale, long-term restoration project to counter the effects of the three cycles. We wrote that in about a generation, after the far end of the third cycle had depopulated much more of the Plains, the federal government would step in as the vacated land's owner of last resort —much as it had in the 1930s-- to create the region's distinctive category of public lands, the National Grasslands. The Buffalo Commons would not mean buffalo on every acre; but where Plains land uses were not working well either environmentally or economically, replacement land uses that treated the land more lightly would become inevitable. The federal government would oversee the replacement, and the new land uses would fall between intensive cultivation/extraction and pure wilderness. The Buffalo Commons used metaphor as a way to give form and words to the unknowable future.

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As the Buffalo Commons term came into widespread use (for recent examples, see Graham 1997, O'Driscoll 1997, Robbins 1997, and Olson 1998), it provoked exploration by many people and organizations, each with their own interpretations, their own heroes and villains. In effect, they discussed what underlay the term and developed their own narrative line to give the metaphor its meaning. Such discussions built on the ambiguity of the metaphor and helped foster accord between groups or individuals who were otherwise deeply divided. For example, Native Americans and white ranchers and farmers could agree that people should not be uprooted involuntarily from their homes and way of life. Energy interests and cattle ranchers knew in their bones that the Plains problems sprang from farm subsidies. For many Plains people, federal intervention harmed their region and kept it in a semi-colonized state; the Buffalo Commons represented simply the latest example of potential federal hubris. Sometimes the one point a group could agree on was that they did not like the Buffalo Commons, but at least that gave them a starting point. From there, they took up the metaphor and pushed it into the future by elaborating on the values and choices they wished to attain and avoid.

We have called this overall approach soft-edged planning, to distinguish it from hard-edged —more rule-bound— planning (Popper and Popper 1996). Story and metaphor work as process, engendering new layers of understanding as they get diffused. They loop back as discussion grows and meaning gets amplified and modified.

In this process, the Buffalo Commons has grown to have concreteness and specificity. The question is no longer why or whether the Buffalo Commons will occur, but how.

IV. The American Land Use System

1. Introduction

For rural America to respond to drought, water table declines, and demographic shifts, and economic stagnation, policy makers and leaders will have to rely on the American land use system, which puts relevant power in the hands of local governments, who need desperately the assistance of state and federal governments to respond. How this system was created and how it operates are important to understand as this generation of leaders and professions prepare to respond.

The U.S. system of land use control was based initially on English law precedents. The English system established strong private property rights which were limited initially by a few common law doctrines created and enforced principally by the courts. Gradually a system of regulating building construction and particularly noxious, or inappropriately located, land uses evolved at the local level. There was no "national" land use system in England at the time of the creation of the federal republic in the United States.

Under the U.S. system of government, states retained the power to define and limit property rights, including the right to use the land and its natural resources. From that reservoir of authority, states have delegated land use control principally to local governments, including the power to create land use districts that dictate how cities, towns, and villages and their surrounding regions develop. States began by empowering local governments to adopt land use plans, to establish uniform zoning districts, and to review and approve land subdivision and site development. In most states, local governments have been given additional powers by their states to achieve proper development patterns and to mitigate the adverse impacts of land development on natural resources and the environment. Some state and federal laws have been adopted that limit local land use authority to ensure that statewide, regional, and federal interests are protected.

The U.S. Constitution[7] gave the national Congress the power to regulate interstate commerce, including the authority to prevent sources of environmental pollution that enter navigable waters or travel across state lines in the air. This authority has been broadly interpreted, sustaining some federal regulation of private land, such as strip mining, when there is a rational basis for finding that the activity affects

[7] The text of the United States Constitution is available online at http://www.house.gov/Constitution/Constitution.html.

interstate commerce. Congress also has the authority to tax and spend, which it can use to discourage private pollution and to encourage positive state and local activity regarding the environment and land development.

This multi-jurisdictional approach has resulted in overlapping regimes, with all three levels of government establishing rules for some matters, such as wetlands and habitat protection, preservation of natural resources, transportation development, and prevention of environmental pollution. As a result, the contemporary challenge is to integrate some of the various governmental influences on private land use to limit waste and redundancy while preserving the need for flexibility in addressing diverse regional, state, and federal interests.

2. The Modern Era of Zoning

In New York City, particularly, Fifth Avenue merchants were upset with the encroachment of other land uses, such as garment factories and offices, into their high-end retail neighborhood. There was broad sentiment that the City was becoming too densely settled, largely because of the spread of skyscrapers. In 1913, the City appointed a commission which was told to investigate a completely new idea: the division of the city into land use districts.

Based on the commission's recommendations, the nation's first comprehensive zoning ordinance was adopted by New York City in 1916. It divided the City into multiple land use districts, or zones. These districts allowed private landowners to use their land only for the purposes permitted in the applicable district. This protected Fifth Avenue retailers, for example, from the incursion of garment factories—an industrial use—in that retail zone.

This concept spread quickly. By the mid 1920s, nearly 400 local governments had adopted comprehensive zoning laws. Their authority to do so was granted by enabling acts adopted by their state legislatures. In the U.S., virtually all 50 states have adopted this method of land use regulation; their legislatures have passed relatively similar zoning enabling laws that delegate the authority to municipalities to regulate private land uses.

Local governments are regarded as legal instruments of their states. The states have created various types of local governments—cities, towns, townships, villages, boroughs, or counties—and delegated authority to them to legislate regarding specific interests. The legislative authority of municipalities is limited to that delegated by the state and extends only within their geographical boundaries.

Planning and zoning enabling laws specifically authorized municipal governments to control the use of the land by adopting land use plans and creating zoning districts. In most states, zoning regulations must conform to the locality's land use plan. In each zoning district, various building construction rules are established. These limit, for example, the heights and sizes of buildings and the amount of the

building lot that can be built upon. Within each zoning district, each parcel of land is assigned at least one as-of-right land use, while permitting accessory uses typically associated with those principal uses. Variances of the standards may be awarded when landowners can prove that the zoning standards impose unnecessary hardships. Uses that do not conform to newly adopted zoning regulations may continue but may not be expanded or enlarged.

State enabling laws also authorized localities to create administrative and quasi-judicial agencies to review and adjudicate proposals for land development and petitions for relief from zoning regulations. Planning boards or commissions were established in most communities to review and approve individual development proposals. Zoning boards of appeal were created to hear applications to reverse adverse determinations of zoning enforcement officials or for relief from the strict application of zoning standards where they create unnecessary hardships regarding unique parcels of land. These agencies are required to hold public hearings on most proposals and petitions, to provide notice to affected parties of the hearings, to hold meetings open to the public, and to ensure that their voting members have no conflicts of interest that prevent their decisions from being objective.

The most controversial aspect of zoning was that it prohibited private landowners from using their land for activities of their own choosing. Building construction limits were firmly established and accepted under prior state and municipal law. But taking away the right of a private landowner to use his or her land to meet market needs was a new idea and more controversial.

In the state of Ohio, the constitutional authority of the Village of Euclid to adopt and enforce use limitations was challenged by Ambler Realty Company.[8] Ambler claimed that separating uses through zoning districts accomplished no legitimate governmental purpose and, on its face, was unconstitutional. The plaintiff's technical claim was that zoning violated its constitutional right to due process: to be protected from arbitrary or unreasonable laws which did not further a legitimate public purpose.

The U.S. Supreme Court disagreed. In 1926, it handed down its decision in *Euclid v. Ambler Realty Co.*,[9] holding that the separation of land uses among zoning districts did accomplish a legitimate public purpose, using nuisance limitations on private property use as an analogous doctrine. The Court reasoned that the effect of zoning was to create land use standards that protected neighbors from nuisance-like use of nearby land. Thereafter, establishing zoning districts that carefully prescribed authorized land uses within each zone became the principal method of controlling private land use in the interest of building communities that were safe and economically efficient. Following this decision, the adoption of uniform building and use standards within various land use districts became known as "Euclidian Zoning."[10]

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[8] *See* Euclid v Ambler Realty Co., 272 U.S. 365 (1926) .

[9] *Id.*

[10] *See* CHARLES HAAR AND JEROLD KAYDEN, ZONING AND THE AMERICAN DREAM: PROMISES STILL TO KEEP (1989).

This system relied on local governments to make land use decisions. The role of the state was to establish the scope of local land use authority. Interestingly, during the early part of the 20th century, the role of the federal government was generally irrelevant to the creation of cities and towns and the control of private land use. The federal influence on metropolitan development began in earnest in 1934 with the adoption of the National Housing Act, which established a system of mortgage insurance through the Federal Housing Administration. In 1937, Congress created the public housing program, using its power to tax and spend to grant subsidies to local housing authorities to build low-income housing. In quick succession, it used this same authority to create the urban renewal program, offering planning and building grants to local urban renewal agencies, to subsidize housing conservation and rehabilitation, encourage the adoption of local housing codes, provide funds to non-profit housing companies for moderate- and middle-income housing, and eventually, in 1974, to provide block grants to localities, large and small, for community development activities.[11]

By the 1970s, state courts had determined that private nuisance actions were not competent, in the context of nuisance actions brought by a few affected landowners, to resolve regional air and water pollution problems resulting from commercial and industrial activities.[12] In response, Congress began a decade-long effort of adopting federal laws to control land, air, and water pollution, using its power under the interstate commerce clause. Curiously, this legislative initiative did not involve local governments or engage their potential to alter land development activities under their delegated land use authority.

At the inception of this era of federal environmental law-making, there was a reexamination of the wisdom of having delegated such extensive authority for controlling private land use to thousands of local governments in the 50 states, each making its own rules in the absence of any set of guidelines established by the states or the federal government.[13] Critics wondered how regional and statewide interests could be protected when local land use authority was confined to the borders of individual municipalities. Further, there were concerns that the delegation of land use power to localities was an ineffective method of controlling the underlying regional and national causes of environmental damage.[14]

Two responses followed. First, attempts were made to limit local control through preemptive measures, regional land use agencies, state directives, and other approaches. Local control of private land use began to be limited by state and federal laws adopted to deal with the negative effects of land use that were beyond the control,

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[11] *See* John R. Nolon, *Re-examining Federal Housing Programs in a Time of Fiscal Austerity: The Trend Toward Block Grants and Housing Allowances*, 14 URB. LAW. 249, 253-257 (1982).

[12] Boomer v Atlantic Cement Co., 257 N.E. 2d 870 (1970).

[13] In 1972, there were about 38,500 general purpose local governments. *See* U.S. CENSUS BUREAU, PRELIMINARY REPORT NO. 1: THE U.S. CENSUS OF GOVERNMENTS, *available at* http://www.census.gov/govs/www/cog2002.html.

[14] Fred Bosselman and David Callies, *The Quiet Revolution in Land Use Control*, COUNCIL ON ENVTL. QUALITY (1972) at 1.

competence, or concern of local governments. Although these limitations on local control in a few states are noteworthy, they are not widespread and have not disturbed the primary reliance on municipal control in the U.S. land use system.

Second, many state legislatures gave greater power and flexibility to local governments to respond to development pressures. So-called "neo-Euclidian zoning" techniques such as planned unit development districts, floating zones, special use permits, and others evolved at the local level.[15] These allowed local governments more flexibility in locating development in appropriate places. In the modern era, additional techniques have been authorized such as the purchase of development rights, the transfer of development rights, and the recreation of traditional neighborhood districts to give even greater authority to local governments to marshal the forces of development and arrange buildings appropriately on the land.

These responses—the minimal erosion of local land use discretion and the delegation of additional and flexible authority—are evidence that the traditional land use system is evolving.[16] It is interesting and instructive to examine how the federal and state governments have respected the centuries-old tradition of municipal control while at the same time confronting new challenges. The influential book *Land Use in America*[17] begins its agenda for land use in the 21st century with two critical recommendations. First, it states that "[l]ocal governments must take the lead role in securing good land use. Initiatives in land use planning and growth management need to be anchored in a community-based process that develops a vision for the future." Second, "State governments must help local governments by establishing reasonable ground rules and planning requirements … and providing leadership on matters that affect more than one local jurisdiction."[18] It is in the details of the limitation and expansion of local control that the ability of law to meet the changing exigencies of society is evident.

The seeds of the movement to limit and reshape local control were planted in the 1930s as planners dealt with the spread of land development beyond the borders of cities and urban villages.[19] After World War II, the search began for a higher level of government or administrative unit to define regional land use needs and shape development to meet them. The reformists of the 1970s called for state growth management laws, for regional governments to ensure that regional land use interests are met, and for further limits on local control of certain natural resources such as coastal areas and wetlands.

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[15] *See* John R. Nolon, *Well Grounded: Using Local Land Use Authority to Achieve Smart Growth*, Chapters 6-8 (2001).

[16] *See* Charles M. Haar, *The Twilight of Land-Use Controls: A Paradigm Shift?*, 30 U. RICH. L. REV. 1011, 1038 (1996).

[17] HENRY L. DIAMOND AND PATRICK F. NOONAN, LAND USE IN AMERICA: THE REPORT OF THE SUSTAINABLE USE OF LAND PROJECT (1996).

[18] *Ibid* at 99-103.

[19] *See* DOUGLAS R. PORTER, STATE AND REGIONAL INITIATIVES FOR MANAGING DEVELOPMENT: POLICY ISSUES AND PRACTICAL CONCERNS 3 (1992).

3. Regional Planning and Control

From its inception, the U.S. land use system has encouraged voluntary, grassroots approaches to intermunicipal and regional planning. The Standard City Planning Enabling Act, promulgated by the Hoover Commission in 1928, provided for regional planning by authorizing local planning commissions to petition their state's governor to establish a regional planning commission and to prepare a master plan for the region's physical development. Provisions were included in the planning enabling act for communication between the regional and municipal planning commissions with the objective of achieving a certain degree of consistency between local and regional plans.[20] In 1968, the Douglas Commission—the National Commission on Urban Problems—appointed by President Johnson, issued its report, *Building the American City*, which reinforced regional planning. The Commission recommended that each state create a state agency for land use planning and prepare state and regional land use plans. The White House staff refused to accept the report.[21] A federal statute, the National Land-Use Planning Act, that would have provided a framework for federal, state, regional, and local land use planning was vigorously debated in the early 1970s, but was not adopted.[22]

These examples illustrate that regional consciousness has been part of the land use system and regularly reaffirmed since the early days of American zoning. Much of the United States, at one time or another, has been brought within the jurisdiction of some form of voluntary regional planning organization due to a variety of influences. The most powerful of these forces was the promise of funding for regional efforts under housing, water, transportation, and other public works grant programs of the federal government. Predominant among the organizations formed were voluntary, area-wide regional councils of government, multi-state river basin compacts, and regional economic development and transportation organizations.

With few exceptions, regional bodies in the U.S. have stopped far short of preemptive land use planning and regulation. They have become, however, effective vehicles for communication, education, collaboration, and networking. Among their most significant contributions is the effect they have of educating local land use officials.[23] In these regional bodies, local representatives learn about the common problems and interdependence of localities that share economic or housing markets or that have regulatory power over regional river basins and watersheds that cannot be protected without intermunicipal cooperation.

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[20] *See* EDWARD M. BASSETT, THE MASTER PLAN (1938).

[21] *See* P.L. 92-463, Federal Advisory Committee Act, H. REP. NO. 92-1017 (April 25, 1972).

[22] *See*, Margaret Weir, *Planning, Environmentalism, and Urban Poverty: The Political Failure of National Land-Use Planning Legislation, 1970-1975*, *in* ROBERT FISHMAN, THE AMERICAN PLANNING TRADITION: CULTURE AND POLICY 193 (2000).

[23] *See* NELSON WIKSTROM, COUNCILS OF GOVERNMENTS: A STUDY OF POLITICAL INCREMENTALISM 131 (1977).

4. Expanding Local Control

By the middle of the 20th century, local zoning, subdivision, and site plan regulations had become traditional components of the land use system. Then, as the post-World War II building boom occurred, legislatures in many states began to give their local governments authority to adopt more complete, flexible, and diverse land use laws. They have been aided by liberal interpretations of delegated powers by state courts. Using these powers, localities in the U.S. have created two recent and dramatic movements: smart growth and local environmental protection.

Smart growth is offered as a solution to the problems of urban sprawl, the deterioration of older cities and villages, and the failure of new development to create quality neighborhoods and to preserve natural resources. It provides a popular label for a growth strategy that addresses current concerns about traffic congestion, disappearing open space, nonpoint source pollution, the high cost of housing, increasing local property taxes, longer commutes, and the diminishing quality of community life. Under many suburban zoning laws and subdivision regulations, the densities and design features of traditional neighborhoods found in older urban areas can no longer be replicated.[24] Smart growth calls for a new type of land development pattern, one that is more concentrated, affordable, environmentally sensitive, and that creates a quality of neighborhood in which residents feel comfortable living.[25]

Smart growth also calls for the identification and preservation of critical environmental areas before land development occurs. By identifying critical environmental areas and protecting them via regulations and acquisition programs, communities can better define where to locate the development needed to accommodate population increases. The sustainable development movement taught that development and conservation are mutually supportive. Proper land conservation increases the quality of life, protects needed natural resources, stabilizes property values, and provides recreational and tourism benefits. Proper development, for its part, takes development pressures away from critical environmental areas, provides tax resources for municipal services, and can provide financial resources for land conservation.

Once municipal growth areas have been designated, local governments have a number of strategies to choose from in order to direct development into such areas. The following illustrative list is drawn from strategies local governments are authorized to use in New York State, and is representative of local powers in most populous states:

- *Higher Density Districts*: In a designated growth zoning district, the density of development can be increased as a matter of right. Municipalities can use their traditional zoning authority to create mixed-use neighborhoods with bulk, area, and use provisions that create the type of compact development pattern envisioned by the smart growth concept. Such districts provide sufficient density

[24] Jonathan Barnett, *What's New About New Urbanism?, in* CONGRESS FOR THE NEW URBANISM, CHARTER OF THE NEW URBANISM 5 (2000).
[25] *See About New Urbanism*, CONGRESS FOR THE NEW URBANISM, http://www.cnu.org/about/index.cfm.

of mixed-use development to support the transportation and transit services needed to increase pedestrian traffic and reduce car travel.

- *Bulk and Area Requirements*: A designated growth zoning district can contain bulk, area, and parking provisions that encourage types of development that support smart growth principles. By establishing setback lines that require buildings to be brought up to the sidewalk and by requiring parking and garages in the rear, pedestrian use of streets can be encouraged and an attractive neighborhood design created. The number of parking spaces required can be fewer if real prospects of transit services exist. Design amenities such as front porches and traditional architectural styles can be included in the zoning provisions. In some parts of these designed zoning districts, narrower streets can be specified to discourage traffic and ease pedestrian use.
- *Incentive Zoning*: Significant waivers of zoning requirements can be offered to developers, including increasing the density of development allowed, as a method of directing larger-scale development into designated growth areas.[26] Developers can be encouraged to provide public amenities such as transportation, parks, affordable housing, social service centers, or other infrastructure in exchange for the waivers.
- *Special Permits*: Larger-scale developments providing for mixed uses may be approved by special permits issued by the planning board or other administrative body. This practice has been followed for decades by municipalities as a method of combining land uses in designated planned unit or planned residential zoning districts.[27]
- *Floating Zones*: Large-scale developments can be permitted by amending the zoning code to provide for a special use zone, such as a mixed-use development district, that can be affixed to a large area upon the application of all or a majority of the landowners. That application, if successful, results in the amendment of the zoning map to redistrict the subject parcels and permit the new use.[28]
- *Generic Environmental Impact Statements*: When any of these techniques is used to create a designated growth area, a generic environmental impact statement can be prepared that identifies negative environmental impacts and provides for their mitigation.[29] When this happens, it is possible that developers of individual projects will not be required to prepare lengthy and costly environmental impact studies. This alone can provide a powerful incentive for developers to concentrate their projects in designated development areas.
- *Transfer of Development Rights*: State law allows New York municipalities to establish transfer of development rights programs that concentrate development in receiving districts and provide for the transfer of development rights from

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[26] N.Y. TOWN LAW § 261-b (McKinney 2004); N.Y. GEN. CITY LAW § 81-d (McKinney 2004); N.Y. VILLAGE LAW § 7-703 (McKinney 2004).

[27] N.Y. TOWN LAW § 274-b (McKinney 2004); N.Y. GEN. CITY LAW § 27-b (McKinney 2004); N.Y. VILLAGE LAW § 7-725-b (McKinney 2004).

[28] In *Rodgers v. Village of Tarrytown*, 96 N.E.2d 731 (1951), municipalities in New York learned that they have the authority to create novel zoning devices, such as the floating zone, to achieve the most appropriate use of land.

[29] *See* N.Y. COMP. CODES R. & REGS. Tit. 6, § 617.10 (2004).

sending districts.[30] In smart growth terms, the receiving district is the designated growth area and the sending area is a conservation or natural resource protection area.

- *Intermunicipal Agreements*: In New York, local governments have been given liberal legal authority to cooperate in the planning and zoning field.[31] Through intermunicipal agreements, they can designate shared or interlocking growth districts that create real market opportunities and a complementary range of housing types, retail services, office buildings, and needed amenities. This important technique is used most often when several communities share a transportation corridor.

5. The Advent of Local Environmental Law

Slowly, during the past 30 years, local governments have developed a new body of local regulations designed to protect natural resources and prevent environmental pollution.[32] Today one can point to thousands of local laws that protect forests, freshwater and tidal wetlands, ridgelines, stream banks, vegetative cover, viewsheds, watersheds, wildlife habitats, and other natural resources that are threatened by land development. Equally numerous are local laws that prevent environmental contamination, notably nonpoint sources of water and air pollution that escape regulation under the Clean Air Act and the Clean Water Act enacted by the federal Congress. Local laws now regulate stormwater runoff, soil erosion, and surface water sedimentation in an attempt to prevent further environmental degradation at the local level and to preserve the quality of community life.

Beginning in the 1960s, some communities used large-lot zoning as a crude way to protect open space and its associated natural resources. Up-zoning occurred in some suburban areas and was aimed principally at controlling population growth, maintaining residential property values, and containing the cost to the community of servicing development. Incidentally, it also limited water use, aquifer contamination, and nonpoint source pollution. As the environmental movement evolved and matured in the 1970s and 1980s, local lawmakers became increasingly sensitive to environmental issues. There were early signs forecasting the adoption of local environmental law. Of particular importance was the National Flood Insurance Program, which required local governments to adopt and enforce floodplain management programs as a prerequisite to local eligibility for national flood disaster assistance payments. Catastrophes had their role in the movement. Hurricanes, for example, led to stormwater management regulations and stringent setback requirements along the coasts of barrier islands that are particularly vulnerable to tropical storm damage.

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[30] *See* N.Y. TOWN LAW §261-a (McKinney 2004); N.Y. VILLAGE LAW §7-701 (McKinney 2004); N.Y. GEN. CITY LAW §20-f (McKinney 2004).

[31] N.Y. TOWN LAW § 284 (McKinney 2004); N.Y. GEN. CITY LAW § 20-g (McKinney 2004); N.Y. VILLAGE LAW § 7-741 (McKinney 2004).

[32] *See* John R. Nolon, *In Praise of Parochialism: The Advent of Local Environmental Law*, 26 HARV. ENVTL. L. REV. 363 (2002).

Contemporary local environmental laws take a number of forms. Environmental objectives can now be found in local comprehensive plans, the boundaries of conservation zoning districts can be drawn to correspond to and protect watershed areas, environmental standards can now be found in subdivision and site plan regulations, and localities can adopt stand-alone environmental laws to protect particular unique and threatened natural resources.[33] The clear purposes of these laws are to control nonpoint source pollution and preserve natural resources from the adverse impacts of land development. Although the majority of U.S. communities have not adopted numerous and sophisticated local environmental laws, the increasing number of these laws, in the aggregate, constitutes a significant body of land use practice.

6. Supporting Innovative Local Action

Local governments, empowered and guided by their states, have considerable authority to effect comprehensive and complete solutions. If properly guided and assisted, they can create strong local communities, while meeting regional and statewide needs. They can become effective partners of the federal government in protecting federal waters, the air, and other matters of interstate importance.

Many states draft model local land use and environmental laws that localities may be allowed or required to adopt. State agencies provide technical assistance to municipalities regarding the adoption and enforcement of these models and sponsor educational programs to encourage more local governments to become involved. Some states also provide incentives, such as bonus eligibility points for discretionary grant programs to local governments that have adopted effective land use and environmental laws.

The federal government can encourage states to delegate authority to promote smart growth and protect natural resources to local government by sponsoring the preparation of model state acts that enable municipalities to adopt flexible and innovative land use laws. It was the model act promulgated by the U.S. Department of Commerce in the 1920s that led to the rather rapid adoption of state zoning enabling acts and of local zoning ordinances. Providing federal funding to support the emerging efforts of states to prepare smart growth policies and plans helps create a framework for state and local action to protect environmental resources in critical areas.

Further efforts in this direction are warranted. Federal and state funding also can be provided for the identification of critical watersheds, habitats, and forests and the development of local inventories of natural resources. With federal support, states can encourage local governments to create natural resource inventories and protect critical environmental assets by providing financial incentives to localities that comply with state smart growth programs. Federal and state incentives can also be provided to facilitate efforts to link transportation planning with intermunicipal land use planning. To the

[33] Several hundred of these local laws are available on the Gaining Ground Information Database, prepared and maintained by the Land Use Law Center, *available at* http://landuse.law.pace.edu/SPT/SPT--Home.php.

extent that the federal government builds on state and local action, its legal and geographical influence is broadened.

Beyond these municipally focused initiatives, additional strategies for integrating governmental land use regulations are possible. These include coordinated project review and joint permitting systems between the federal and state agencies, delegation of the administration of federal wetland, stormwater, and habitat permitting authority to state governments, and, importantly, the cross certification of compatible state and federal land use plans and programs. This coordinated approach to land use regulation was evident 30 years ago in the Coastal Zone Management Act of 1972 under which federal incentives for state and local cooperation were applied. This cooperative approach is repeated in the Disaster Mitigation Act of 2000, a federal law that requires states, in conjunction with their localities, to create and submit plans for more intelligently regulating development in disaster prone areas and which rewards those that cooperate with enhanced eligibility for federal disaster relief payments.[34]

Although the U.S. land use system is fragmentary and still uncoordinated in many respects, it shows signs of coherence. Further integration of the system can be achieved by focusing on and reinforcing the role of municipalities. United States law and practice emphasize the role of local government in land use control for a number of important reasons. First, it is the historical approach, emanating from the medieval municipal corporation and surviving today, despite many attempts to loosen the local grip. Second, local economic markets and environments differ—they are not easily susceptible to generic statewide and national solutions. Third, local citizens and politicians are intimately familiar with local circumstances and have a great stake in economic success and protecting the quality of community life. Fourth, emphasizing a strong local role organizes state and federal political, legal, and financial energies by giving them a focal point.

Respecting the role of municipalities in land use and environmental regulation reminds policymakers that conditions and interests differ greatly from place to place. It suggests, too, that the legal system must remain open to invention. As Justice Brandeis observed over 70 years ago, "a single courageous state may, if its citizens choose, serve as a laboratory; and try novel social and economic experiments without risk to the rest of the country."[35] By enabling, encouraging, guiding, and directing local government experimentation in land use matters, the 50 states empower thousands of local partners in society's perpetual search for the creation of livable, affordable, and environmentally sound communities.

V. "Zoning in" the Future

Zoning and land use regulations in most communities were designed to deal with different economic, demographic and environmental issues than communities, particularly in the Great Plains – as noted above, face today. As conditions change,

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[34] P.L. 106-390 (Oct. 30, 2000).

[35] *New State Ice Co*. v *Liebmann* 285 U.S. 262, 31 (1932) (Brandeis, J., dissenting).

new uses need to be promoted and uneconomical ones phased out. Amending the comprehensive plan, with which zoning must be consistent in most states, is an excellent method of bringing the community to consensus about land use, economic development, and human settlement issues that are needed and that they will support. This in turn builds a constituency for effective action and the plan guides development regulations, which direct the resources and investment of the private sector. Nowhere is this more evident than in what happened in Greensburg, Kansas a few years ago.

Within one year of being 90 percent destroyed by a devastating tornado in 2007, the citizens of Greensburg had amended their comprehensive plan. They felt that working as a community on a plan, while they restored their homes and businesses, was a good way to figure out what to do. In May of 2008, they adopted a comprehensive plan that contained this language:

> Out of crisis emerges opportunity, and as a community, Greensburg citizens believe they have the chance to build a stronger, thriving town. On May 4th, 2007, an EF-5 tornado hit Greensburg, a town of 1,389 in Southwestern Kansas. Over the last four decades this small rural farm town has been declining in population with a struggling economic base. In the wake of the disaster it became apparent that big changes would have to occur to sustain the town for future generations. The community set forth to rebuild a prosperous future through sustainable community design. The immense challenges facing Greensburg's reconstruction and the desire to embrace common sense green solutions make it an ideal candidate to become a model sustainable rural community. Greensburg has the opportunity to repair the destruction with a balanced approach based on Kansas values and a promising new way of life. Greensburg can become a community with strong leaders who reach out to neighbors. See page 2.

There is more. On page 10, the comprehensive plan reads:

> The root of sustainability is based in common Kansas values. A Kansan thinks in terms of generations and harbors a sincere belief that decisions should build strong communities for our children. We still believe in the power of community, and in our rural areas neighbors still gather at the coffee shop to talk about the issues of the day. A Kansan's character is rooted in the agricultural industry prominent in the region. We understand the natural systems that power a sustainable economy and know what it means to live off, and with, the land.

According to a USA Today's article on April 15th, 2013, "Six years after the tornado, Greensburg is the world's leading community in LEED-certified buildings per capita. The town is home to a half-dozen LEED-platinum certified buildings, including the new City Hall and the new 48,500-square-foot Kiowa County Memorial Hospital. Renewable energy powers the entire community, and the streetlights are all LED.

Greensburg zoned in its future through land use planning. A northern Nebraska rural town supports a world-class links golf club; to the extent that the Buffalo Commons becomes a reality in the Great Plains, rural town can zone in wild-recreational tourism; disappearing groundwater may lead to growing plant material for biofuels: raw materials for energy that come from plant based renewable resources, which can lead to on-farm digester systems. Large scale wind farms and solar arrays can take advantage of wind resources, which exist in many portions of the Great Plains, and the sun that consistently shines there.

Some rural communities are rezoning their downtowns and neighborhoods and hamlet crossroads areas to provide flexibly for their future. Through overlay zoning, planned unit developments, special use permits, the private sector can easily propose economical uses, rather than comply with tightly constrained zoning districts. This can lead to turning the single-family homes of seniors who don't need them, into more affordable two and three bedroom structures; to putting elderly cottage housing in rear yards with shared parking and septic; to creating bed and breakfasts for visiting tourists; to aggregating parcels for the construction of affordable housing for seniors.

Local officials, through their state-wide and regional organizations can advocate for the help they need to reconfigure to zone-in the future asking for a renewal of interest, for example in the Homestead Economic Opportunity Act proposed over a decade ago that directs tax credits, student loans, and investment incentives toward high out-migration counties.

As an extended example, local zoning – where not preempted by state law – can allow hydraulic fracturing to happen without ruinous local impacts. In this story is an example of the federal governmental system trying to adjust to new circumstances and deciding who should regulate oil and gas drilling and to what extent.

One of the many issues raised by hydraulic fracturing, or fracking, is which level of government should regulate which aspects of the practice. With fracking, the legal authority is visibly fragmented. The debate is complicated by the fact that the benefits associated with fracking are national, regional, state-wide, and local in nature and that the risks associated with fracking raise concerns that are within the existing legal jurisdiction of federal, state, and local government to regulate. These realities lead, in turn, to further debates about which level of government should have the primary role in regulating fracking. Some argue that the federal government should fully preempt the field of fracking regulation, others argue that states should preempt local regulation, and still others see benefits in the involvement of all three levels of government in regulating the technology. If the advocates of either federal or state preemption prevail, the historical role of local governments in controlling local land uses and their impacts will be diminished, if not extinguished.

Federal Regulation of Environmental Pollution

The federal regulatory system with respect to fracking is particularly fragmented and incomplete. The Safe Drinking Water Act ("SDWA"), which applies to the injection or reinjection of fracking fluid into groundwater aquifers that provide drinking water, only imposes standards upon gas drilling operations that inject diesel fuel, which is but one of dozens of environmental and land use concerns with the gas drilling industry. The Clean Water Act ("CWA"), which applies to surface water contamination, is powerless to address the potential contamination resulting from water migrating to the surface waters after being injected into the ground. The Clean Air Act ("CAA") is currently being used to institute new rules on the release of methane and hazardous air pollutants, but the scope of this relatively successful regulatory scheme is confined to the well pad point source of air pollution.

The Comprehensive Environmental Response Compensation, and Liability Act ("CERCLA") grants the EPA the authority to hold polluters strictly liable for cleanup costs of hazardous waste sites, but "petroleum… [and] natural gas" are exempted from the definitions of "hazardous substances." Likewise, oil and gas waste is exempted from the "cradle-to-grave" waste management scheme of the Resource Conservation and Recovery Act ("RCRA.")

The Endangered Species Act ("ESA") grants the Secretary of Interior the power to protect endangered species from "take" but this approach is rarely used and entirely contingent upon the regional concerns of particular species.

The Obama administration partially granted a petition to require manufacturers to disclose the chemical makeup of fracking fluids under the Toxic Substance Control Act ("ToSCA"), but even if fully granted these disclosures do not necessitate any regulation, in and of themselves.

State Regulation of Mining Operations

States have traditionally regulated the oil, gas, and mining industries, at least with respect to their operations. Because of the limited authority and regulations of the federal government, states have been most active level of government in regulating the relatively new technology of unconventional gas exploration: the horizontal drilling of gas contained in shale formations. State regulations generally are divided between three phases of hydrofracking.

The first is site development, where some states require blasting permits, stormwater management, and baseline water quality testing, some minimal set-backs from developed neighborhoods and some critical environmental resources, but with great variation from state to state. Most states have minimal regulation at this stage of fracking.

The second is the drilling phase of each well, where some states require blowout prevention equipment, integrity in surface pits and tanks used for storing waste, solid

waste disposal, and the management of pits regarding their capacities, again with great variation.

The third is the fracturing process itself where gas is extracted, stored, or shipped. Here states may require the disclosure of chemicals used, usually excepting trade secrets, permits for water withdrawal, disposal of flowback water, etc. again with great variation.

A few states require a permit for geophysical testing to locate gas underground; the states have the bulk of responsibility for regulating the impacts of oil and gas well site development, drilling, hydraulic fracturing, and ongoing production from the well. With respect to geophysical testing to locate oil or gas underground, a small number of states require a permit and careful environmental review. Many others, however, have minimal regulation at this stage. For testing that involves the use of explosives in "shot holes," most states require that any one blasting shot holes must have a blaster's license. Some states mandate minimum distances between blasting and buildings and other structures, and some require the filling in of shot holes and minimal restoration of sites. For well site development once geophysical testing is complete, states with delegated Clean Water Act authority typically issue a general stormwater permit with best management practices to prevent and mitigate erosion; the EPA issues this permit in states without delegated authority. Some states also require that operators test existing (baseline) water quality prior to well site development, or incentivize this testing through a rebuttable presumption that contamination within a certain distance and time of drilling was caused by the oil and gas operator. Most states do not address habitat fragmentation or other impacts of well site development, although Maryland has proposed to require a comprehensive plan that would include consideration of the well-site footprint.

The bulk of state regulations apply after site development, when drilling begins. All states require that the well be "cased" in a particular way—that it be lined with steel cemented into the ground. Casing regulations vary substantially. Some are narrative, requiring "adequate" casing," whereas others specify the type of steel and cement that must be used, the time for which the cement must set around the casing before being disturbed, the type of cementing method required, and how deep the casing must run. During drilling, states typically require the use of blowout prevention (BOP) equipment to prevent the well from exploding when an operator encounters unexpected pressures while drilling. All states also regulate, to some extent, the surface pits or tanks that are used to store drilling, and later fracturing, wastes. Most require that the pits be lined and "dewatered" (emptied and dried out) within a certain period of time after drilling and fracturing ends. Solid wastes—solids from dewatered pits, and the drill cuttings such as rock and soil that come out of the well—are either buried on site or sent to a state-regulated "exploration and production" (E&P) waste landfill. With respect to the management of surface pits at sites, most states also require that a certain amount of empty space called "freeboard" be maintained in pits so that they do not overflow, and some require secondary containment beneath storage tanks or pits—additional liners or other materials that will catch spills if they

occur. Finally, most states require operators to have a spill prevention and response plan, in which certain practices are supposed to be followed to avoid or catch spills and quickly recover spills if they occur.

For the fracturing process following well drilling and casing, few direct regulations apply to fracturing. States typically do not regulate the type of chemicals that may be used, for example, although most require disclosure of the chemicals while allowing for trade secret protection. Several states do, however, require that the well be pressure tested before fracturing to ensure that the casing can withstand the pressure, and that operators notify the state oil and gas agency before fracturing the well. Some states require permits for the withdrawal of water for fracturing, and others do not; for surface water withdrawals, states like West Virginia and Pennsylvania ask the operator to demonstrate that the withdrawals will not adversely affect aquatic life. Specific state regulations also apply to the disposal of flowback water, with many states allowing disposal only in underground injection control wells (regulated by states if they have delegated authority under the Safe Drinking Water Act) or, in limited circumstances, through wastewater treatment plants. Following drilling and fracturing, states typically require minimal site restoration.

Local Regulation of Land Use Impacts

The impacts of fracking on local communities are many and, cumulatively, profound. Consider the following list:

1. Road conditions, deterioration, congestion, and repair
2. Critical environmental area impacts
3. Erosion of community character and sense of place
4. Adverse impact on property values
    a. Mortgage restrictions
    b. Resale limitations
    c. Negative adjacent land uses
5. Adverse impacts on farming and farm land preservation
6. Air pollution: localized effects (methane)
7. Chemical fires
8. Burns from seeping hydrochloric acid
9. Impact on local public health institutions
10. Ground water pollution
    a. Well contamination
    b. Dumping
    c. On-site storage of flow back
    d. Solvents, acids, methane, diesel fuel, etc. in ground water
11. Ground water depletion
12. Surface water pollution
13. Earthquakes
14. Transmission line placement and replacement
15. Soil erosion and sedimentation

16. Visual blight: viewshed interruption and night sky pollution
17. Noise pollution
18. Local economic development plans and conditions
    a. Tourism
19. Local housing plans and conditions
    a. Man camps, temporary housing provision
20. Site specific soil erosion and sedimentation
21. Adverse impacts on locally valuable habitats and species
22. Ridgeline protection
23. Boom town creation
    a. Cyclical and non-permanent nature of economic demands

Relatively few of these are within the scope or concern of federal and state agencies and regulations. In a different context, local governments would protect themselves from these impacts through comprehensive planning, zoning, subdivision and site plan regulations and negotiations with drilling companies. They would have a fracking component of their comprehensive plans after a full community discussion of the facts, impacts, benefits, and concerns about the technology. That plan would identify critical environmental areas, perhaps agricultural areas, residential and commercial neighborhoods where fracking would be inappropriate and identify industrial zones where fracking, like other industrial operations are permitted. As drilling projects proceeded, they would be subject to local subdivision and site plan regulations, which might be amended to consider and deflect some of the unique adverse impacts of unconventional gas exploration on neighbors and the community.

But there are three factors, however, that inhibit normal land use regulation in this field. First, there is the impression that regulating unconventional gas operations is the province of the federal government under the several federal statutes discussed above, or by the state government, which has traditionally regulated oil and gas operations. Second, some argue that local governments in some states are preempted by state law from regulating the practice. Third, this is a new and complex technology about which much is not known and it takes great capacity at the local level to understand it and decide how to react.

As a consequence of these inhibiting factors many local governments either do not adopt plans and regulations or simply ban the practice in the absence of a better idea of how to deal with it. They can, however, do so, but will need the help of outside agents to draft proper regulations, in accordance with their comprehensive plans which will balance energy exploration with other opportunities such as tourism attracted by an unspoiled countryside. The need for an ordered and connected federal system of regulations and resource allocation, leads into the final section of this paper, which delves into the theory of complex adaptive systems and how order, and survival, is achieved when ecosystems, organization, and even rural communities confront crises.

VI. Building Alliances, Connectivity, Bottom Up Strategies, and the Man Who Knows Everything

Two areas of academic theory and research are particularly useful in understanding the dynamic interactions within local land use law: the scholarship of scientists who examine the behavior of "complex adaptive systems"[36] and a field called the "diffusion of innovations."[37] These descriptions parallel descriptions of change within and among communities that we have seen from our experience working directly with local governments. What follows is an outline of the process of adoption of land use innovations and an explanation of why and how state and federal influences can help further positive local change.

In the fields of physics and ecological studies, scientists have studied complex adaptive systems that exist in nature and how they successfully adapt when challenged by change. Their theories gradually migrated to the study of business associations, governmental entities, and public law. Broadly defined, a complex adaptive system is an organized entity comprising various components: niches in ecosystems, divisions in corporations, departments in governments, and stakeholder groups in localities, to name a few.[38] One of the key architects of complex adaptive system thinking is Dr. Murray Gell-Mann, who won the Nobel Prize in Physics in 1964, wrote an acclaimed book, the Quark and the Jaguar on sustainable development, one of the founders of the

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[36] *See* MURRAY GELL-MANN, THE QUARK AND THE JAGUAR: ADVENTURES IN THE SIMPLE AND THE COMPLEX (1994). Gell-Mann describes biological evolution, the behavior of organisms in ecological systems, learning and thinking in human beings, the evolution of human societies, and the behavior of investors in financial markets as "processes." Within each process, he asserts:

> A complex adaptive system acquires information about its environment and its own interaction with that environment, identifying regularities in that information, condensing those regularities into a kind of "schema" or model, and acting in the real world on the basis of that schema. In each case, there are various competing schemata, and the results of the action in the real world feed back to influence the competition among those schemata.

Id. at 17. Until perhaps the late 1950s, traditional zoning techniques sufficed to order the external development pressures on communities in the United States. As development pressures mounted, this model of land use control failed many communities whose leaders then reacted to this feedback of failure by adopting new land use techniques, a process that evolves within and spreads among communities through the process Gell-Mann describes as a complex adaptive system. *See generally* MITCHELL M. WALDROP, COMPLEXITY: THE EMERGING SCIENCE AT THE EDGE OF ORDER AND CHAOS (1992) (providing details of the work conducted by the Santa Fe Institute on the science of complexity).

[37] *See* EVERETT M. ROGERS, DIFFUSION OF INNOVATIONS 6 (5th ed. 2003) ("Diffusion is a kind of *social change*, defined as the process by which alteration occurs in the structure and function of a social system. .... In this book, we use the word 'diffusion' to include both the planned and spontaneous spread of new ideas").

[38] *See* GELL-MANN, *supra* note 35, at 9:

> Complex adaptive systems include a human child learning his or her native language, a strain of bacteria becoming resistant to an antibiotic, the scientific community testing out new theories, an artist getting a creative idea, a society developing new customs or adopting a new set of superstitions, a computer programmed to evolve new strategies for winning at chess, and the human race evolving ways of living in greater harmony with itself and with the other organisms that share the planet Earth.

Santa Fe Institute, and was described by the New York Times as "the man that knows everything."

Diffusion theorists refer to "social systems" and observe and describe the diffusion of innovations as they are communicated and adapted through defined processes over time by members within a system.[39] Urban planning scholars reference the behavior of complex adaptive systems and the field of diffusion of innovations to define how regional planning networks can work to rationalize land use planning and control.[40]

Regarding grassroots change in land use law and practices, the relevant system is the community and its formal decision-makers, the members of the local legislature and those who influence their actions. At this level, land use "innovations" [41] include laws that provide for the transfer of development rights or the protection of wildlife habitat, for example. The larger system relevant to land use reform comprises the locality, state and federal legislatures and their land use agencies, and their constituent civic and private-sector stakeholders.

In nature and in human organizations, the systems that thrive are those that have established effective mechanisms for exchanging, evaluating, and reacting to information among their component parts. As stress occurs, information is gathered at the lowest level of the system and relayed to higher levels that digest and synthesize that information. Then, through continued communication, system behaviors are reordered to react and adapt to change.[42]

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[39] ROGERS, *supra* note 36, at 5. "*Diffusion* is the process in which an innovation is communicated through certain channels over time among the members of a social system."

[40] *See* David E. Booher & Judith E. Innes, *Network Power in Collaborative Planning* 12 - 13 (2000-01) (unpublished working paper, U. Cal. at Berkeley Inst. of Urb. and Regional Dev., on file with the Harvard Envtl. Law Rev.):

> Network power emerges from communication and collaboration among individuals, agencies, and businesses in a society. Network power emerges as diverse participants in a network focus on a common task and develop shared meanings and common heuristics for action. It grows as these players identify and build on their interdependencies to create new potential. In the process, innovations and novel responses to environmental stresses can emerge. These innovations, in turn, make possible adaptive change and constructive action of the whole.

See also id. at 3 ("Like a complex adaptive system, [the planning network] as a whole is more capable of learning and adaptation in the face of fragmentation and rapid change than a set of disconnected agents.").

[41] *See* ROGERS, *supra* note 37, at 12 ("An *innovation* is an idea, practice, or object that is perceived as new by an individual or other unit of adoption.").

[42] GELL-MANN, *supra* note 35, at 17:

> The common feature of all these processes is that in each one a complex adaptive system acquires information about its environment and its own interaction with that environment, identifying regularities in that information, condensing those regularities into a kind of 'schema' or model, and acting in the real world on the basis of that schema. In each case, there are various competing schemata, and the results of the action in the real world feed back to influence the competition

Connectivity among components is the key to successful adaptation. In a fully connected system, the components can be described as nested into one another, forming a loose network of interdependent parts. They constitute a hierarchical form that enables the system to self-regulate, adapting organically as stresses occur. This process of change is not necessarily orderly, nor does the nested hierarchy necessarily exhibit consistent rational behavior. Through continued and effective communication, however, the system adapts in unpredictable but generally successful ways as it deals with external events.

Serious land use threats are felt first and most profoundly at the local level and stimulate "perturbed" or "anticipatory" local action, always led by individuals who become innovators in the process of adapting to change.[43] For example, when a community experiences a serious groundwater pollution problem, its leaders immediately react by figuring out what happened and crafting a solution, such as an aquifer protection law, because they are perturbed. In some communities, leaders get advance warning about such problems by attending technical seminars, learning about events in nearby places, talking to extension agents, or through their general reading and studies. In these cases, they sometimes succeed in proposing and getting protective laws adopted in anticipation of pending problems. Diffusion research clarifies the types of localities that will most successfully adopt innovations capable of managing this change in a positive way over time. They are arranged as "organizations" that have leaders who take a positive attitude toward change, that are linked internally through interpersonal networks, and that are open to outside ideas. Such organizations have leaders who seek needed innovations outside the system, are open to considering such ideas, and communicate effectively so that the information and interests of others within the system are instrumental in adapting new ideas to the needs of the organization.

Within an innovative organization, leaders champion change, and they do it effectively to the degree that they have the power, charisma, or most importantly the interpersonal skills needed to overcome inevitable indifference and resistance. "Champions of change" occupy a key position where they can link others into the decision-making process; they understand the interests and concerns of others and they are effective negotiators.[44] Their instinct, often, is to form a coalition within the

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among these schemata.

[43] *See id.* at 434. "The presence of an innovation champion contributes to the success of innovation in an organization . . . . Research has shown that innovation champions may be powerful individuals in an organization, or they may be lower-level individuals who possess the ability to coordinate the actions of others.

[44] According to Rogers, "A champion is a charismatic individual who throws his or her weight behind an innovation, thus overcoming indifference or resistance that the new idea may provoke in an organization." A local government is an "organization" with a chief elected officer, a legislative body, and land use agencies such as a planning commission, zoning board of appeals, conservation committee, and master plan committee. It is influenced by those affected by land use decisions when they vote and when they organize constituents to speak at public meetings and hearings. Our experience shows that effective champions of change in local land law can be members of any one of these boards or committees and, at times, even particularly effective stakeholders. Rogers writes that, according to

organization to study, adapt, adopt, and implement a needed innovation. This coalition building approach is a key strategy, because innovations that are adapted to local circumstances by those affected are more likely to succeed over time.[45] When the process of adopting an innovation is hurried, the imported idea is less likely to be adjusted appropriately to local circumstances, and there will be less constituent commitment and a greater likelihood of failure, with difficulties in its implementation less likely to be remedied.

Successful innovations spread horizontally among organizations with common characteristics. Land use leaders, for example, are more likely to adopt an innovation that they learn about that has worked well in a neighboring or similar community. The process of adapting smart growth and environmental protection laws to local circumstances involves the entire apparatus of local land use decision-making, which varies from state to state. Often it requires the input of planning boards, conservation commissions, landowners, and citizens at public hearings, which results in action by the local legislative body -- the elected representatives of the people. For new laws to be adopted, clever and enlightened local leaders must shape and direct the debate and see that the desired local legislative reform occurs. In that process, it is critical that local voters and elected leaders believe that the proposed change is credible. This is aided by knowledge that similar changes have been adopted in similar places by similar people, that they are supported by sound public policy, or that there are incentives available for those who make such changes.

As noted above zoning law in the first decades of the 20th century rapidly spread from state to state and locality to locality and was adapted to grassroots circumstances along the way. In the same fashion, local smart growth and environmental protection laws move among communities as the adaptation process proceeds. One way to plan change, then, is to find a community in crisis or one seriously anticipating adverse change, identify leaders who exhibit the characteristics of champions of change, and put innovative laws from other communities in their hands. This is the work of change agents, paid professionals, or those who work for federal, state, or non-governmental agencies whose mission is to ensure the appropriate use of the land. State statutes themselves can be agents of change if they are drafted so that they contain persuasive guidelines and are supported by technical assistance or grants to encourage their adoption.

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studies of organizational change, the "important qualities of champions were that they (1) occupied a key linking position in their organization, (2) possessed analytical and intuitive skills in understanding various individuals' aspirations, and (3) demonstrated well-honed interpersonal and negotiating skills in working with other people in their organization." *Id.* at 414 - 15.