AGRICULTURE AND ECOSYSTEM SERVICES: STRATEGIES FOR STATE AND LOCAL GOVERNMENTS

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INTRODUCTION

This Article focuses on hints of movement in a new direction for agriculture. The impetus comes not primarily from the federal government, but arises, ironically, out of a merger between the age-old practice of paying farmers to do what is right, the fear of losing agricultural lands to suburban development, the rising fiscal burdens to state and local jurisdictions presented by new suburban development, and the new understanding that farms may hold tremendous untapped value as providers of ecosystem services to local, regional, and national communities. The goal in this new policy movement is to unlock the multifunctional capacity of farms to contribute to the environmental and economic wellbeing of the landscape while continuing to serve as our primary source of food and fiber, and it is playing out with promise at the state and local level.[1]

One might think implementing this win-win for agriculture

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[1] The development of farm multifunctionality policy began in earnest with the European Union's Agenda 2000 reforms of the Common Agricultural Policy. *See* Thomas L. Dobbs & Jules N. Pretty, *Agri-Environmental Stewardship Schemes and "Multifunctionality"*, 26 REV. OF AGRIC. ECON. 220 (2004). Extensive background and evaluation of the topic can be found in ORG. FOR ECONOMIC CO-OPERATION & DEVELOPMENT, MULTIFUNCTIONALITY: TOWARDS AN ANALYTICAL FRAMEWORK (2001) [hereinafter OECD].

and the environment is a policy "no-brainer," but agriculture has long been the Rubik's Cube of environmental policy. Although agriculture is a leading cause of pollution and other environmental harms,[2] it has been resistant to regulation and, for the most part, remarkably successful at being paid to do the right thing.[3] While other industries have advanced to flexible, market-based "second generation" environmental policies and beyond, agriculture somehow keeps dodging the bullet.[4] Federal and state agencies have tried to overlay small pieces of conventional regulation on farms, which farm interests have resisted at every turn,[5] and Congress opens debate on Farm Bills every few years with promises of innovative policy reform, only to drift back into business as usual.[6] Seldom has so much time, money, and energy been expended year after year, decade upon decade, to keep policy of any other kind exactly where it started out. Agricultural economist David Freshwater sums up this history well:

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[2] For an inventory of environmental harms agriculture has caused and is continuing to cause in the United States, see J.B. Ruhl, *Farms, Their Environmental Harms, and Environmental Law*, 27 ECOLOGY L.Q. 263, 272–92 (2000) [hereinafter Ruhl, *Farms*]. The trend is not abating as "recent scientific assessments have alerted the world to the increasing size of agriculture's footprint, including its contribution to climate change and degradation of natural resources." E. Toby Kiers et al., *Agriculture at a Crossroads*, 320 SCIENCE 320, 320 (2008).

[3] For a survey of this policy failure, describing the "safe harbor" agriculture enjoys from environmental regulation and the subsidy programs that pay farms to meet minimal baseline standards other industries are mandated to achieve, see Ruhl, *Farms*, *supra* note 2, at 293–316, 325–27. *See also* J.B. Ruhl, *Three Questions for Agriculture About the Environment*, 17 J. LAND USE & ENVTL. L. 395, 404–05 (2002); J.B. Ruhl, *Farmland Stewardship: Can Ecosystems Stand Any More of It?*, 9 WASH. U. J.L. & POL'Y 1 (2002).

[4] Agriculture "never had coherent first-generation environmental protection programs" and "no significant environmental controls have been placed on farm practices even where agricultural activities are a primary cause of pollution problems." C. Ford Runge, *Environmental Protection from Farm to Market*, *in* THINKING ECOLOGICALLY: THE NEXT GENERATION OF ENVIRONMENTAL POLICY 200, 200–01 (Marian R. Chertow & Daniel C. Esty eds., 1997); *see also* Ruhl, *Farms*, *supra* note 2, at 268 n.6.

[5] I cover several examples of regulatory controls on agriculture, including regulation of concentrated animal feeding operations under the Clean Water Act and regulation of habitat disturbance under the Endangered Species Act, in Ruhl, *Farms*, *supra* note 2, at 316–27.

[6] For a thorough examination of Farm Bill politics, see WOODS INST. FOR THE ENV'T., U.S. AGRICULTURAL POLICY AND THE 2007 FARM BILL (Kaush Arha et al., eds., 2007), *available at* http://woods.stanford.edu/docs/farmbill/farmbill_book.pdf [hereinafter 2007 FARM BILL].

> With each farm bill cycle there are calls for a major rethinking of U.S. farm policy to make it better suit current farm conditions and the expectations of the broader American public about the roles of agriculture. These calls for reform have been for the most part unsuccessful because there has been no argument compelling enough to overcome advocates of the status quo. But as time passes the wisdom of maintaining a set of policies that have their basis in the 1930s and were designed to support a structure of agriculture that no longer exists becomes more questionable.[7]

Paying farmers to do the "right thing" environmentally has been a theme of federal farm policy for decades, embodied in programs such as the Conservation Reserve Program (CRP), which pays farmers to take land out of production for defined periods to enhance its conservation values, and the Conservation Security Program (CSP) and Environmental Quality Incentives Program (EQIP), which pay farmers to employ better practices on working lands.[8] And either paying or forcing farmers to preserve agricultural land uses at the urban fringe has become a primary driver of state and local land use policy.[9] In this sense farms have long been understood as land units that have the capacity to contribute to environmental and cultural values.

In recent years, however, ecologists and economists focusing on agriculture have forged a more complete vision of the capacity of agricultural lands. They see farms as housing the natural capital capable of providing a stream of diverse good and services, including ecosystem services such as increased biodiversity, carbon sequestration, pollination, groundwater recharge, and improvement of water quality.[10] To be sure, farms taking this

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[7] David Freshwater, *Applying Multifunctionality to U.S. Farm Policy* 1 (Univ. of Ky., Econ. Staff Paper No. 437, 2002) (unpublished manuscript on file with author), *available at* http://www.uky.edu/Ag/AgEcon/pubs/staff/staff437.pdf.

[8] For a thorough review of agricultural land retirement and working land conservation subsidy programs, see Craig Cox, *U.S. Agriculture Conservation Policy & Programs: History, Trends, and Implications*, *in* 2007 FARM BILL, *supra* note 6, at 113.

[9] For a comprehensive overview of this state and local land use regulation trend, see JULIAN CONRAD JUERGENSMEYER & THOMAS E. ROBERTS, LAND USE PLANNING AND DEVELOPMENT REGULATION LAW 815–71 (2d ed. 2007).

[10] Ecosystem services are economically valuable benefits humans derive from ecological resources directly, such as storm surge mitigation provided by coastal dunes and marshes, and indirectly, such as nutrient cycling that supports crop production. Natural capital consists of the ecological resources that produce

working landscape model to heart would look and behave differently from conventional operations based on intensive monoculture crops and concentrated livestock, but they unmistakably would be active and potentially prosperous agricultural operations. Hence it is no exaggeration to suggest that "the scientific and political planets are aligning to create both the demand for policy-relevant research into the [ecosystem services] available from agriculture and the means to create incentives for farmers to provide those services."[11]

Unfortunately, federal policy has been slow to move in this direction. While it has become a rite of passage to begin each five-year cycle of Farm Bill work with great fanfare over the prospect of stepping up the "green subsidy" and farm preservation programs, the rhetoric and content each time are steadily watered down until the programs look about as they started. The long prevailing system of farm income supports, including green subsidies, simply do not tap into or promote a sense that there is more to agriculture than supplying food, fiber, and energy commodities and a dose of cultural nostalgia.[12]

It is unlikely, therefore, that federal farm policy alone will align these interests. It will be important for farm multifunctionality to respond to *demand*-driven signals, whereas

these service values, such as forests, riparian habitat, and wetlands. For descriptions of natural capital and ecosystem services, see MILLENNIUM ECOSYSTEM ASSESSMENT, ECOSYSTEMS AND HUMAN WELL-BEING: SYNTHESIS (2005), *available at* http://www.milleniumassessment.org/documents/document.356.aspx.pdf; NATURE'S SERVICES: SOCIETAL DEPENDENCE ON NATURAL ECOSYSTEMS (Gretchen C. Daily ed. 1997); Robert Costanza et al., *The Value of the World's Ecosystem Services and Natural Capital*, 387 NATURE 253 (1997). For coverage of the emergence of the ecosystem services concept in law and policy, see J.B. RUHL, STEVEN E. KRAFT & CHRISTOPHER L. LANT, THE LAW AND POLICY OF ECOSYSTEM SERVICES (2007); James Salzman, *A Field of Green? The Past and Future of Ecosystem Services*, 21 J. LAND USE AND ENVTL. L. 133 (2006); J.B. Ruhl & James Salzman, *The Law and Policy Beginnings of Ecosystem Services*, 22 J. LAND USE & ENVTL. L. 157 (2007).

[11] Scott M. Swinton et al., *Ecosystem Services from Agriculture: Looking Beyond the Usual Suspects*, 88 AMER. J. AGRIC. ECON. 1160, 1164 (2006). An excellent survey of the literature supporting this movement is found at G. Philip Robertson & Scott M. Swinton, *Reconciling Agricultural Productivity and Environmental Integrity: A Grand Challenge for Agriculture*, 3 FRONTIERS IN ECOLOGY AND THE ENV'T 38 (2005).

[12] *See* David Abler, *Multifunctionality, Agricultural Policy, and Environmental Policy*, 33 AGRIC. & RESOURCE ECON. REV. 8 (2004); Katherine R. Smith, *Public Payments for Environmental Services from Agriculture: Precedents and Possibilities*, 88 AM. J. AGRIC. ECON. 1167, 1167–68 (2006).

even the green subsidy component of federal farm policy is *supply*-driven and tailored to what is possible and convenient for conventional agriculture.

> These land retirement, working lands, and land use preservation programs' payment priorities are agriculture-centric. They are based on what the producers of the agri-environmental benefits can supply, rather than what is necessarily demanded by the population that would benefit from ensuing environmental service enhancement. . . . [T]he choice of how benefits are targeted derives from a universe of acreage-based attributes; in other words, what existing, independent farm production facilities can supply. . . . There is no good evidence that any existing public agri-environmental payment program purchases a given 'environmental service.'13

With little prospect of the Farm Bill moving off this position,[14] it is time to consider how state and local governments can become more active in bringing about farm multifunctionality and how the federal government can help them. That is the focus of this Article. It explores the emerging theme of farms as multifunctional land uses and suggests that state and local governments can best help ground it through flexible, efficient policy instruments. The message for Congress is to realign federal farm policy to facilitate the delivery of a more sustainable profile of farm goods and services through state and local programs. Although federal farm subsidy programs surely could be repositioned to better promote farm multifunctionality directly,[15] the benefits of multifunctional agricultural production, compared to the conventional commodity production orientation, are primarily local.

On this policy front, therefore, I propose that federal policy support state and local innovations rather than dominate the field as has been the case historically. In Part I of the Article I examine

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[13] Smith, *supra* note 12, at 1167–68.

[14] The 2008 Farm Bill, popularly known as the Food, Conservation, and Energy Act of 2008, did not alter the structural features of the green subsidy programs. Farm, Nutrition, and Bioenergy Act of 2007, H.R. 2419, 110th Cong. (2007).

[15] For a discussion of how federal "green subsidy" farm payments could be reconfigured to promote farms multifunctionality, see Kaush Arha et al., *Conserving Ecosystem Services Across Agrarian Landscapes*, *in* 2007 FARM BILL, *supra* note 6, at 207; William J. Even, *Green Payments: The Next Generation of U.S. Farm Programs?*, 10 DRAKE J. AGRIC. L. 173 (2005).

the theme of farms as multifunctional production units as it is developing in ecological literature, then examine the potential future scenarios of agricultural land uses and the tools state and local policy could use to help break the logjam of agriculture-environment policy by promoting the multifunctionality of farms. Part II of the Article then uses two case studies from Florida to focus on two such tools in particular—payments for ecosystem services (PES) and transferable development rights (TDR).

The PES approach is predicated on the opportunity for state and local governments to reduce infrastructure spending associated with residential and commercial development, such as the need for increased water supply and maintaining water quality, by paying agricultural operations directly to deliver equivalents at lower cost in the form of ecosystem services.[16] Although PES programs defined broadly include conventional green subsidy programs such as the CRP, as well as payments for environmental amenities, such as conservation of endangered species habitat, that generate incidental ecosystem service benefits, ideally payments would be based on demand-driven, market-priced transactions.[17]

The TDR is a technique well-known in land use law[18] and gaining traction in agriculture policy as a means of preventing farmland from being devoured by the suburban amoeba.[19] TDRs,

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[16] For general background on PES programs, see B. Kelsey Jack, Carolyn Kousky & Katherine R.E. Sims, *Designing Payments for Ecosystem Services: Lessons from Previous Experience with Incentive-Based Mechanisms*, 105 PROCEEDINGS OF THE NAT'L ACAD. OF SCI. 9465 (2008). For discussion of specific PES initiatives, mainly from other nations, see James Salzman, *Creating Markets for Ecosystem Services: Notes from the Field*, 80 N.Y.U. L. REV. 870 (2005); Brian C. Steed, *Government Payments for Ecosystem Services—Lessons from Costa Rica*, 23 J. LAND USE & ENVTL. L. 177 (2007).

[17] Indeed, some advocates of PES programs in agricultural settings emphasize this feature to differentiate PES programs from subsidy programs. *See, e.g.*, JOHN M. ANTLE, PAYMENTS FOR ECOSYSTEM SERVICES AND U.S. FARM POLICY 17 (Am. Enter. Inst. Forum on The 2007 Farm Bill and Beyond, Working Paper, 2006), *available at* http://www.aei.org/docLib/20070515_antlefinal.pdf.

[18] *See* JUERGENSMEYER & ROBERTS, *supra* note 9, § 9.10, at 546 (TDR "programs are frequently incorporated into growth management programs"); Julian Conrad Juergensmeyer, James C. Nicholas & Brian D. Leebrick, *Transferable Development Rights and Alternatives After Suitum*, 30 URB. LAW. 441 (1998) (surveying several prominent programs).

[19] For surveys of the use of TDRs in agricultural land policy, see Elisa Paster, *Preservation of Agricultural Lands Through Land Use Planning Tools and Techniques*, 44 NAT. RESOURCES J. 283, 306–08 (2004); Edward Thompson, Jr., *"Hybrid" Farmland Protection Programs: A New Paradigm for Growth*

which have a long history in local historic preservation[20] and environmental protection[21] programs, are a way of rewarding a landowner for foregoing development (either voluntarily or by regulatory force) in one area (the "sending area") by providing a density or other development "credit" that can be applied to exceed the default development limits in another area (the "receiving area").

Although distinct in several ways, including fiscal impact, the role of regulation, and the medium through which provision of ecosystem services is rewarded, these two approaches share design issues being worked out in two newly-initiated programs in Florida, as summarized in Part II. It is the funding and promotion of this kind of state and local programs I envision as becoming a focal point of federal policy.

I. PROMOTING FARM MULTIFUNCTIONALITY THROUGH STATE AND LOCAL LAND USE POLICY

The vision of agriculture has vacillated in the public eye over time. As Swinton et al. explain, in the mid-1800s George Perkins Marsh revealed the opportunity costs of conversion of natural habitat to agriculture in his epic book, *Man and Nature*;[22] yet Aldo Leopold's equally influential *Sand County Almanac*[23] later offered a "poetic evocation of agriculture as part of a larger ecosystem community."[24] Rachel Carson's 1962 classic, *Silent Spring*,[25] then returned "scientific and public attention to the negative externalities of farming."[26] Yet "if the harbinger of the last intellectual wave to wash over agriculture was *Silent Spring*, the bellwether of the next wave may be *Nature's Services*, edited by Gretchen Daily."[27] Published in 1997, *Nature's Services*[28] was the

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Management?, 23 WM. & MARY ENVTL. L. & POL'Y REV. 831 (1999).

[20] *See, e.g.*, Penn Cent. Transp. Co. v. City of New York, 438 U.S. 104 (1978).

[21] *See, e.g.*, Suitum v. Tahoe Reg'l Planning Agency, 520 U.S. 725, 728–32 (1997).

[22] *See generally* GEORGE PERKINS MARSH, MAN AND NATURE (David Lowenthal ed., Univ. Wash. Press 2003) (1864).

[23] *See generally* ALDO LEOPOLD, A SAND COUNTY ALMANAC (Oxford Univ. Press 2001) (1949)

[24] Swinton et al., *supra* note 11, at 1161.

[25] RACHEL CARSON, SILENT SPRING (Houghton Mifflin 1994) (1962).

[26] Swinton et al., *supra* note 11, at 1161.

[27] *Id*.

first comprehensive treatment of the ecosystem services concept grounded in practical ecological foundations. It quickly became the impetus for a broad movement toward integrating ecological economics and ecology across a spectrum of policy fronts. One emerging focal point of the new intellectual wave is the concept of farm multifunctionality.

A. *The Emerging Vision of Farm Multifunctionality*

Following the lead of *Nature's Services*, the growing science and policy literature on ecosystem services divides them into five types: *provisioning services* that underlie the production of commodities; *regulating services* that moderate dynamic natural phenomena; *cultural services* that provide human psychic satisfaction; *preserving* services that maintain ecological diversity and resilience, and *supporting services* that promote the capacity of ecosystems to produce the other service types.[29] The story of conventional crop and livestock agriculture has been largely one of managing provisioning (food and fiber) and cultural (farmland character) services and their associated supporting services, primarily because these are essential for farms to produce marketable commodities and retain their charmed status in the public eye. Only recently has the focus turned to expanding agriculture's position as a source of regulating services valuable to surrounding local, regional, and national communities, the problem being how to provide farmers the incentive to manage for such services when no market yet exists for them. As Swinton et al. explain:

> Agriculture (including planted forests) conventionally supplies food, fiber, and fuel—'provisioning services' in [ecosystem services] parlance. Farmers also help maintain the natural 'supporting' [ecosystem services] that make agriculture productive, such as pollination, biological pest regulation, and soil nutrient renewal. In theory, the same managed ecosystems that provide these marketed products could produce other types of [ecosystem services] if suitable incentives existed. The broad class of 'regulation [ecosystem services]' covers climate regulation, water purity, surface water flows, groundwater

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[28] *See* NATURE'S SERVICES, *supra* note 10.

[29] *See* MILLENNIUM ECOSYSTEM ASSESSMENT, ECOSYSTEMS AND HUMAN WELL-BEING: A FRAMEWORK FOR ASSESSMENT 57 (2003), *available at* http://www.millenniumassessment.org/en/Framework.aspx.

> levels, and waste absorption and breakdown. All of these offer benefits that are poorly captured by current markets, yet which managed agricultural and forest ecosystems could potentially provide.[30]

The problem, however, goes well beyond how services could be captured in markets. Jordan et al. explain that agricultural "research and development. . .and policy have focused on maximizing biomass production and optimizing its use, with far less emphasis on evaluation of environmental, social, and economic performance."[31] Similarly, "current federal programs and policy on environmental quality in agricultural landscapes mainly subsidize retirement of land from active production."[32]

By contrast, agricultural multifunctionality emphasizes "the joint production of standard commodities (e.g., food or fiber) and 'ecological services'" on the premise that "major additional gains may result from a 'working landscape' approach that improves environmental performance of active farmland by rewarding farmers for delivering environmental benefits, as well as food and biomass."[33] Methods a multifunctional farm would use to achieve this more balanced production profile would include precision farming, no-till farming, organic farming, rotational cropping, crop residue usage, bio-pest controls, riparian cover, filter strips, contour farming, incorporated pollinator habitat, and water retention and recharge ponds.[34] The following chart illustrates the different ecosystem service production profiles of conventional and multifunctional agricultural land uses:

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[30] Swinton et al., *supra* note 11, at 1160 (citation omitted).

[31] N. Jordan et al., *Sustainable Development of the Agricultural Bio-Economy*, 316 SCIENCE 1570, 1570 (2007) (footnotes omitted).

[32] *Id*.

[33] *Id*. (footnote omitted).

[34] *See* Rebecca L. Goldman, Barton H. Thompson & Gretchen C. Daily, *Managing for Ecosystem Services on U.S. Agricultural Lands*, *in* 2007 FARM BILL, *supra* note 6, at 97, 106.

Ecosystem Service Type	Conventional Farming	Multifunctional Farming
Provisioning—food, fiber, energy sources, pharmaceuticals, and other consumed commodities supplied by nature	Land and resources are managed primarily to produce food and fiber commodities and, increasingly, biomass fuels	Food, fiber, and fuel production remain a primary purpose of land and resource management
Regulating—services that modulate ecosystem processes with economic relevance to humans, such as gas composition, air and water temperature, nutrient flows, and waste decomposition	Land unsuitable for cultivation or grazing and land taken out of production through CRP and other subsidy programs will provide incidental regulating service benefits; land in cultivation and active grazing has diminished capacity to provide regulating services	Riparian habitat is actively managed to promote nutrient and sediment capture, provide flood control, and provide thermal regulation of stream flows; interior wetland areas are managed to promote groundwater recharge and suppress dry freeze effects; woody and grassy biomass is managed for carbon sequestration
Cultural—services that enhance human use and appreciation of natural resources and the built environment, including recreation, aesthetic appreciation, scientific research, and cultural, spiritual, and intellectual inspiration	Active farmlands are devoted primarily to food and fiber production and not generally open to public; existence of farming lands in community provides some background cultural significance	Active farmlands could be opened to public cultural activities such as stay-and-work, school visits, or bed-and-breakfast; areas managed for regulating and supporting services could provide eco-tourism, recreational, and scientific opportunities
Preserving—services that maintain ecological resilience and the diversity of ecological futures	None of significance	Areas are actively managed as seed banks, wildlife habitat, and to restore native grasses and other vegetation
Supporting—services that sustain other forms of service flows	Land unsuitable for cultivation or grazing and land taken out of production through CRP and other subsidy programs will provide incidental supporting service benefits such as pollination, seed dispersal, and biological pest control; land in cultivation and active grazing has diminished capacity	Areas are actively managed with the specific purpose of enhancing pollination, pest control, seed dispersal, and other supporting services

The problem, of course, is that farmers have no inherent incentive to move from the conventional model to the multifunctional model. To put it in economic terms, farmers view the provision of regulating services to outside communities as a positive externality—doing so benefits others, but nobody is willing to pay for the benefits.[35] The market rewards farmers for producing commodities, and federal farm subsidies force a tradeoff between commodity production and ecological conservation. Why is it that farms cannot be rewarded for producing commodities *and* ecosystem services?

B. *Conceiving Alternative Futures for Agricultural Lands*

Even if farming as usual is a superior land use option for a community as compared to, say, cookie-cutter sprawl,[36] those do not exhaust the alternatives. Rather, a spectrum of potential future scenarios presenting different tradeoffs must be considered before land use policy can make sensible comparisons. For my purposes, I simplify those additional scenarios to the following four, the advantages and disadvantages of which are explored in the next section:

1. *Agricultural Use with Increased Environmental Performance Baseline*. Under this scenario, farms are regulated more heavily than is the current practice, primarily to enhance environmental performance. For example, riparian buffers would be mandated, onsite water recharge features would be required, and tillage practiced would be specified. Of course, this is the scenario agriculture has steadfastly and thus far successfully resisted, but it is nonetheless an option.
2. *Conversion to Multifunctional Working Landscape*. Under this scenario, a baseline performance level of agricultural practices would first be specified, either at conventional

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[35] *See* OECD, *supra* note 1, at 13; Jules Pretty et al., *Policy Challenges and Priorities for Internalizing the Externalities of Modern Agriculture*, 44 J. ENVTL. PLANNING AND MGMT. 263 (2001). The literature summarizing the economic incentives associated with ecosystem services, particularly regulating services that flow from land where natural capital is located and benefits users of other land parcels, is reviewed in RUHL, KRAFT & LANT, *supra* note 10, at 57–83.

[36] *See, e.g.*, Paster, *supra* note 19, at 283. ("[P]roductive agricultural lands are an irreplaceable natural resource being lost to sprawling subdivisions throughout the country.").

levels or through regulation at more demanding levels (as above), and then incentive programs would be designed to compensate farmers for enhancing the flow of regulating ecosystem services above the baseline to identified off-farm populations and areas. For example, if riparian buffers and onsite recharge features were not required under the baseline, providing them would entitle a farmer to some compensatory benefit in return.

3. *Conversion to Open Space*. Under this scenario, public or private interests would simply buy out all or substantially all of the land use rights associated with agricultural lands, either through conservation easements or fee title. From there the land management regime might include management for ecosystem service flows (perhaps even selling them where markets or other compensatory incentives can be identified).
4. *Conversion to Planned Mixed-Use, Mixed-Density Development*. Under this scenario, agricultural lands are converted to development, but not as uniform low-density "sprawl." Rather, either through land use regulation or in response to market demand, the buildout is comprehensively planned and includes clustered high-density development, mixed commercial, office, and residential uses, and substantial recreational and conservation open space. Some working agricultural uses might be retained, and the planning of land use locations could take into account the location of natural capital and its associated ecosystem services flows.

Which of the alternative futures is "better" is by no means obvious. Opening up "the multifunctional set of services provided by farmland complicates the task of identifying which farmland should be preserved,"[37] and expanding the alternatives to farming beyond "sprawl" suggests a spectrum of public trade-offs any one of which might, in context, be preferable to agriculture. For my purposes, it is not necessary to decide which of these best fits; rather, the question is what instruments state and local

[37] B. James Deaton, Patricia E. Norris & John P. Hoehn, *Setting the Standards for Farmland Preservation: Do Preservation Criteria Motivate Citizen Support for Farmland Preservation?*, 32 AGRIC. AND RESOURCE ECON. REV. 272, 272 (2003).

governments have at their disposal to pursue a multifunctional agricultural land policy.

C. *State and Local Policy Instruments*

With the expanded slate of scenarios in hand, state and local jurisdictions wishing to favor one or another must explore the policy instruments at their disposal and the advantages and disadvantages of using particular instruments to achieve the desired scenario. This section provides a brief inventory of methods that state and local jurisdictions can use toward that objective, followed by an integrated assessment of scenarios and tools.

Many of the tools are designed to preserve existing farmland "as is." This "save farming" premise permeates federal and state policy. The American Farmland Trust (AFT) in particular has been a vocal advocate on behalf of farmland conservation.[38] AFT has been quite successful, helping to bring about the Farmland Protection Policy Act[39] in the 1981 Farm Bill and a host of farmland protection measures in the Farm and Ranch Lands Protection Program[40] renewed in the 2002 Farm Bill. But many

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[38] *See* AMERICAN FARMLAND TRUST, http://www.farmland.org (last visited Aug. 8, 2008). Based on National Resources Inventory, the Department of Agriculture reports that "46 percent of the land converted to urban and built-up uses comes from cropland and pasture, while 38 and 14 percent comes from forest land and range land, respectively. Much of the land being lost is prime, unique, or important farmland located near cities." 7 C.F.R. 1491 (2003). Some critics have portrayed the farmland preservation movement as an alliance between agricultural landowners seeking to be paid to keep farming and local anti-development, pro-open space interests seeking to thwart urban growth. *See, e.g.*, William A. Fischel, *The Urbanization of Agricultural Land: A Review of the National Agricultural Lands Study*, 58 LAND ECON. 236 (1982); Jesse Richardson, *Farmland Protection*, AGRICULTURAL LAW UPDATE, Oct. 2006, at 4. Nevertheless, many different federal, state, and local programs have been implemented to respond to AFT's call, and the trend is on the rise. *See* David C. Levy & Rachel P. Melliar Smith, *The Race for the Future: Farmland Preservation Tools*, 18 NAT. RESOURCES & ENV'T 15, 15 (2003).

[39] *See* 7 U.S.C. §§ 4201–4209 (2000); 7 C.F.R. § 658.1 (1984). The legislation requires federal agencies to ensure their respective programs avoid unnecessarily contributing to the loss of farmlands and to ensure that they act compatibly with state and local policies designed to protect farmland; no funding for or regulation of farmland preservation is provided. For a critique of the legislation as largely ineffective, see Robert M. Ward, *The US Farmland Protection Policy Act: Another Case of Benign Neglect*, 8 LAND USE POLICY 63 (1991).

[40] *See* Farm Security and Rural Investment Act of 2002, Pub. L. 107-171 §

state and local programs are designed to serve the same objective.

For example, one way farmland can be "saved" in this sense is to configure local zoning regulations to prohibit it from being converted from agricultural uses, or to impose insurmountable barriers to converting it to suburban development, a method some states and localities have used over vociferous objections of the very landowners ostensibly being protected.[41] Whether this status quo lock-in approach saves farms or saves existing suburbanites from yet more suburban development is, of course, a matter for debate and is largely in the eyes of the beholder.[42] In any event, courts have generally rejected the argument that these "exclusive agricultural use zoning" restrictions constitute regulatory takings.[43]

Another technique is to use tax policy to favor continuation of agricultural land uses.[44] For example, many state and local governments adopt "differential property tax assessment" provisions that provide lower assessment rates for agricultural land uses and thereby, in theory, deter conversion to higher rate land uses. But the evidence is that these measures do not deter conversion to development at the urban fringe, where returns on development frequently more than offset the higher tax rates.[45]

By contrast to the state and local exclusive agricultural use zoning and tax relief programs, the early thrust of state and local efforts, later supported by the federal farmland protection

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2503 (2002); 7 C.F.R. §. 1491 (2003). The program provides matching funding to states and local governments to purchase conservation easements from farmers and ranchers to limit conversion to nonagricultural land uses. *See generally* Renee Johnson, CRS Report for Congress, Farm Protection Program: Status and Current Issues, RS22565 (Jan. 5, 2007); Micheal R. Eitel, *The Farm and Ranch Lands Protection Program: An Analysis of the Federal Policy on United States Farmland Loss*, 8 DRAKE J. AGRIC. L. 591 (2003).

[41] *See* JUERGENSMEYER & ROBERTS, *supra* note 9, § 13.8, at 852–55. For a survey of techniques, including exclusive use zoning, large lot zoning, and cluster zoning, see Peggy Kirk Hall, *Approaches to Zoning that Support and Protect Agriculture*, AGRICULTURAL LAW UPDATE, May 2007, at 6.

[42] For a series of articles presenting contrasting perspectives, see Mark W. Cordes, *Takings, Fairness and Farmland Preservation*, 60 OHIO STATE L.J. 1033 (1999); Jesse J. Richardson, Jr., *Downzoning, Fairness and Farmland Protection*, 19 J. LAND USE & ENVT'L. L 59 (2003); Mark W. Cordes, *Fairness and Farmland Preservation: A Response to Professor Richardson*, 20 J. LAND USE & ENVTL. L. 371 (2005).

[43] *See, e.g.*, Gardner v. N.J. Pinelands Comm'n., 593 A.2d 251 (N.J. 1991).

[44] *See* JUERGENSMEYER & ROBERTS, *supra* note 9, § 13.14, at 866–69.

[45] *See* Sandra A. Hoffman, Note, *Farmland and Open Space Preservation in Michigan: An Empirical Analysis*, 19 U. MICH. J.L. REFORM 1107 (1986).

initiative, was funding of programs for purchase of development rights (PDR) and purchase of agricultural conservation easements (PACE), the effect being to preclude conversion to more intense development. For perhaps obvious reasons, AFT has strongly advocated PDR/PACE programs, with over half the states and 50 local governments adopting such programs and the 2002 Farm Bill providing $600 million in federal matching dollars for PDR/PACE acquisitions, as implemented by the USDA's Commodity Credit Corporation.[46]

Zoning, tax breaks, and PDR/PACE programs involve either regulation or public financing. Another alternative for farmland preservation, one that neither regulates farms directly nor demands public revenue financing, is the local use of TDRs to reward an agricultural landowner who withdraws land from potential conversion to development with "credits" that can be used in other areas to go above and beyond the baseline of allowable development parameters, such as density of units.[47] The obvious attraction to TDRs for purposes of farmland preservation is that they impose no fiscal burden on the public; on the other hand, the potential downfall of TDRs is that they depend on developer demand for the credits.

The techniques mentioned thus far may be useful in maintaining agricultural land uses in status quo, but they do not inherently promote better farming practices to reduce environmental harms or enhance regulating and supporting services. The chief method of improving the "baseline" environmental performance of farms has been through the promulgation of "best management practices" (BMPs), such as tillage methods, integrated pest management, and retention of riparian habitat.[48] To be comprehensively effective, these would have to be regulatory mandates, whereas they have been employed mostly as voluntary guidelines[49] or as the "cross-compliance" condition to receive subsidies or other incentives.[50]

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[46] 7 C.F.R. § 1491 (2003).

[47] *See* JUERGENSMEYER & ROBERTS, *supra* note 9, § 13.11, at 860–62.

[48] *See* David Zaring, *Best Practices*, 81 N.Y.U. L. REV. 294, 331–34 (2006).

[49] *See* Even, *supra* note 15, at 180–83; Zaring, *supra* note 48, at 326–39.

[50] *See* Sandra S. Batie & Alyson G. Sappington, *Cross-Compliance as a Soil Conservation Strategy: A Case Study*, 68 AM. J. AGRIC. ECON. 880 (1986); Ramu Govindasamy & Mark J. Cochran, *The Conservation Compliance Program and Best Management Practices: An Integrated Approach for Economic Analysis*, 17

The underlying assumption of this collection of instruments is that farming remains on the landscape in some substantial form, whereas some of the alternative scenarios involve removing agricultural uses altogether. At one extreme, the conversion to open space can be accomplished through purchase of permanent conservation easements restricting all but passive uses, or by acquisition of title with similar deed restrictions. Some state and local governments, as well as private land trusts, have been aggressive at accomplishing these land use conversions, though often some level of agricultural use is contemplated.[51] Agricultural interests have not always been keen about programs designed to convert agriculture into open space, however, as the concern exists that the agricultural land base in an area may fall below the "critical mass" necessary to support a cohesive agricultural economy including seed and equipment suppliers and produce distributors.[52]

At the other conversion extreme, the image AFT and other "save farming" advocates portray as the inevitable alternative to farming is conversion to the uniform low-density residential buildout characteristic of conventional zoning—the scenario most associated with sprawl—even though mixed-use, mixed-density planned unit development scenarios are viable options in many agricultural localities.[53] At the core of either kind of buildout scenario is the local zoning power, in these cases exercised not to restrict agricultural landowners to farming but to liberate them from it.

Nowhere in the list thus far have ecosystem services been the central focus. To be sure, agricultural BMPs, though directed

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REV. AGRIC. ECON. 369 (1995).

[51] *See* JUERGENSMEYER & ROBERTS, *supra* note 9, §§ 13.12 to 13.13 at 862–66. One of the largest such programs in the world is the Florida Forever land acquisition program, which has put into conservation status over 535,000 acres of land at a cost of $1.8 billion through December 2006. *See* FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION, FLORIDA FOREVER: PROTECTING OUR FUTURE, http://www.dep.state.fl.us/lands/acquisition/FloridaForever (last visited Sept. 24, 2008). In July 2006 the program purchased 74,000 acres of prime ranching lands in central Florida from the Babcock Ranch, agreeing to phase out agricultural land uses after 10 years. *See* Press Release, Florida Department of Environmental Protection, State of Florida Seals Historic Purchase of Babcock Ranch (July 31, 2006), *available at* http://www.dep.state.fl.us/secretary/news/2006/07/0731_01.htm.

[52] *See* JUERGENSMEYER & ROBERTS, *supra* note 9, § 13.5 at 838.

[53] *See id.* § 13.10 at 857–60.

primarily at environmental quality, will in many instances incidentally enhance regulating services, and as discussed below could even be designed more purposefully for that effect. Indeed, ecosystem service delivery can be integrated into *any* of the described programs as an output goal.

Two instruments in particular have become most closely associated with proposals for promoting farm multifunctionality. One is obvious: pay for enhanced environmental services directly though PES programs tied to the costs local jurisdictions avoid by substituting regulating ecosystem services for technological service infrastructure. Used this way, PES are neither a subsidy nor a payment for intrinsic or ecological benefits such as endangered species habitat; rather, they are what the name implies—a demand-driven payment for a valuable service rendered. In areas where the development market has put extreme pressure on agricultural lands, however, PES payment rates may not be adequate to compete with alternative land uses to preserve agricultural uses. In that scenario, TDRs, because they tap into development market values, may provide sufficient incentive to retain some agricultural land use integrity. Here the TDR credit calculus is not limited to preservation of farmland or cultural amenities, but includes also the level of ecosystem service delivery expected from the natural capital that is secured through altered agricultural practices. Either instrument, therefore, can promote ecosystem service delivery to an important, if not driving component of the valuation calculus on which the PES transfer or TDR credit is based.

Putting it all together, the different future scenario alternatives and the different policy instruments, with their associated advantages and disadvantages, can be matched up as shown in the following chart:

Future Scenario	Policy Tools	Advantages	Disadvantages
Compete in Land Market to Maintain Status Quo Agricultural Use	Tax incentives; subsidies	Maintains agricultural land uses	May not compete successfully against high value suburban development; potentially expensive to maintain competitive edge; does not alter ecosystem service profile
Lock-in of Status Quo Agricultural Use	Exclusive agricultural use zoning districts; purchase of development rights (e.g., PDR/PACE programs)	Maintains agricultural land uses	Politically controversial if zoning used; does not alter ecosystem service profile; restricts land market
Agricultural Use with Increased Environmental Performance Baseline	Command-and-control regulation mandate of best management practices; incentives such as subsidies and tax relief; possibly also zoning	Maintains agricultural land uses; reduces environmental harms; possible shift of ecosystem service profile toward regulating and supporting services	Potentially undermines financial stability of agricultural uses by increasing compliance costs and reducing production potential; requires new managerial skills; politically controversial; requires more regulatory infrastructure; expensive if incentives are used; could prompt conversions to development scenarios if exclusive agricultural use zoning not also used
Transformation to Multifunctional Working Landscape	Payment for environmental services; transferable development rights; pollutant trading programs; certification programs; planned unit	Maintains some agricultural land uses; likely to increase open space and associated ecosystem services; likely to significantly shift ecosystem service	Possible reduction in food and fiber production; requires public expenditures for PES (potentially offset by cost savings); requires new

	development zoning for any areas being developed	profile toward regulating and supporting services; requires only moderate use of regulation	managerial skills; possible increased density of development within community if transferable development rights are used
Conversion to Open Space	Purchase of conservation easement with enforceable terms or fee simple title with deed restrictions	Eliminates environmental harms; nonregulatory; responds to land market; likely to significantly shift ecosystem service profile toward regulating and supporting services	Expensive; loss of agricultural land; reduction in food and fiber production; restricts future land market if terms or restrictions are comprehensive and permanent
Conversion to New Urbanism Mixed-Use, Mixed-Density Development	Planned unit development zoning; transferable development rights	Responds to land market; likely to increase open space and associated ecosystem services; promotes affordability of housing stock	Loss of rural and agricultural land; reduction in food and fiber production; loss of opportunity to enhance ecosystem service flows; increased fiscal and infrastructure demands on local community
Conversion to Uniform Low-Density Development	Conventional uniform, low-density residential district zoning	Responds to land market; promotes affordability of housing stock	Loss of rural and agricultural land; reduction in food and fiber production; loss of opportunity to enhance ecosystem service flows; increased fiscal and infrastructure demands on local community

II. DESIGNING PES AND TDR PROGRAMS FOR AGRICULTURAL ECOSYSTEM SERVICES—CASE STUDIES FROM FLORIDA

Because of their potentially prominent role in encouraging the conversion of conventional farming to multifunctional agricultural land uses, this section focuses on the use of PES and TDR programs built around ecosystem service values. The two approaches share several general design features in addition to presenting their respective characteristics and differences. If appropriately designed and managed, however, PES and TDR programs can contribute significantly to state and local policies designed to enhance farm multifunctionality.

A. *General Design Issues*

Promoting the shift from conventional farming to multifunctional farming, particularly when incentives are used to enhance delivery of regulating services to surrounding communities as a primary goal, presents a number of threshold design issues for the managing jurisdiction regardless of the incentive mechanism. First, the baseline expectations of agricultural land uses must be defined so that the managing jurisdiction can identify when providing incentives is appropriate.[54] As noted previously, the regulatory baseline for agriculture has been set quite low, meaning farmers have relatively high expectations for when they deserve incentives to "push" them toward improved performance. An incentive program could be designed, however, to leave a performance gap between the regulatory baseline and the performance levels that trigger eligibility for incentives, providing a "pull" toward a more realistic baseline before the push of incentives encourages even more improvement. In either approach, the managing jurisdiction must form a clear understanding of existing agricultural practices, the desired practices (e.g., riparian buffers, wetland recharge features, native vegetation open space), and performance levels that trigger incentives.

Next, the goal of enhancing regulating ecosystem services should be based on a known present or expected future demand that can be assigned a value with reasonable geographic and economic specificity. Where are the expected ecosystem services

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[54] *See* Even, *supra* note 15, at 197.

likely to produce benefits, in what form, and how valuable are they in present and expected future land use scenarios within the jurisdiction? These are macro-level questions that require assessment of the potential capacity of existing and restored natural capital on the target agricultural lands, the present and future configuration of land uses in the managing jurisdiction, and the geographic match between the two. Valuation of the ecosystem service flows then can be based on expected avoided costs—e.g., the cost savings of avoided flood control or recharge capital expenditures; the avoided costs of flood and drought damages.[55] Comprehensive jurisdiction-wide inventories of natural and built capital will be needed, as will well-conceived future land use planning projections, both of which will necessarily rely heavily on geographic information system (GIS) modeling.

With the demand side analysis in place, a supply side assessment also is necessary to identify the most effective and efficient incentive distribution. In all likelihood, the agricultural lands identified as having the capacity to enhance ecosystem service values will be divided under numerous owners. Yet the delivery of ecosystem services off the landscape is unlikely to be linear and proportionate, such that securing ten percent of the targeted lands will yield ten percent of the ecosystem services. Natural capital might provide services that substitute for the services technological capital provides, but natural capital is an ecological resource that behaves according to complex ecosystem properties.

For example, the connections between ecological resources and the delivery of ecosystem service benefits to human populations is known in many contexts to operate at landscape levels, to involve an array of ecological attributes, and to behave in nonlinear relationships over space and time.[56] This raises the difficult question of how precisely to define the proxy for natural

[55] Assigning these values is a major research effort today among agricultural economists. *See* John M. Antle & Jetse J. Stoorvogel, *Predicting the Supply of Ecosystem Services from Agriculture*, 88 AM. J. AGRIC. ECON. 1174, 1174 (2006).

[56] *See, e.g.*, Edward B. Barbier et al., *Coastal Ecosystem-Based Management with Nonlinear Ecological Functions and Values*, 319 SCIENCE 321, 321 (2008) (demonstrating that wave attenuation benefits of coastal wetlands do not respond linearly to surface area of the wetlands). The complex relationship between ecological resources and ecosystem service values is explored in RUHL, KRAFT & LANT, *supra* note 10, at 15–35.

capital the program is designed to maintain and for which the incentive is paid or doled out.[57] For example, is it any riparian habitat, or does the type and density of vegetation matter?[58] Moreover, securing ten percent of the natural capital capacity of the targeted agricultural lands might produce zero improvement in ecological service flows—it might take half of the targeted natural capital enhancements before the jurisdiction realizes any measurable ecosystem service benefits. In that event, providing incentives to cover anything less than half the resources, while it would secure ecological resources, would not have the desired ecosystem service value payoff. Incentive programs thus must be carefully designed to correspond with the ecological properties of the targeted natural capital resources on a landscape level first, from which incentives can be provided to specific parcel owners in a coordinated manner.

Finally, any incentive system designed to enhance targeted regulating ecosystem services must account for the larger physical and political systems in which it is operating. Aligning farmer incentives to provide, say, increased wetland recharge resources or riparian habitat necessarily imposes some trade-offs both ecologically and economically. Those trade-offs must be recognized and considered. Also, other land use and farm policies must be considered. Will the retention of agricultural land and open space have impacts on the stock of affordable housing in the jurisdiction? Are federal farm policies competing with state and local incentive programs, making it difficult for the one or the other set of incentives to gain traction?[59] The point is simply that the program, even assuming it has been thought through with respect to baseline performance expectations and the demand for and supply of services, must be integrated into the larger picture and its consequences and conflicts fully considered.

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[57] Jack et al. note that "when marginal benefits from service provision are not constant, more complex incentive schemes are needed to achieve environmental effectiveness." Jack, Kousky & Sims, *supra* note 16, at 9466.

[58] *See* Francisco Alpizar, Allen Blackman & Alexander Pfaff, *Payments for Ecosystem Services: Why Precision and Targeting Matter*, RESOURCES, Spring 2007, at 20, 20–21.

[59] *See* Jack, Kousky & Sims, *supra* note 16, at 9467 (discussing the potential for different incentive and subsidy programs to work at cross purposes).

B. *Designing Agricultural PES Programs—The Florida Ranchlands Environmental Services Project*

Assuming a jurisdiction has a firm handle on the general design issues outlined above, the choice of a PES program presents additional considerations. For example, the Florida Ranchlands Environmental Services Project (FRESP), launched in 2005 by the World Wildlife Fund (WWF) and private and public partners, is a pilot PES program designed to pay ranchers in an 850,000-acre area of central Florida to enhance delivery of three regulating ecosystem services—water retention, phosphorous load reduction, and wetlands habitat expansion.[60] The target area is located north of Lake Okeechobee, with cow-calf operations as the dominant agricultural land use. A 2004 study WWF conducted for state agencies[61] concluded that changing water management practices in the ranchlands could be a cost-effective alternative to regional water treatment facilities in moderating water flows and phosphorous loads to lake Okeechobee.[62] Most significantly, the study demonstrated that "the agencies could buy these services from cattle ranchers at a lower cost than producing the services by building new public works projects."[63] And the ranchers could be better off as well:

> Under the program, ranchers will sell environmental services to agencies of the state and other willing buyers. The public will benefit when services are provided at a lower cost than can be secured from public investment in regional water storage and water treatment facilities. And ranchers, who face low profit margins and fluctuations in the price of beef, will be provided with another source of income, creating a financial incentive for

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[60] *See* Sarah Lynch & Leonard Shabman, *The Florida Ranchlands Environmental Services Project: Field Testing a Pay-for-Environmental-Services Program*, RESOURCES, Spring 2007, 17, 17. Funding for the three-year FRESP pilot study is $2.3 million from the USDA, Florida Department of Agriculture, and South Florida Water Management District, plus an additional $2 million from the State of Florida. *See* Memorandum from Deena Reppen, Director, Office of Government and Public Affairs, to South Florida Water Management District Governing Board Members, re FRESP (Aug. 6, 2007) (on file with author); WWF ET AL., FRESP: LAKE OKEECHOBEE WATERSHED, http://www.archbold-station.org/abs/maerc/MAERC%20docs/FL%20Enviro%20Ser%20Project_one%20pager.pdf (last visited Sept. 24, 2008).

[61] *See* SARAH LYNCH ET AL., ASSESSING ON-RANCH PROVISION OF WATER MANAGEMENT ENVIRONMENTAL SERVICES (June 2005) (on file with journal).

[62] *See* Lynch & Shabman, *supra* note 60, at 17.

[63] *Id*.

> land to remain in ranching rather than be converted to more intensive agriculture and urban development—land uses that will further aggravate water flow, pollution, and habitat problems.[64]

Hence, whereas WWF might normally have targeted payments from its limited funds for wildlife habitat conservation, the idea behind the program is to identify cost savings to local jurisdictions and state agencies that make paying for ecosystem services an efficient expenditure of public resources, with the incidental benefit of increased wildlife habitat conservation.

Nevertheless, design issues identified in the report led WWF and its partners to test the concept through the FRESP pilot program involving eight ranches. Chief among these issues is the method of documenting that the payment has produced the benefit, which requires finding the right "trade-off between the cost of documentation and the accuracy of measurements that is acceptable to buyers and sellers."[65] So, for example, the water retention service payments will pay ranchers to rehydrate drained wetlands and raise the height of the water table in the ranch soil profile and drainage network, and remote instruments will monitor data on rainfall, water stages, and flow, allowing a before-and-after comparison.[66] Once this relationship between changed ranching practices and enhanced service flows is identified, measuring on-site changes in ranching practices can provide the pricing proxy for ecosystem service enhancement and the documentation to support buyer confidence. In short, any PES program must devise a way for the buyer and seller to know that payment X yields service value Y, and that this is a rational economic move for both parties.[67]

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[64] *Id*. at 18.

[65] *Id.*

[66] *See id*. at 18–19. The FRESP pilot study was initiated in 2006. However, severe drought in 2007 limited the collection of data and no conclusions have been drawn yet as to these critical relationships. Interview with Sarah Lynch, Program Director, WWF FRESP (Feb. 5, 2008).

[67] This design need, as well as other economic aspects of PES design, is covered in more detail in Antle, *supra* note 17, at 13–17.

C. *Designing Agricultural TDRs for Ecosystem Service Enhancement—The Florida Rural Lands Stewardship Act*

Relatively new to agricultural settings[68] and showing only limited success thus far,[69] farmland TDR programs are for the most part constructed around an "old agriculture" model—one based largely on preserving farm "character"[70] and which neither recognizes nor promotes farmland multifunctionality.[71] Jesse Richardson's compact and insightful analysis of agricultural TDR programs[72] identifies several design challenges that have grown out of this experience. First, and most obviously, the program depends on supply of and demand for the TDRs. Neither is as easy to make happen as it seems. Agricultural "senders" need to view the TDR as more attractive than either their conventional agriculture or "last harvest" options, and there must be "communities willing to accept designation as a receiving area for higher-density development."[73] Even when the supply and demand communities are identified as willing in principle to engage in the transaction, the balance between the two is delicate. By contrast to PES, the "market" for TDRs is a regulatory construct, not a true market, and thus depends on some finely tuned government intervention to make demand in the receiving area strong and the supply of the TDRs just right to keep them valuable in that market.

> If too many development rights are created or if the incentives in the receiving areas are insufficient, the price of the development rights will be too low. . . . If not enough development rights are distributed or if the incentives in the receiving areas are too great, the price of development rights

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[68] *See* JUERGENSMEYER & ROBERTS, *supra* note 9, § 13.11 at 860 ("[T]he application of the transferable development approach to agricultural land use preservation is of relatively recent origin.").

[69] *See* LINCOLN INST. OF LAND POLICY, TRANSFER OF DEVELOPMENT RIGHTS FOR BALANCED DEVELOPMENT 3–5 (May 1998) (suggesting that, outside of a few success stories, "the overall picture is ambiguous"), *available at* http://pb.state.ny.us/pbc/conference_9805_transferdevelopment.pdf; Jesse J. Richardson, Jr., *Goldilocks, the Three Bears and Transfer of Development Rights*, AGRIC. L. UPDATE, Dec. 2006, at 4 (noting that only eight of twenty-three farmland preservation TDR programs active in 2004 protected more than 1,000 acres).

[70] *See* Rick Pruetz & Erica Pruetz, *Transfer of Development Rights Turns 40*, 59 PLAN. & DEV. L. 3, 5 (2007).

[71] *See* Richardson, *supra* note 69, at 5–6.

[72] *See id.*

[73] *Id*. at 4–5.

> will be very high. . . . The number of development rights and the incentives for both sides must be "just right."[74]

But getting that part right is just the beginning. Housing markets fluctuate and cross local political boundaries. How will a local TDR "coordinate and collaborate with other local governments in the region" to keep a handle on those trends?[75] Farmers that sell TDRs cannot sell to developers, but might not necessarily stay in active farming. "No one has investigated whether these programs actually promote and aid farm production."[76] And if the TDR program is aimed at rewarding farmers for conserving environmental values, how are those values calculated in sending areas and then converted into density development rights in receiving areas? How many apples get you so many oranges? Based on these challenges, Richardson concludes that "the theoretical beauty of TDR programs lures many to the tool. However, the complexity makes implementation difficulty."[77]

Although Richardson's assessment of agricultural TDR programs is a sobering reminder that the simple elegance of TDR theory ultimately gives way to the utter complexity of their implementation, some states have forged ahead with what could be promising structural advances, particularly with respect to enhancing the delivery of ecosystem services. For example, in 2001 the Florida Legislature enacted the Rural Land Stewardship Act (RLSA),[78] which allows counties to designate all or portions of agricultural and rural lands in the jurisdiction as a rural land stewardship (RLS) area. Within RLS areas, the local government applies planning and economic incentives consistent with guidelines to be developed by the Florida Department of Community Affairs (DCA) to encourage the implementation of innovative and flexible planning and development strategies and creative land use planning techniques, with TDRs as the primary policy mechanism.

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[74] *Id*. at 6.

[75] *See id.* at 4.

[76] *Id*. at 5.

[77] *Id*. at 6.

[78] FLA. STAT. § 163.3177(11)(d) (2008). For background on the legislative purpose and amendment history of RLSA, see DEP'T OF URBAN & REG'L PLANNING, FLA. STATE UNIV., RURAL LAND STEWARDSHIP 2007 ANNUAL REPORT 1–4 (2007).

1. *Structure and Goals*

Like any TDR-based program, RLS areas contain "stewardship sending areas" within which natural resources and rural land values are conserved, and "receiving areas" within which development is authorized to occur, with the TDR linking the two areas.[79] A landowner who conserves rural and natural resource values in the sending area accrues "stewardship credits" entitling the landowner to TDRs, known in RLSA parlance as transferable rural land use credits, allowing greater development densities in receiving areas than would apply under the otherwise applicable zoning rules.[80] These credits

> may be assigned at different ratios of credits per acre according to the natural resource or other beneficial use characteristics of the land and according to the land use remaining following the transfer of credits, with the highest number of credits per acre assigned to the most environmentally valuable lands or, in locations where the retention of open space and agricultural land is a priority, to such lands.[81]

RLSA stands apart from most TDR programs in two respects. First, it is entirely voluntary on the credit generating side. Most TDR programs, particularly those focused on historic and environmental preservation, regulate activities in the sending area and provide TDRs as the purported quid-pro-quo.[82] Understandably, this leads to resentment among the landowners regulated in the receiving area who receive what they may believe is inadequate value in the TDR to compensate for the lost development potential, even so far as to frequently lead to takings claims.[83] By contrast, RLSA uses TDRs purely as an incentive to alter land use practices and deter conversion to suburban development in the sending area.

Second, RLSA strikes a chord very close to the farm multifunctionality theme. The statute specifies six goals that must be served by creation and operation of a RLS area: (1) restoration

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[79] FLA. STAT. § 163.3177(11)(d)(4).

[80] *Id*.

[81] *Id*. § (d)(6)(j).

[82] *See* Juergensmeyer, Nicholas & Leebrick, *supra* note 18, at 448–55 (surveying several prominent programs).

[83] *See* Andrew J. Miller, *Transferable Development Rights in the Constitutional Landscape: Has Penn Central Failed to Weather the Storm?*, 39 NAT. RESOURCES J. 459, 459 (1999).

and maintenance of the economic value of rural land; (2) control of urban sprawl; (3) identification and protection of ecosystems, habitats, and natural resources; (4) promotion of rural economic activity; (5) maintenance of the viability of Florida's agricultural economy; and (6) protection of the character of rural areas of Florida.[84] These goals evidence an advance in thinking beyond prior practice in agricultural TDRs. On its face at least, RLSA thus is more than a farmland status quo or cultural amenity preservation program—it focuses on providing incentives tied to the economic value of rural land and natural resources integrated within working landscapes.

Nevertheless, although the credit generating side of RLSA is nonregulatory and innovatively ties in the concept of economic value of rural lands, the credit consumption side has the look and feel of conventional TDR programs in that it relies on a default rule for development density and units that can be exceeded through purchase of credits. Hence, in addition to the agriculture and ecosystem service design issues mentioned already generally and for PES programs, RLSA left many *land use* policy and implementation questions unanswered. For example: What is the appropriate methodology for identifying and designing development in receiving areas? How is demand for RLSA land use credits maintained in the receiving area? What is it that land use credits are "buying" in the way of number of units, density of development, mixed uses, and so on?[85]

Before the DCA had developed guidelines addressing these and related issues, two RLS areas had been established—one just under 200,000 acres in Collier County, which includes the new town of Ave Maria in its receiving area, and St. Lucie County's 22,000-acre RLS area encompassing the Adam's Ranch—and many others were in planning.[86] Clearly, demand for the RLSA program was strong in Florida. To catch the RLSA train before it had left the station at full steam, therefore, in April 2007 the

[84] FLA. STAT. § 163.3177(11)(d)(2).

[85] A brainstorming session I had with DCA staff in the spring of 2007 developed a long list of such issues, which focus primarily on land use in the receiving area and thus are outside the scope of this work. *See also* NATHANIEL REED, CHAIRMAN EMERITUS, 1000 FRIENDS OF FLORIDA, WORKING TO SUSTAIN FLORIDA'S RURAL AND NATURAL LANDS: A CALL TO ACTION 10–11 (2007); Letter from Charles Pattison et al. to the Honorable Thomas Pelham, Secretary, Florida Department of Community Affairs 2–5 (June 6, 2007).

[86] *See* DEP'T OF URBAN & REG'L PLANNING, *supra* note 78, at 6–8.

Secretary of the DCA delivered a letter to one of the counties planning a RLS area designation to "inform the County of the process the Department will use in considering and authorizing RLSA proposals."[87] Since then, the DCA has initiated a rulemaking to develop comprehensive RLSA guidelines and has conducted several workshops to identify stakeholder interests and input.[88]

2. *Integrating Ecosystem Services into the RLSA Framework*

Although RLSA makes no specific mention of farm multifunctionality or farm provision of ecosystem services, the statute's multi-factored goals-set clearly opens the door to organizing RLS areas and TDRs around those principles. For example, integrating ecosystem service production capacity into the stewardship credit calculus would support and reward the "restoration and maintenance of the economic value of rural land" and contribute to the "promotion of rural economic activity." Providing farms a means of capitalizing on their production of regulating services would contribute to the "maintenance of the viability of Florida's agricultural economy." Providing incentives to conserve the agricultural land capital producing those services would "support the identification and protection of ecosystems, habitats, and natural resources," and the consequence of doing all of the foregoing could only contribute to the "control of urban sprawl" and the "protection of the character of rural areas of Florida." The fit between RLSA and the farm multifunctionality movement thus seems as tight as a glove.

Moreover, by linking the value of the TDR to ecosystem service production, RLSA would test the farm stewardship claim—the better the stewarding for the greater community, the more value in the TDR. This approach thus makes the trade-off between provisioning and regulating services explicit and transparent. To the extent the TDR contains an increment of value clearly attributable to provision of regulating services, farmers in RLS areas can evaluate the consequences of emphasizing

[87] Letter from Thomas G. Pelham, Secretary of the Florida Department of Community Affairs, to The Honorable C. Guy Maxcy, Chairman, Highlands County Board of Commissioners 1 (Apr. 4, 2007) (on file with journal).

[88] These developments can be followed on DCA's Rural Land Stewardship Act website, http://www.dca.state.fl.us/fdcp/dcp/RuralLandStewardship/index.cfm (last visited Sept. 24, 2008).

continued commodity production over conservation of agricultural land capital capable of supplying regulating services to surrounding communities. The scale of the RLSA program, if so configured, would operate from local to national, as TDR values could reflect services such as local groundwater recharge to global carbon sequestration. Finally, although the state oversees RLSA, ultimately the creation and operation of RLS areas will be locally demand-driven.

Indeed, as part of its RLSA rulemaking process, the DCA commissioned the Florida Planning and Development Laboratory at Florida State University (FSU Laboratory) to prepare a RLSA program evaluation study.[89] The final report from that study recognizes the importance of integrating ecosystem services in the RLSA TDR calculus. In particular, two of RLSA's goals—restoration and maintenance of the economic value of rural land and the identification and protection of ecosystems, habitats, and natural resources—invite attention to ecosystem service values farms can provide. The FSU Laboratory's final report[90] thus identifies "captur[ing] the value of environmental services" as one of the "core principles" of successful agriculture TDR programs:

> Successful programs are those that account not only for the aesthetic aspects of agricultural land but also for environmental services agricultural lands provide. These would include the provisioning of non-land resources, like water, and the land's participation in environmental regulation processes (like water purification) that would have to be otherwise acquired in the marketplace.[91]

To ensure that these values are "captured" in a way that properly aligns incentives toward farm multifunctionality, the FSU Laboratory suggested several program evaluation indicator metrics for RLS areas that focus on ecosystem service values. One such indicator appears in connection with the goal of restoration and maintenance of the economic value of rural land:

> *Indicator 1.3. Environmental service values delivered by rural lands in sending areas are reflected in the RLSA system.*
>
> Metric 1.3.1. Stewardship credits reflect the value of conserved

[89] I served on the panel of experts the FSU Laboratory formed to provide input and to critique early drafts of the report.

[90] *See* TIM CHAPIN & HARRISON HIGGINS, RURAL LAND STEWARDSHIP AREAS (RLSA) PROGRAM EVALUATION FRAMEWORK (2007) (on file with journal).

[91] *Id*. at 13.

> environmental services that are bought and sold outside of the RLS program.
>
> Metric 1.3.2. The stewardship credit system provides market incentives to maintain and enhance capacity of rural lands in sending areas to provide environmental services and to monitor the provision of those services.
>
> Metric 1.3.3. Economic values of rural lands in sending areas are enhanced by the use of environmental service values in RLSA system.[92]

The other appears under the goal of identifying and protecting ecosystems, habitats, and natural resources:

> *Indicator 3.5. The capacity for rural lands in stewardship sending areas to provide, maintain, and enhance environmental services is enhanced, as measured by*
>
> Metric 3.5.1. Delivery and value of environmental services within the potential and approved stewardship sending areas.[93]

The FSU Laboratory report did not go further in outlining how to design RLSA implementation to accomplish these goals. In particular, unlike the FRESP PES program, the RLSA TDR program involves *two* interrelated pricing decisions, the relationship between which is not a market-based outcome. As structured, RLSA can be thought of as an accounting mechanism that correlates the public benefits of enhanced ecosystem services in sending areas with the public impacts of increased density in receiving areas. On the one hand, therefore, like a PES program, the RLSA program must calibrate the award of credits to the value of the ecosystem services being delivered through altered land uses. In addition, however, RLSA implementation requires a method for controlling the value of the TDR credits in the receiving areas, as that provides the financial basis for the incentive in sending areas to change land use practices. But it is the value of enhanced land development opportunities, not the enhanced ecosystem services, that drives TDR values in the receiving areas. Balancing these two markets when there is no market-based way of equating a development opportunity in one market with an ecosystem service value in the other market presents the difficult "apples for oranges" conversion calibration for RLSA.

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[92] *Id*. at 15.
[93] *Id*. at 19.

It may be necessary for local jurisdictions to develop proxies for keeping the exchange between the two markets in synch. For example, based on the macro-analysis of natural capital potential in the jurisdiction and the present and expected jurisdictional land uses, it may be possible to define TDR premiums assigned to different sets of agricultural land practices and conservation measures that enhance ecosystem service flows above a defined baseline. A conservation easement might define the standard credit, and restoration of riparian habitat might earn a set premium. For ongoing agricultural land uses, preservation of the status quo use might define the standard credit, and sets of management and restoration practices—the silver, gold, and platinum levels, so to speak—might be used to define levels of premiums.[94] For lands moved into conservation status, premiums above the reward for simple open space could be based on the qualitatively described connection between measurable geographic (e.g., acreage of wetlands), service (e.g., flood protection), demographic (e.g., benefited population), and economic (e.g., replacement value to the benefitted built environment) factors, even if precise quantification is not possible. While these or other proxies might not precisely calibrate ecosystem service benefits with development density impacts, RLSA provides an accounting mechanism that is more transparent and planned than a trade-off negotiated between landowners and local governments as part of a zoning decision.

Leaving ecosystem services out of the RLSA framework will render RLSA an "old agriculture" program that continues to drive farming toward the production of commodities and rural character, with the provision of regulating services to surrounding communities an accidental and incidental benefit which farmers will view, if at all, as a positive externality for which they receive nothing in return. On the other hand, the design issues identified above suggest it will be difficult to fashion general formulae for integrating ecosystem services into specific local settings. Indeed, in its proposed RLSA rule,[95] not yet finalized as of this writing, DCA did little to put the ecosystem services concept in play, though it left the door open to RLSA initiatives to do so. For

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[94] I thank Katrina Wyman in particular for this suggestion.

[95] *See* FLA. DEP'T OF CMTY. AFFAIRS, SECOND DRAFT RURAL LAND STEWARDSHIP AREAS RULE (2008), *available at* http://www.dca.state.fl.us/fdcp/dcp/RuralLandStewardship/Second_Draft-RLSA_Rule.pdf.

example, under the proposal, land values analysis for purposes of the credit system must consider "[a]ll forms of rural resources including agricultural, environmental, local and regional ecosystems, wildlife habitat, [and] water resources," as well as "[t]he broad landscape ecology including geographic linkages and corridors".[96] While this does not mandate incorporation of ecosystem service values in the TDR credit system, it unquestionably allows it. For local jurisdictions wishing to do so, the recommendations of the FSU Laboratory provide useful guidelines.

D. *Matching PES and TDR Programs with Context*

One unmistakable theme from the preceding sections is that, by comparison, PES programs are simple and TDR programs are complex. A PES program is in essence simply a market exchange bringing willing buyers and sellers together, providing the information and market monitoring and enforcement both parties need to enter confidently into transactions.

Of course, that is the trick with ecosystem services—finding buyers and sellers who can exchange in a market. The FRESP has that good fortune. Motivated by the strong national and state desire to improve water quality in the Everglades and to manage water resources better in central Florida, FRESP has seized on a golden opportunity to match demand for and supply of ecosystem services. In rural agricultural areas distant from populated service demand markets, however, PES programs will often consist of sellers without buyers. Even where urbanization is expected over time, a PES program may lack public and private buyer resources to secure ecosystem services today for the urban populations of the future.

By contrast, TDR programs require no public expenditure to generate credits, though by all means they depend on demand for urban development to make the credits valuable. By appropriately placing receiving areas closer to the urbanizing fringe, however, TDR programs such as RLSA may be able to leverage demand for development into demand for credits, thereby promoting enhancement of ecosystem service flows sooner than would be the case under a PES program. Moreover, because a RLSA program is tied closely to a local jurisdiction's future land use plan, the

[96] *Id*. at 7.

jurisdiction is more likely to appreciate the long term need for ecosystem service "green" infrastructure and view the TDR trade-off between development and conservation as a worthy investment. In other words, allowing more development to secure enhanced ecosystem service flows may be a better option for a local jurisdiction than less development with degraded ecosystem services flows.

The point is that PES and TDR programs are different, and as such may be suited to different contexts. A summary of some of those differences is provided in the following chart:

	PES	TDRs
Advantages	Provides opportunity for public capital infrastructure cost savings; based purely on market incentives; can be applied at large scales where regional ecosystem services are valued; simple by comparison	No expenditure of public resources required for creation of credits; provides opportunity for public capital infrastructure cost savings; receiving area can be positioned near market demand for development while sending area can be rural; value of credits can be managed through regulation of receiving areas and kept sufficiently high to deter conversion to development
Disadvantages	Requires expenditure from public (or private) resources; less likely to be viable in rural areas where no immediate market exists for the services; payments may not be sufficient to deter conversion to development scenarios; requires new managerial skills	Requires regulation in receiving area; results in increased development and costs associated with resulting demand on public infrastructure; depends on active development market demand in receiving area; requires new managerial skills
Major Design Issues	Deciding the baseline expected performance levels of agricultural land uses; identifying the economic values of the enhanced ecosystem services and their pathways of delivery; downscaling macro-level to parcel-level; calibrating altered land use practices with enhanced ecosystem service flows; documenting the altered management practices	All of the PES design issues plus: managing supply and demand equilibrium between the sending and receiving markets; setting conversion rates between enhanced ecosystem service values and development rights in receiving areas; meeting fiscal and infrastructure demands imposed by the increased development rights in receiving areas

CONCLUSION

Robert Wolcott recently aptly described the threshold at which American farm policy finds itself:

> Agriculture occupies the high ground of comparative advantage in supplying socially demanded, low-cost ecosystem services. Agriculture is accustomed to publicly funded incentives, and private markets to signal supply value sought by society whether corn, soybeans, or wildlife habitat. The level and composition of the demand side is increasingly evident, though in flux as well. . . .The prospect of broad-scale compensation of agricultural producers for supplying ecosystem services is real.[97]

The question is whether federal, state, and local farm policy will seize this opportunity. Can the Farm Bill ever break out of its commodity support/land retirement mold? Will federal, state, and local policy converge on the vision of farms as multifunctional production units? This Article has made the case that state and local policy, through PES, TDR, and similar techniques, can have a significant role to play in moving toward that vision.

Federal farm policy should encourage and support such state and local initiatives, as it is in the national interest to maintain and enhance the natural capital that agricultural lands contain and can deliver locally across the landscape. Measures Congress might take include:

- Fund research to determine how to calibrate farm practices with ecosystem service delivery at local scales, as USDA has done with FRESP.
- Develop national standards for quantifying ecosystem service values associated with agricultural lands, including the development of proxies that can inexpensively be measured to estimate service delivery potential
- Give preference in federal "green subsidy" payments programs for farms that would actually deliver ecosystem service values to identifiable local and regional populations
- Fund pilot and permanent demand-based state and local farm multifunctionality programs such as FRESP

The 2008 Farm Bill took a modest step in this direction.

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[97] Robert M. Wolcott, *Prospects for Ecosystem Services in the Future Agricultural Economy: Reflections of a Policy Hand*, 88 AM. J. AGRIC. ECON. 1181, 1182–83 (2006).

Section 2709 of the Food, Conservation, and Energy Act of 2008 requires the Department of Agriculture to "establish technical guidelines that outline science-based methods to measure the environmental services benefits from conservation and land management activities in order to facilitate the participation of farmers, ranchers, and forest landowners in emerging environmental services markets" and to establish guidelines to develop a procedure to measure environmental services benefits, a protocol to report environmental services benefits, and a registry to collect, record and maintain the benefits measured.[98] Ideally, the agency will develop procedures and protocols that are relevant to state and local efforts such as RLSA and FRESP, as well as to other federal regulatory land management agencies, thereby promoting national uniformity of standards.

Conventional agriculture is at a crossroads, facing pressure to improve its environmental performance profile at the same time it is facing pressure to produce more food, fiber, and fuel commodities on the one hand or to give way to urban development on the other. In the best of all worlds, markets would fully recognize the value of ecosystem service flows and farms could make appropriate balances between providing services, commodities, or land development opportunities. But hoping for this seems quixotic, as markets have proven time and again to be poor at valuing the multifunctional capacity of ecological landscapes.

Understanding the multifunctional capacity of agricultural lands, however, provides insight into how state and local governments, with federal guidance and support, could promote alternatives that blend enhanced environmental performance with better development planning. RLSA and FRESP could become model farm policy programs in this respect, or they could recede into the ways of "old agriculture." Whatever their future, however, it is promising to find state and local governments beginning to act strategically to influence the future scenarios of existing agricultural land uses notwithstanding the substantial design challenges these techniques face.

[98] Food, Conservation & Energy Act of 2008, H.R. 2419, 110th Cong. § 2709 (2008).