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Extension Specialist Roles in Communities of Interest and Place: An Example from the Agriculture-Wildlife Interface

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Abstract: The role of land-grant university Extension specialist originates in a community of place, enters into communities of interest to leverage resources or partnership opportunities, and returns to the local level with more effective outcomes than possible by operating solely within the community of place. A case study describes synergistic specialist programming roles that moved Wisconsin farmers and communities of interest toward a common goal of protecting corn fields from sandhill crane damage. Outcomes reinforce the concept that specialists are most effective when they forge seamless relationships between communities of place and interest, as "honest brokers," to solve unique practical local problems.

Introduction

The threefold mission of the land-grant college and university system is research, teaching, and service. Reflection on mission and balance of professional effort has focused on Extension specialist roles and recognition within academic departments on campus (McGrath, 2006; McDowell, 2001).

On campus, specialists generate original research-based knowledge, as well as synthesize, evaluate, integrate, and apply research information from other sources in support of Extension programming (Radhakrishna, 2001). Specialist teaching and service roles are defined in McGrath's (2006) *The Scholarship of Application*. Extension activities become scholarship when specialists document the public benefits of Extension programs to clientele, when these activities are communicated to and validated by peers, and when they are communicated beyond the university (McGrath, 2006).

Public value is created when a service benefits society (Kalambokidis, 2004). A significant portion of specialist scholarship takes place off campus, as a representative of the land-grant mission in partnership with diverse stakeholders and interest groups addressing problems relevant to communities where universities and colleges are located (Kellogg Commission, 1999).

Communities of place are defined by where people live, work, and play, whereas communities of interest emanate from shared interests of their members and are not confined to one organization or geographic location (ECOP, 2002, p.3).

In their *Journal of Extension* commentary "Partnerships Evolve Over Time," Bender and Bull (2007) documented processes in which Extension partnerships with communities of place and interest form and reform, over time, to maintain consensus, political support, and financial resources vital to Extension's future. They focused on the significant role communities of interest and place play in Extension successfully acquiring resources to meet community needs.

This article provides a case study to introduce and illustrate the concept that Extension specialists play a signature role in both communities of place and interest, and that these roles are synergistic. Specialist faculty are uniquely positioned to meet needs by leveraging what the Extension Committee on Organization and Policy (2002, p.3) described as the "seemingly endless array of possibilities offered by communities of interest."

Concepts

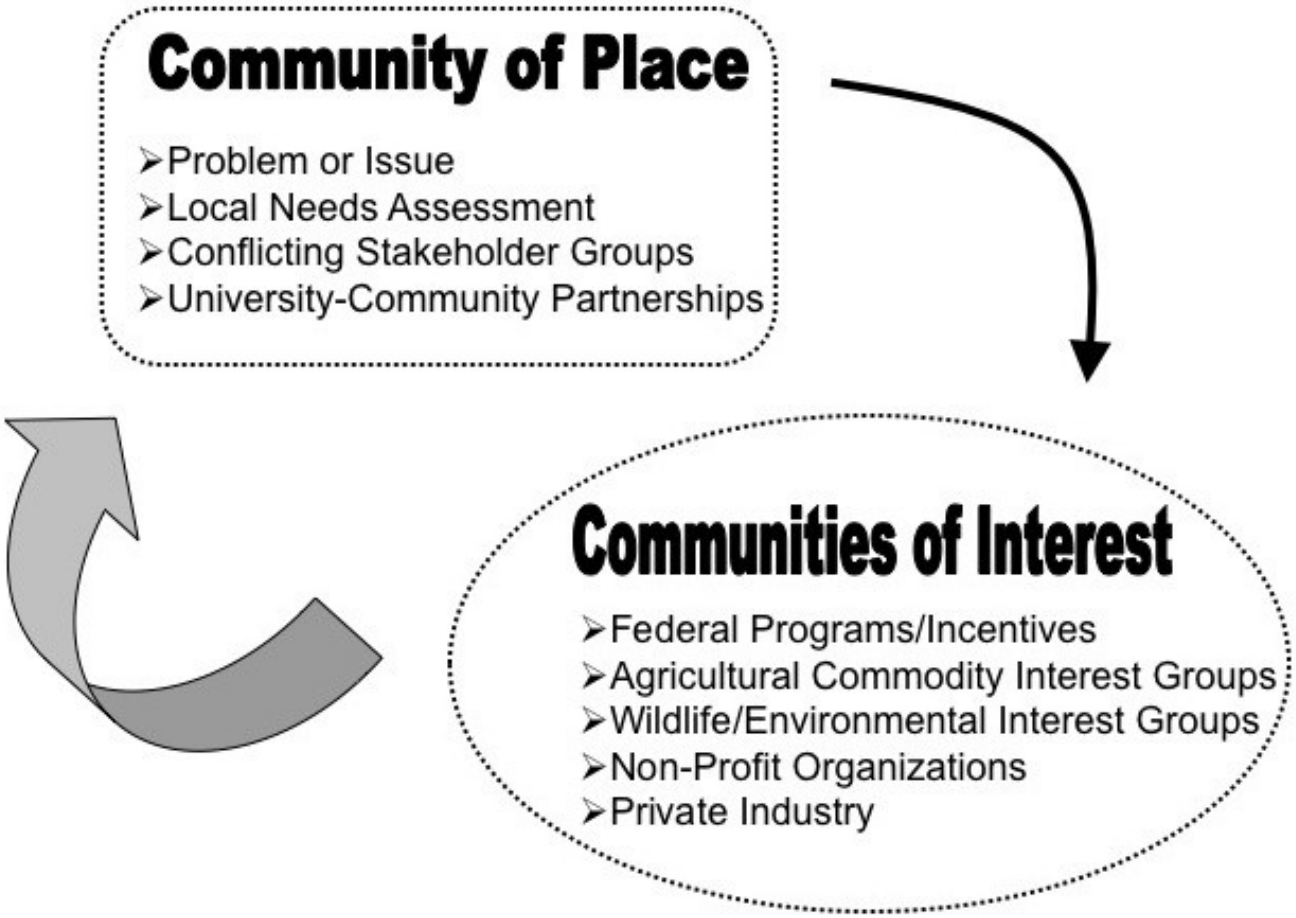
The following three concepts provide a framework to characterize Extension specialist faculty roles spanning communities of place and interest:

- Specialist faculty focus a significant portion of outreach and engagement efforts on communities of interest that can influence local conditions, thereby delivering outcomes that a community of place may not otherwise have access to (Figure 1).

- Extension specialists play the role of "honest broker" (Orbach, 2001) within and between communities of place and interest. Specialists are unbiased partners providing research-based information and working toward a common goal with various sectors of society.

- Because many practical problems are unique, there are often no hypotheses to test in outreach and engagement scholarship—only a problem to solve (McDowell, 2003).

Figure 1.
Extension Specialist Roles (Arrows) Function Between Communities of Place and Interest



An Example from the Agriculture-Wildlife Interface

The Setting

Greater sandhill cranes (*Grus canadensis tabida*) arrive in Wisconsin by early spring, flying north from southern U.S. overwintering locations. In the 1930s, it was estimated that only 25 pairs of sandhill cranes could be found in Wisconsin (Henika, 1936). Conservation efforts—hunting prohibition and wetland protection—helped this population of Greater sandhill cranes recover. Populations increased steadily and expanded in range to include all of Wisconsin, with the highest populations in eight south central and west central counties (Su et al., 2004).

While the rebound in sandhill crane populations is a wildlife preservation success story, it led to an increase in wildlife damage to agriculture. Cranes eat newly planted corn seeds that occur in straight rows at predictable intervals. Corn is most vulnerable from planting to about 2 weeks after seedlings emerge. Damage can be extensive and costly, requiring farmers to replant entire fields in heavily affected areas.

At least 3.7 million acres of corn are planted for grain and silage in Wisconsin in a typical year (USDA NASS, 2007). Approximately 2.8 million of these acres are farm fields within 1 mile of an emergent wet meadow, the roosting habitat for sandhill cranes. Because crane habitat includes a mix of public lands and private farm fields, this creates potential for conflict between agriculture and wildlife preservation interests.

The Local Need

Historically, this conflict was kept largely at bay by a coincidental relationship between the organochlorine insecticide lindane and sandhill cranes. Lindane was first registered by the U.S. Environmental Protection Agency (US EPA) under the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) in the 1940's. For decades, it was used by farmers as a corn seed treatment to protect newly planted kernels and seedlings from feeding damage by soil insect pests such as seed corn maggot (*Delia platura*).

Over the years, Wisconsin farmers observed corn fields that had received lindane insecticide seed treatment sustained less damage from sandhill crane depredation than untreated corn fields. Indeed, avian dietary studies suggest that birds are repelled by lindane-treated corn seed (US EPA, 2002).

From an insect pest management perspective, the 1996 Food Quality Protection Act (FQPA) led to US EPA FIFRA registration of reduced-risk insecticides (US EPA 1999). Alternative pesticides were developed with lower mammalian toxicity (i.e., human safety) than older products such as lindane, which is internationally recognized as a toxic, environmentally persistent, and bio-accumulative pesticide (Morello, 2006).

US EPA registration of lindane as a corn seed treatment remained in effect for 10 years after passage of the FQPA. However, its market share declined as newer insecticides from the neonicotinoid chemical class became more widely used in Wisconsin and throughout the Corn Belt. Neonicotinoid insecticides protect corn seeds from early season soil insect pests, but do not have a coincidental repellent effect on cranes.

In 2003, Wisconsin farmers began to approach the University of Wisconsin, Madison Entomology Department field crops Extension entomologist to report that they were no longer able to find lindane at agricultural supply retailers in Wisconsin. They noted a concurrent increase in crane damage to corn as seed was no longer treated with lindane insecticide. On August 2, 2006, US EPA announced cancellation of corn seed treatment registration of lindane (US EPA 2006).

Extension is often the first source farmers turn to for assistance with wildlife depredation to agricultural crops (Drake & Grande, 2002). Because of the historical relationship between lindane corn seed insecticide and sandhill cranes, Wisconsin farmers and UW Extension county agents were now seeking wildlife management help from UW Madison Extension entomology.

Communities of Interest

Wisconsin farmers with fields in proximity to sandhill crane spring/summer habitat constituted the community of place.

Some farmers expressed frustration at the hunting prohibition on cranes in Wisconsin and resulting lack of hunting license revenue for counties to support crop damage compensation claims by this wildlife species (Cullen, personal communication). Physical crane deterrents such as propane cannons or other pyrotechniques, dummies, and reflective flagging are ineffective controls since cranes rapidly habituate to "scare" methods (Sudgen, Clarke, Woodsworth, & Greenwod, 1988).

After identifying a local need, the UW Madison Extension field crops entomology specialist explored the issue further and concluded that this need could not be addressed by specialist and farmers alone, acting within the bounds of community of place. The Extension specialist was uniquely positioned to leverage opportunities at the agriculture-wildlife interface by partnering with various communities of interest (Table 1) to solve a practical problem and mitigate potential conflict in a community of place.

Table 1.
Communities of Interest Addressing Issue of Sandhill Crane Damage to Corn in Wisconsin

Community of Interest (COI)	**Organizational Structure/Mission**	**COI Interest in WI Corn Crop Damage by Cranes**
International Crane Foundation	Non-profit organization dedicated to preservation of crane species and their habitat[1].	Crane conservation. Involve private land-owners. Seek solutions other than hunting that address farmer needs while protecting cranes.
Arkion Life Sciences, LLC	Private industry. Development and sale of biological pesticides for non-toxic bird management[2].	Manufacture and sale of anthraquinone (AQ), a non-toxic biopesticide for bird management.
WI Department of Agriculture Trade & Consumer Protection, Special Pesticide Registrations	State agency program to quickly register pesticides in response to special local need or emergency[3].	Responsive to WI agriculture need for an alternative crane repellent corn seed treatment. Can make formal request to EPA for federal approval of special pesticide registration (e.g., AQ on corn in WI).
U.S. Environmental Protection Agency, Office of Pesticide Programs	Federal agency that registers pesticides for use in the U.S under FIFRA. Approval or denial of state special local need or emergency pesticide registration requests[4].	Evaluates state requests for special pesticide registration. Focus on the corn-crane crop/pest combination, pesticide safety data, and proof of emergency need.
The IR-4 Project, Biopesticide Program	USDA & State Agricultural Experiment Stations (SAES) Interregional Research Project 4. Publicly funded research program develops data to support and expedite regulatory clearance of reduced-risk pest control products for specialty and minor crop growers[5].	Interested in supporting field and laboratory trials to expedite EPA registration of a biopesticide alternative to lindane to manage crop damage by a threatened wildlife species. Recognized corn seed protection from crane damage as a minor use.

[1]International Crane Foundation (Baraboo, WI) http://www.savingcranes.org/
[2]Arkion Life Sciences, LLC (Wilmington, DE) http://www.arkionls.com/index.htm
[3]Wisconsin Dept. of Agriculture, Trade & Consumer Protection, Special Pesticide Registrations (Madison, WI)
http://datcp.state.wi.us/arm/agriculture/pest-fert/pesticides/special.jsp
[4]U.S. EPA, Office of Pesticide Programs (Washington, DC)
http://www.epa.gov/pesticides/about/aboutus.htm
[5]The IR-4 Project (IR-4 Headquarters: Rutgers, The State University of New Jersey)

http://ir4.rutgers.edu/index.html

The Process

Headquartered in Baraboo, Wisconsin, within a farming community, the International Crane Foundation (ICF) was well aware of the effect that dwindling lindane corn seed insecticide supply was having on farmer awareness and perceptions of sandhill cranes.

ICF led the way in finding alternatives to lindane to protect newly planted corn seeds and seedlings from crane feeding. In 2000 and 2001, ICF field ecologists conducted replicated field studies evaluating several naturally occurring plant-derived biopesticides as corn seed treatments to repel sandhill cranes. One compound, anthraquinone (AQ), repelled cranes from treated corn seeds and reduced crane herbivory as effectively as lindane.

AQ is found in plants and recognized as an avian feeding deterrent (Izhaki, 2002). This aromatic compound has been produced synthetically and received US EPA FIFRA Section 3 pesticide registration as a deterrent to geese on turf and in other non-agricultural settings (Dolbeer, Seamans, Blackwell, & Belant, 1998). ICF field trials showed that, as with lindane, cranes would sample AQ-treated corn and then stop feeding on corn seeds and shoots. Cranes remain in the field where they forage on waste grain and insect larvae and adults, but corn is taken "off the menu" (J. Barzen, ICF, personal communication).

Beginning in fall 2003, Wisconsin farmers were asking their UW Madison field crops entomology Extension specialist for information on declining market availability of lindane insecticide. Over the next year, farmers asked their Extension specialist for help to achieve one or both of the following outcomes:

1. Determine a manufacturer source of lindane nationally and help move more lindane into Wisconsin for corn seed treatment.

2. Provide research-based information on alternative corn seed treatments that would protect corn from crane feeding, and gain new registration of an alternative seed treatment for use in Wisconsin as soon as possible.

The first farmer request would have required the Extension specialist to communicate market need to pesticide manufacturers to increase lindane production and distribution for corn seed treatment. However, this would not be a sound integrated pest management (IPM) recommendation within the entomology discipline. While corn was a labeled use site for lindane seed treatment until August 2006, sandhill cranes were not a labeled target pest. Any effort to increase lindane availability in Wisconsin between 2003 and 2006 would need to be under an Extension recommendation for soil insect pest management.

With effective reduced-risk neonicotinoid insecticide seed treatments widely available for early season corn insect pests, a lindane recommendation would have sent a contradictory message to farmers, particularly those who do not experience crane damage on their farms. Moreover, crane damage occurs primarily in ecologically sensitive areas that are within 1 mile of emergent wetlands, and application of a persistent organochlorine insecticide like lindane (Walker, Vallero, & Lewis, 1999), in close proximity to such habitat poses unnecessary risks of exposure to aquatic organisms.

In spring 2005, ICF asked the UW Madison entomology Extension specialist to join them in approaching the Wisconsin Department of Agriculture Trade and Consumer Protection (WI DATCP) Special Pesticide

Registrations program (Table 1) to seek authorization from U.S. EPA for AQ use on corn seed in Wisconsin.

Arkion Life Sciences, LLC, a private company specializing in the manufacture and application of biopesticides and non-toxic bird management services assisted ICF with 2000-2001 field research trials of AQ on corn seed as an effective crane repellent. AQ was already being manufactured and sold nationally by Arkion Life Sciences, under a FIFRA Section 3 registration, in non-agricultural settings (Dolbeer et al., 1998), but never before as a food-use on an agricultural crop.

US EPA FIFRA Section 18 special pesticide registrations provide time-limited exemptions from full FIFRA Section 3 registration requirements. They are issued by EPA as emergency or crisis exemptions. Before granting a Section 18, EPA requires data that proves the pest or economic emergency is genuine, that there are no alternative pest management options available—and that there are, or will be, serious efforts to obtain a Section 3 registration for the proposed use (Insider eJournal, 2006).

With a previous Section 3 registration for non-food use and ICF field research efficacy data in an agricultural setting, AQ was a candidate for US EPA Section 18 special registration on corn in Wisconsin. However, in 2004, prior to programming steps by the UW Madison field crops entomology Extension specialist described below, EPA had denied a WI DATCP Section 18 application for AQ on corn seed. In part, the EPA ruling was based on the perception that Wisconsin farmers had access to lindane insecticide, which provided coincidental protection of corn from crane damage.

Ultimately, for AQ to receive a food-use Section 18 on corn (and eventually a full Section 3 FIFRA registration), data from laboratory and field residue studies would need to be presented to US EPA's Office of Pesticide Programs. The USDA IR-4 Project works with land-grant universities to support such studies, financially and technically. The goal of USDA IR-4 is to expedite EPA registration of reduced-risk pest control products for specialty and minor crop growers and minor uses on a major crop such as field corn (Table 1). It was clear that AQ is not harmful to birds. However, the EPA Office of Pesticide Programs required field and laboratory residue analyses to prove that AQ is not absorbed into shoots of growing corn plants or kernels at harvest.

Programming Steps

Wisconsin farmers and the International Crane Foundation had simultaneous interest in gaining access to a new corn seed treatment in Wisconsin. Each group had different motivations, crop protection and wildlife conservation, respectively. In addition, three different state and federal agencies (WI DATCP, US EPA, USDA IR-4) and one private company (Arkion Life Sciences) were potential land-grant university partners in this process.

A unified programming approach by the entomology Extension specialist fostered interaction between communities of interest to move toward a common goal of protecting newly planted corn fields in Wisconsin.

For example, the Extension specialist provided expert opinion to WI DATCP and US EPA on the emergency situation in Wisconsin of increasing corn crop depredation by sandhill cranes and lack of effective bird control measures. The specialist's September 2005 telephone survey of 12 agricultural supply companies and pesticide manufacturers in Wisconsin, regionally and nationally, proved a decrease in lindane distribution in the U.S. prior to its cancellation in 2006. Importantly, the specialist articulated the connection between changes in farmer insecticide use in corn for soil insect pests and resulting increase in sandhill crane depredation of corn seeds and young plants.

Based on the specialist's input communicated through teleconferences and written correspondence, WI DATCP re-submitted an application for a Section 18 emergency exemption to EPA for AQ, co-authored by the Extension

specialist. In December 2005, U.S. EPA granted this authorization under the trade name Avipel® (previously sold as Avitec®) for corn seed treatment in Wisconsin, Michigan, and Minnesota for the 2006-2009 growing seasons. In addition, the specialist wrote a 2006 proposal to the USDA IR-4 Project and secured IR-4 funding for AQ field residue trials on corn at land-grant universities in Wisconsin, North Dakota, Ohio, Michigan, and New York. Data from these trials will assist Arkion Life Sciences with obtaining a permanent US EPA registration and label.

Through Extension meeting presentations, newsletter articles, and media interviews by the Extension specialist between 2006 and 2008, more than 1,500 Wisconsin farmers increased their capacity to respond to sandhill crane depredation. In 2006, over 15,000 packets of Avipel® powder were sold in Wisconsin, with treatment potential of almost 40,000 acres. Sales corresponded to areas of dense sandhill crane concentration.

Specialist outreach and engagement programming steps included:

- **Held a teleconference "summit"** (June 2005) **between WI DATCP, UW Extension specialist, ICF, US EPA, and Arkion Life Sciences.** Objective to foster communication between communities of interest, identify information gaps, and agree to a process of working toward AQ special registration on corn in Wisconsin.

- **Conducted a telephone survey of 12 agricultural supply companies and pesticide manufacturers** (September 2005). Objective to provide information to US EPA about a decrease in lindane production and distribution. (Although registered until August 2006, farmers could not readily obtain lindane for several years preceding EPA cancellation as a corn seed treatment due to lack of product distribution in the U.S.).

- **Petitioned USDA IR-4 to include AQ corn seed treatment in IR-4 supported field and laboratory residue studies for food use registration.** (October 2005).

- **Co-authored a Section 18 specific exemption with WI DATCP for special registration of AQ seed treatment on field and sweet corn to prevent damage from Sandhill cranes in Wisconsin.** (December 2005).

- **Held a roundtable at 2007 Wisconsin Corn Soy Expo that engaged and educated farmers about the use of AQ as an alternative corn seed treatment.**

- **Conducted three field residue studies of AQ corn seed treatment for field and sweet corn in Wisconsin (UW Madison Entomology) under USDA IR-4 program protocols.**

Outcomes and Implications for Extension

Major outcomes in this case study include the following.

- IR-4 accepted specialist's petition to implement field residue studies necessary to support a Section 3 registration for 9,10 anthraquinone on corn seed. Test plots were evaluated in Wisconsin, Michigan, New York, North Dakota, and Ohio in 2006 and 2007.

- US EPA has granted a Section 18 emergency exemption authorization each year since 2006, which allows use of 9,10 anthraquinone (Avipel®) on field and sweet corn seed in Wisconsin. Similarly, Minnesota, Michigan, and Texas have received a Section 18 authorization for this use. A section 3 national registration with EPA for this use is anticipated for the 2011 season.

- Extension specialist successfully leveraged opportunities in communities of interest to achieve timely registration of a reduced-risk alternative to lindane for corn seed protection from crane feeding in Wisconsin.

This case study illustrates how one Extension specialist applied the concepts introduced in this article to address an agriculture-wildlife interface issue in a community of place. Engagement efforts were expanded to seek opportunities in communities of interest, partner as "honest broker" with diverse stakeholders (farmers, state and federal government agencies, and wildlife conservationists), and integrate agricultural field research to solve a unique practical problem.

What are the implications of concepts featured in this article for a wide audience of Extension professionals?

Specialist faculty operate initially from a community of place in which their land-grant college or university campus is located. Informal or formal needs assessment occurs, and university-community partnerships are formed to develop relevant Extension programs. Extension specialists are most effective when they forge seamless relationships between communities of place and interest to address local needs.

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