

AGROECOLOGY IN ACTION: HOW USEPA LINKS POLICY WITH PRACTICE BY SUPPORTING THE EXTENSION OF INTEGRATED FARMING SYSTEMS

K. D. Warner

*Environmental Studies Institute, Santa Clara University, Santa Clara, CA 95053;
Phone: (408)551-7086; Email: kwarner@scu.edu*

Abstract

Lacking a Congressional mandate to regulate agriculture's environmental impacts, the USEPA has supported local initiatives in integrated farming systems' research and extension. This support has emerged through the initiative of regional USEPA staff when they have compiled a systematic analysis of agriculture's environmental impacts. Enhancing agriculture's environmental stewardship is possible, but requires re-orienting and re-organizing agricultural science so that it facilitates grower, consultant, and commodity organization participation through agroecological partnerships. Conventional "transfer of technology" extension practice cannot create the development of integrated farming systems necessary to advance sustainability. This paper reports four years of field research, including more than 250 interviews with agricultural scientists, U.S. EPA, and other regulatory agency staff, growers, consultants, and agricultural commodity group staff in four states. It documents innovative social networking strategies these participants developed to put agroecology into action or to extend integrated farming systems perspectives, and the critical role the U.S. EPA has played in them. These initiatives have been particularly effective in California's perennial crops, especially wine grapes, almonds, and pears, where organophosphate pesticide-use reduction has reached 80%. To take full advantage of the potential of agroecological partnerships, Congress must provide U.S. EPA additional administrative and policy tools.

Key words: agroecology, environmental policy, integrated farming systems, extension practice

Introduction

The United States has never had an explicit, systematic environmental policy for agriculture, despite its serious and extensive impacts. Congress has never shown much interest in regulating the environmental consequences of agriculture, in large part because it has found the persistent cultural myths about family farmers and the national virtues they exemplify politically useful (Browne et al., 1992). USEPA faces particular challenges in regulating agriculture because the farming practices shaping the quantity, media, and impacts of pollution are distinct by crop, region, and specific ecological context, frustrating consistent enforcement. The kind of agriculture (annual crops, perennial crops, animal husbandry) determines the kinds of pollution (nutrients, soil erosion, agrochemicals) most likely to leak out of the farming system into the broader landscape. Local soil, moisture, and geological

conditions have a tremendous effect on the severity and scope of pollution, and operation-specific management practices can result in highly variable environmental impacts, even within the same kind of cropping or animal production system.

Regional offices of the USEPA in the West have supported local initiatives in integrated farming systems' research and extension. This support has emerged through the initiative of regional USEPA staff when they have compiled a systematic analysis of agriculture's environmental impacts. Enhancing agriculture's environmental stewardship is possible, but requires collaborative multi-stakeholder participation in agroecological partnerships. Conventional "transfer of technology" extension practice cannot create the development of integrated farming systems necessary to advance sustainability. This paper reports on USEPA participation in innovative social networking strategies developed to extend integrated farming systems strategies, or to put agroecology into action. It argues that to address agriculture's environmental impacts in a coherent way, the U.S. Congress must pass enabling legislation that will allow USEPA to play a stronger role in ecosystem management (Warner, 2006b).

Methods

This paper reports qualitative research into the social relations between USEPA agency staff and social networks of growers, consultants, scientists, and growers' organizations pursuing pollution prevention goals in the Western U.S. Using in-depth interviews among growers, scientists, regulators, and agency staff, it highlights creative efforts by agency staff to address agricultural pollution despite absence of a legislative mandate to regulate agriculture. Three years of field interviews in California provided data sources for this research. Primary sources of information are semi-structured interviews with 32 partnership leaders. This is supplemented by: personal interviews with 97 other participating growers, managers, scientists, and grower organization staff; 13 focus groups with 84 participating growers, extension agents, scientists, and grower organization staff; and participant observation at 34 partnership-related meetings. Data from this field work was analyzed and reported in a dissertation (Warner, 2004), and supplemented with 18 interviews with partnership participants in three other states.

The problem of agro-environmental regulation

Congress has never given the USEPA a clear mandate to address agricultural pollution, even as deleterious effects on water quality have become incontrovertible (U.S. Geological Survey, 1999). Laws regulating pesticides and non-point source water pollution have been the two key anchors for creative efforts on the part of entrepreneurial USEPA staff who have worked to meet pollution prevention goals. The USEPA was created with a whole cluster of environmental laws, but two of them stand out for the purposes of regulating agricultural pollution (Andrews, 1999). Congress passed the Federal Environmental Pesticides Control Act in 1972, which transferred responsibility for pesticide registration and regulation to the USEPA, in large part to address charges that the U.S. Department of Agriculture suffered from a pro-pesticide bias (Bosso, 1987). Congress assigned the USEPA responsibility for pesticide evaluation and registration, but regulatory enforcement of pesticide use was still in the hands of the states, with the USEPA supervising. In the same year, Congress passed the Federal Water Pollution Control Act Amendments, better known as the Clean Water Act. American cities and industry have made impressive progress in controlling point-source or end-of-pipe water pollution, and agricultural nutrients are now the greatest source of non-point-source water pollution (U.S. Geological Survey, 1999).

Agriculture can pollute several environmental media: air, surface water, and groundwater quality, often simultaneously, and sometimes from different activities. Environmental impacts may be temporally or spatially distinct from the activities that cause them, as is the case with surface and groundwater pollution. Decisions about agricultural practices in the United States are made by 2 million farm operators. Each of these factors presents a significant obstacle for typical environmental regulatory strategies, confounding the regulatory uniformity required of an equitable process (Rosenbaum, 1994).

Even as *Silent Spring* (Carson, 1962) stimulated new environmental policies, U.S. agricultural pesticide use grew dramatically, reaching a billion pounds per year in 1976 and fluctuating around that level ever since (Aspelin, 2000). California's specialty-crop agriculture has used a disproportionate amount of the nation's total pesticides, roughly 20–25 percent (Aspelin and Grube, 1999). After DDT was banned, many growers compensated by switching to organophosphate pesticides. These insecticides do not bioaccumulate and

threaten top predators as did DDT, but they are acutely toxic, and increasing reliance on organophosphates meant greater acute health risks to growers and farm workers (Wright, 1990). California's San Joaquin Valley has the maximum concentration of many pesticides among all of the U.S. watersheds studied by the U.S. Geological Survey: pesticides were detected in 69 percent of the groundwater samples collected from the eastern San Joaquin Valley (U.S. Geological Survey, 1998a). A companion report on the Sacramento River found that watershed to generally be in better shape, although it did find that agricultural streams here have some of the nation's highest concentrations of the insecticide diazanon (U.S. Geological Survey, 2000).

Twenty years after the USEPA's creation, attention within the agency began to focus on agriculture's environmental problems. The USEPA was initially created with a legislated shotgun marriage of existing media (air, water) and category (pesticides, solid waste) programs. William Reilly, USEPA Administrator under President George H. W. Bush, directed his staff to undertake regional analyses of environmental problems to determine gaps they needed to address. The agency increasingly framed these as pollution prevention initiatives, and this shifted attention from end-of-the-pipe pollution management to the reduction or elimination of potential pollutants, especially hazardous or toxic materials (Gottlieb, 2001). It also launched initiatives to work with other federal agencies with existing authority to manage resources. Under Reilly's tenure, the USEPA also emphasized public sector/industry partnerships to promote voluntary pollution prevention (Andrews, 1999).

Concurrently, the National Research Council (1993) issued a report titled *Soil and Water Quality: An Agenda for Agriculture*, which called for a systems approach to prevent pollution while protecting farming productivity. It argued that integrated farming system plans should become the basis of federal, state, and local soil and water quality programs. The report observed that-

Inherent links exist among soil quality conservation, improvements in input use efficiency, increases in resistance to erosion and runoff, and the wider use of buffer zones. These links become apparent only if investigators take a systems-level approach to analyzing agricultural production systems. The focus of such an analysis is the farming system, which comprises the pattern and sequence of crops in space

and time, management decisions regarding the inputs and production practices uses, management skills, education and objectives of the producer, quality of the soil and water, and nature of the landscape and ecosystem with which agricultural production occurs (p 107-8).

This report became the most influential agricultural environmental resource protection agenda during the 1990s. It did not explicitly define “integrated farming system,” admitting that variability in cropping systems, ecosystems, and regional contexts made a singular definition impossible, but it did hold point a general direction for agricultural resource protection, one with remarkable parallels to the USEPA’s pollution prevention approach.

During the 1990s, stimulated by these new conceptual approaches, in at least USEPA Regions IX and X (the Pacific Southwest and Northwest), staff conducted systematic analyses and determined that agriculture was the greatest unregulated source of pollution (Warner, 2006b). Lacking statutory authority to regulate agricultural pollution but aware of the potential of community-based environmental protection approaches (USEPA, 1997), staff in these regions looked for local initiatives that might provide new opportunities for pollution prevention in California and Washington State. During the Clinton administration, the U.S. Department of Agriculture set new goals for implementation of IPM, but passage of the Food Quality Protection Act (FQPA) in 1996 was the most important agricultural regulatory initiative of that decade (Warner, 2006b). When USEPA staff encountered networks of growers seeking to make voluntary progress in this area, they discovered that by investing in them, they could achieve agency goals with carrots, not merely sticks.

Essentially all industrial farming operations pollute, and comprehensive enforcement is impossible. Laws such as the Clean Water Act and the FQPA provide a framework for environmental regulatory agencies at federal and state levels, but their limited resources leave all but the most egregious environmental offenses unaddressed. Agriculture’s widely distributed and independent decision makers, managing varied farming systems in highly variable ecological contexts, frustrate regulatory enforcement models. For these reasons, developing incentive systems of collaborative voluntary efforts to develop integrated farming systems hold more promise for resource protection.

California: partnering with ecologically informed agricultural initiatives

During the early 1990s, several informal groups of growers and crop-specific semi-public commodity organizations, recognizing that agriculture was under considerable if diffuse public pressure to improve its environmental performance, began initiatives to reduce pollution. In California, the most successful and enduring of these initiatives took place among almond, pear, and winegrape growers. These primarily addressed insecticides. In Washington State, some annual growers recognized the problems with farming practices that left the soil vulnerable to wind and water erosion. Other initiatives began in dairy and corn/soy systems in the upper Midwest. These partnerships – their origins, practices, extension strategies, and impacts- are analyzed in detail elsewhere (Warner, 2006a; Warner, 2006b), but several of their key traits are summarized here.

An agroecological partnership is defined to be “an intentional, multi-year relationship between at least growers, a grower’s organization, and one or more scientists to extend agroecological knowledge and protect natural resources through field-scale demonstration.” These initiatives have gone beyond integrated pest management, to take an integrated farming system approach to pollution prevention, as recommended by the National Resource Council. Because of their system approach, integrated farming systems merit the term agroecology (Altieri, 2002; Warner, 2006b). This model contains traditional elements of extension, but deliberately configures them to more effectively promote agroecological knowledge. The scale of grower, scientist, and organizational participation in agroecological partnerships, plus the degree of entrepreneurial leadership they have invested in them, are without parallel in California over the past two decades. A total of 32 partnerships in 16 commodities were launched in California between 1991 and 2003. The agroecological partnership model became the chief strategy for extending alternative agricultural knowledge in California during the decade following 1993.

The Biologically Integrated Farming System (BIOS) partnership among almond growers was the first high-profile, successful agricultural partnership in California (Dlott et al., 1996). BIOS facilitated social or group learning about the interactions between components of their farming system (Pence and Grieshop, 2001). The initial partnership consisted of the non-governmental organization Community Alliance with Family Farmers

(CAFF), staff from the University of California Sustainable Agriculture Research and Education Program (SAREP), and a University of California farm advisor. They set out to improve upon conventional extension practice by re-imagining how traditional participants related to each other in the generation of agricultural knowledge. To fund almond BIOS, CAFF contacted Augie Feder, a new USEPA staff member in the Region IX office, which had hired Feder because its analysis had identified agriculture as the top source of California's unmitigated pollution. Regional USEPA leadership recognized that their traditional existing media (air, water) and category (pesticides, solid waste) programs were not sufficient, so they wanted to try a new approach. Feder had heard of an initial study demonstrating the viability of reduced pesticide strategies and recognized it represented the kind of systems-based, pollution-prevention approach the USEPA needed to support.

Feder brought to bear knowledge of the latest science policy for addressing agricultural pollution, but also documentation of the problem of the organophosphate diazinon. It was and is a priority pollutant in the western United States. Almond growers were the top users nationwide of diazinon, followed by prunes, even though only a fraction of growers apply it annually. The environmental problem of diazinon focused regulatory agency interest in alternatives. Feder secured some initial funds for almond BIOS, and then when the first year's results indicated dramatic reductions in agrochemical use, he argued successfully that support for this kind of community-based, grassroots project achieved the agency's pollution-prevention goals far more efficiently than regulatory actions. His supervisors encouraged him to partner with BIOS and other voluntary initiatives to prevent pollution and achieve agency goals.

BIOS brought wide attention to the possibility of alternatives, both within the agricultural and regulatory communities. BIOS demonstrated that alternative extension practices could facilitate alternative agriculture. Other partnerships in winegrapes, pears, and stonefruit had been initiated earlier, and partnerships in prunes and in cotton started while BIOS was still in its infancy. The quick and evident success of BIOS caught the attention of the regulatory community. CAFF insisted that what they had demonstrated to be successful in almonds could be reproduced in other commodities. The example of BIOS and the advocacy of CAFF stimulated legislators, public agency officials, and philanthropic

foundations to fund and create funding programs for more partnerships. The two primary funding programs have been SAREP's Biologically Integrated Farming Systems and the Department of Pesticide Regulation's Pest Management Alliance (PMA) program, but other funders emerged as well (Warner, 2006b).

USEPA has been a generous funder of SAREP's Biologically Integrated Farming Systems program. USEPA staff recognized that it could achieve through voluntary partnership initiatives what was not possible through regulatory initiatives. In 1996, Congress passed the FQPA. It established a thorough review of pesticides and threatened to ban organophosphates, causing considerable anxiety among growers and agricultural organizations. The FQPA also provided funding for alternative pest-management approaches through the USEPA and the USDA, which have funded various partnership activities across the country seeking alternatives to hazardous pesticides. Ten of the 32 California partnerships were launched within two years of the FQPA's passage.

The California Department of Pesticide Regulation, located in the state's Environmental Protection Agency, initiated its own program, the Pest Management Alliance (PMA). It is the first and only state pesticide agency-initiated pest-management extension effort in the United States. Between 1998 and 2002, the DPR sponsored eight PMA grants that qualify as multi-year partnerships. The PMA partnerships are based on the public/private industry partnerships developed between the USEPA and manufacturers using USEPA's language of risk assessment and reduction.

These partnerships have had notable successes in some commodities and much less in others. Generally, perennial crop growers have taken advantage of partnership activities, more so than other growers (Warner, 2006a). Winegrape growers have organized six partnerships, the most of any commodity (Warner, in press). Significant reductions in FQPA-targeted pesticide use has occurred in every winegrape region where partnership activities have taken place. The almond industry has documented the greatest voluntary volume reduction of organophosphate use in California history. Pear growers reduced organophosphate use faster than any other commodity in the history of California agriculture (for an analysis of pesticide use reductions, see Warner, 2006b).

Washington State: listening and partnering

USEPA staff in the Seattle regional office identified the Columbia Plateau's agro-environmental problems during the mid 1990s. When they analyzed Washington State air, water, and land pollution—plus habitat loss—they discovered that agriculture was the least regulated source. During the Clinton Administration, the Seattle office of the USEPA secured funding for several community-based environmental protection initiatives, efforts to work cooperatively with local agencies and citizen groups to address environmental problems that are beyond the scope of typical regulatory devices (U.S. Environmental Protection Agency, 1997). This approach identifies geographic regions with environmental problems unaddressed by existing programs, and provides institutional support, coordination, and some funding, for local efforts.

Persuaded by data, the Seattle USEPA office created the Columbia Plateau Agricultural Initiative (CPAI) in 1997, drawing from existing agency staff. Chris Feise, then an extension specialist from the Pacific Northwest land-grant universities serving as a liaison to the agency, insisted that CPAI staff first conduct a listening tour of the farmers and agricultural institutions in the region. He had extensive experience with sustainable farming systems, but realized how much USEPA staff had to learn about agriculture if this initiative had any chance to bear fruit. Plans for the one-week tour included 30 meetings in five counties with more than 90 people. For several staff members, this was the first time ever seeing the Columbia Plateau or visiting a farming operation. They learned the importance of understanding the social institutions in agriculture. The listening tour heard an earful about the credibility problems of regulatory agencies. Farmers explained some of their fears: that the agency rendered decisions affecting the agricultural community without their input; that these regulations will drive them out of business and a way of life; and that costly efforts to improve their environmental practices will only be rewarded with more regulations. The growers convinced USEPA staff that the lack of communication between farmers and agency staff would jeopardize their credibility, as well as stable food production in the region.

The listening tour discovered that tremendous changes were taking place in Washington State agriculture, led by bright, educated, knowledgeable, and innovative people. The staff on tour were challenged by a group of local farmers to back up their stated goals by

funding progressive agricultural initiatives. A local network of farmers had developed a research plan for a demonstration project that was the most holistic approach to agro-environmental problems the staffers had seen. The CPAI team had known they were going to have to create new approaches to working with the rural communities, but it was surprised to discover how difficult it was to persuade its own USEPA colleagues of the merit of a constructive engagement with agriculture. They discovered how deeply entrenched a law enforcement approach was in the culture of their own agency. To succeed, the USEPA was going to have to understand much more about the structure, logic, and economics of agriculture—indeed the culture of agriculture.

Over the next several years, the Seattle office contributed more than \$600,000 to agroecologically informed research and extension, including pest management strategies, crop rotations, and water management. CPAI helped the USEPA learn that progress toward pollution-prevention goals in agriculture was possible. Despite feelings of ambivalence held by partnership participants, a recent analysis of the CPAI initiative determined that growers, the USEPA, and other public sector participants believe it was successful, and an important first step into a new way of thinking and engaging in community-based pollution-prevention initiatives (Feise and Lovrich, 2003). Both regulators and growers observed that the “listening tour” may have been the most significant component of their partnership because it laid the foundation for collaboration.

Conclusion: agency initiative in the absence of coherent policy

Several entrepreneurial approaches on the part of environmental agencies emerged in the 1990s as they began recognizing that traditional regulatory efforts did not adequately address agricultural pollution issues, especially non-point-source water pollution. Regional offices of the USEPA, plus the California EPA, provided funding, leadership, and technical assistance to agroecological partnership activities. These emerged as agency personnel sought more community-based, multi-disciplinary, and integrated approaches. Staff also recognized in a new way the importance of understanding the participatory social processes necessary to support voluntary environmental initiatives (Feise and Lovrich, 2003).

Agency personnel welcome the opportunity to be seen as playing a constructive role in the agricultural community, and agricultural organizations seize opportunities to represent

themselves to regulatory agencies as being environmentally responsible. Yet, the entry of regulatory agencies into extension activities provokes ambivalent feelings among both parties. Agency personnel have asserted the primary function of their agency is to enforce environmental laws, even as they provide to some organizations of growers who are essentially in violation of the Clean Water Act. Agricultural organizations welcome the funding regulatory agencies' dollars, but have had to reassure growers that they are not "negotiating with the enemy." USEPA staff generally perceive the partnership approach to have many limitations, but all the other tools presently in their regulatory toolbox have proven to be even less effective.

Recently the agency has concentrated its resources to support the development of economic incentives to reward growers through the marketplace for adopting suites of practices that partnerships have developed. Protected Harvest is a non-governmental organization that certifies local groups of growers who have developed standards for reducing pesticide impacts and making progress toward environmental goals. Their label accords legitimacy to some of the growers' groups who have sponsored partnerships and allows them to charge a premium price. This means that groups of participating growers are able to capture further benefits from their investment in learning about practices developed by agroecological partnerships. USEPA Region IX awarded Protected Harvest a \$425,000 grant in 2005 to develop standards for dairy, almonds, tomatoes, and stone fruit in California.

Protected Harvest provides a critical link between agroecological initiatives and the public, and it provides a service to society by allowing consumers to vote with their dollars. Some of the consuming public has lost trust in the American industrial food system, because the agricultural industry and policy makers have for too long failed to address its negative environmental and health impacts. Protected Harvest provides economic rewards for groups of entrepreneurial growers, and that is good. It helps environmentally conscious consumers to have confidence in the health and stewardship of some food products, which is also good. These achieve general agency goals for pollution prevention.

But from a policy analysis perspective, public agency support of Protected Harvest should be seen as insufficient to address the absence of coherent U.S. agro-environmental policy. USEPA actively supports groups of growers who want to undertake voluntary

change, but this does not address the environmental consequences of irresponsible growers, those uninterested in practicing stewardship. Anecdotal evidence suggests that a very small number of growers may be responsible for California agriculture's most serious pesticide problems, and market incentives for improved stewardship are unlikely to interest these growers. In California, regional water control boards are increasingly scrutinizing agricultural runoff, but it remains to be seen whether any actual enforcement action take place.

Congress has never provided proper direction or authorization for the USEPA to help agriculture achieve national water and air pollution prevention goals. This is a major impediment for the agency, resulting in one of the most glaring gaps in U.S. environmental protection policy. Agriculture does pose special problems for environmental regulation, but its environmental problems are serious and still not adequately addressed. Does the American public really wish to not regulate agro-environmental problems?

The regional agency initiatives described in this paper are remarkable for their creativity in the absence of legislative mandate. For a genuinely healthier relationship between food, farming, and society in the United States, we need a broad, vigorous debate about how policies can foster the kind of agriculture we want and the coherent environmental policy needed to support that. The USEPA should be given regulatory authority to foster healthy, resilient ecosystems, through its own initiatives and in partnering with the Department of Agriculture and other agencies.

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