A Needs Assessment of Aquaculture Extension Agents, Specialists, and Program Administrators in Extension Programming

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Abstract: The study reported here identified continuing education and training needs of aquaculture Extension agents, specialists, and program administrators in 10 competency areas relating to the need for continuing education or training. Fourteen resources on the AquaNIC Web site were also evaluated, as was the efficacy of the AQUA-EXT listserv. Data were collected with an online survey via http://www.survey.vt.edu/. While a majority of Extension professionals and program administrators did not require significant training to accomplish their work, most agreed on the importance of continuing education in program evaluation, information technologies, and human development. This need varied by identified population demographics.

Introduction

Aquaculture is defined as the culture of aquatic organisms under controlled or semi-controlled conditions (Stickney, 1996). According to the Food and Agricultural Organization of the United Nations (FAO, 2003), total world fishery production in 2002 was 133 million tons, of which 41.9 million tons came from aquaculture. In the United States (U.S.), average per capita consumption of seafood rose to a record 16.3 pounds of fish and shellfish per person in 2003 ("Seafood consumption," 2004). However, due to many inherent aquaculture production issues in the U.S., much of this seafood is cultured overseas and imported. This contributes to a national seafood trade deficit in excess of $7 billion annually (National Marine Fisheries Service, 2004), the largest trade deficit for any agricultural commodity (U.S. Department of Agriculture/Agricultural Research Service Aquaculture Action Plan, 2003).

To decrease this trade deficit, reduce our reliance upon imported foods, improve food biosecurity, and provide new employment opportunities, governmental entities in the Department of Commerce such as the

National Oceanic and Atmospheric Administration (NOAA), the U.S. Department of Agriculture (USDA), and Sea Grant are collaborating to enhance the viability of U.S. aquaculture. According to Swann and Morris (2001), outreach education via the Cooperative Extension Service (which is linked to the USDA) is a core component of an economically and environmentally sound aquaculture industry in the U.S.

To assist with aquaculture Extension programming at the local level, in many states aquaculture Extension agents team with aquaculture Extension specialists and educators who have strong subject matter experience and interact on a more frequent basis through home department affiliations in their institutions and directly with university researchers. These specialists establish the indirect linkage of Extension between clientele and land-grant university-based research and appropriately interpret needs and disseminate information (Taylor & Summerhill, 1994).

Compared with other American agricultural commodity groups, aquaculture production did not come into prominence until the 1960s (Stickney, 1996). Thus many issues related to the needs of clientele, as well as those of aquaculture Extension professionals and program administrators, are not well known. To better understand these relationships, the USDA and Cooperative State Research Education and Extension Service (CSREES) conducted a national survey of Extension and Sea Grant Extension professionals in 2003 (Jensen, Murray, & Mayeaux, 2005). The questionnaire for the study was broad-based and solicited information in the following areas: position, career, professional growth and development, Extension, information and technology, research, regional and multi-state, national, international, clientele, accomplishment reporting, extramural funding, and future and emerging issues (Jensen & Murray, 2003). This initial survey provided an effective baseline from which to begin more in-depth studies regarding the needs of Extension professionals and program administrators in developing effective programming.

Purpose

Given the relative newness of aquaculture as an industry (Stickney, 1996), the complexity of issues limiting further expansion of aquaculture production in the U.S. and the significant challenges facing aquaculture Extension programming, identification of continuing education and training needs of aquaculture Extension professionals and program administrators is of paramount concern. To develop an economically and environmentally sound aquaculture industry, Extension and Sea Grant are increasingly under pressure to enhance program efficiency, productivity, and accountability. There is often no quicker way to speed technology transfer than through the Web.

The Aquaculture Network Information Center (AquaNIC) was implemented at Purdue University as one of the nation's first aquaculture network information centers. In addition, modern reliance upon computers and electronic media emphasizes identification of information technology (IT) training needs for this group (Swann & Morris, 2001). As such, identifying the training needs of aquaculture Extension professionals and administrators, the applicability of the AquaNIC Web site to addressing the needs of this population, and correlating these needs to population demographics was evaluated.

Research Objectives

The specific objectives of this study were as follows.

Objective One

To identify continuing education and training needs of aquaculture Extension professionals and program administrators in 10 identified competency areas, as well as to rank relative importance of each. General

competency areas were identified in the 1968 National Policy Statement on Staff Training and Development. They were used in a North Carolina Extension study examining the training needs of Area Specialized Agents (Gibson & Hillison, 1994).

- Extension organization and administration;

- Program planning, development, and implementation;

- Communication;

- Research;

- Human development;

- Educational process;

- Social systems; and

- Effective thinking;

In the study reported here, competency areas were expanded to include program evaluation and IT.

Objective Two

To determine electronic information resources presently utilized by aquaculture Extension professionals and program administrators within the AquaNIC Web site and identify those that need to be improved upon to enhance Web site utility to this population.

Objective Three

To identify demographics of Extension professionals and program administrators within the AQUA-EXT listserv, and how these may relate to individual education and training needs.

Methods and Procedures

Population

The population was the CSREES mail group listserv entitled AQUA-EXT (N = 223). AQUA-EXT is a closed electronic mail group of individuals with aquaculture interests and Extension appointments within Extension and Sea Grant programs across the U.S. and its territories. AQUA-EXT is operated and managed by CSREES. The use of these email addresses was granted and provided by Dr. Gary Jensen, National Program Leader for Aquaculture, USDA CSREES.

Instrumentation

The survey was conducted online via http://www.survey.vt.edu/. Each individual at the onset of the survey identified him- or herself by email address. This email address was used to identify those who submitted and those who did not submit the online questionnaire. This allowed discernment between respondents and non-respondents (Gregg & Irani, 2004; O'Neill, 2004). Once identified, non-respondents were followed up with additional email prompts and, as needed, subsequent telephone calls (Dillman, 2000; Ilieva, Baron, & Healey, 2002).

For the instrument, sample error was minimized via utilization of the entire population contained within the AQUA-EXT mail group. Because the entire population of the listserv was utilized and we electronically contacted a population that was identified via utilization of this electronic medium, coverage error was also addressed.

The instrument was validated via application in previous studies and through pilot testing with Extension personnel from Virginia Tech as well as members of the National Aquaculture Extension Steering Committee. The non-response error was addressed via identification of individuals not completing the electronic survey and follow-up with additional email reminders, as well as subsequent telephone calls as necessary. Reliability for this instrument was determined by conducting a pilot test of this instrument with non-aquaculture Extension agents, specialists, and faculty at Virginia Tech, as well as members of the USDA/NOAA National Aquaculture Extension Steering Committee. Reliability was evaluated via Cronbach's Alpha for the part of the survey relating to the 10 competency areas, and was calculated at 0.95 utilizing the Statistical Package for Social Sciences (SPSS).

Objectives

Objective One

Perceived relative importance and continuing education and training needs of aquaculture Extension agents, specialists, and program administrators for the 10 competency areas were identified utilizing a self-rating interval scale of one through four, and were determined via means and ranking.

Objective Two

Utilization of electronic resources on the AquaNIC Web site was evaluated with an interval scale of one through five, with one representing "never use," followed sequentially with "once or twice a year," "approximately once every 3 or 4 months," "approximately once a month," and "more than once a month." AquaNIC resources requiring enhancement were identified via open-ended questions, with results grouped into similar categories and reported as percentages

Objective Three

Selected demographics for the AQUA-EXT listserv were age, highest level of education attained, and years of work experience both in their present position as well as in the field. Analysis of Variance determined statistical differences in means of self-rated skills identified in Objective One with demographic categorization as independent variables. Tukey's HSD was then utilized for comparison of means.

Results and Findings

Out of a population of 223 listserv members, 174 useable responses were collected, generating a final response rate of 78%. Out of 174 responders, 44 (25%) identified themselves as Extension agents, 70 (40%) as specialists, 27 (15%) as program administrators, and 33 (19%) as "other." The "other" group was comprised of individuals outside the aforementioned three profession areas, or without a greater than 49% extension effort or appointment, and were excluded from further analysis.

Objective One

Within the 10 competency areas, only IT received a mean perceived-relative-importance score lower than 2.5 (Table 1).

Table 1.
Perceived Relative Importance of Competency Areas to Aquaculture-Extension Professionals (1=little to no importance, 2 = moderate importance, 3=important, and 4 = very important)

Competency Area	Extension Agent (n=44)			Extension Specialist (n=70)			Program Administrator (n=27)		
	Mean	SD	Rank	Mean	SD	Rank	Mean	SD	Rank
Prog/Plan/Dev/Imp	3.32	.50	1	3.26	.44	1	3.29	.73	1
Human Development	2.95	.68	2	2.80	.61	8	3.03	.74	3
Social Systems	2.87	.75	3	2.83	.61	7	2.75	.69	8.5
Program Evaluation	2.86	.67	4	2.87	.58	5.5	2.88	.79	6
Educational Process	2.85	.71	5	3.03	.63	3	3.09	.67	2
Communication	2.82	.46	6	2.87	.47	5.5	2.86	.66	7
Effective Thinking	2.80	.82	7	3.01	.69	4	3.01	.69	4
Ext/Org/Admin	2.78	.64	8	2.74	.60	10	2.75	.75	8.5
Research	2.73	.61	9	3.08	.55	2	2.98	.77	5
Information Technologies	2.42	.63	10	2.77	.57	9	2.46	.77	10

Regarding continuing education and training, no competency area received a mean score greater than 2.5 (Table 2). However, the competency area of program evaluation was the highest ranked need for both specialists and program administrators and the second highest by Extension agents. Extension agents ranked IT as the greatest continuing education and training need.

Table 2.
Perceived Need for Continuing Education and Training in Competency Areas by Aquaculture-Extension

Professionals (1=little to no importance, 2 = moderate importance, 3=important, and 4 = very important)

	Extension Agent (n=44)			Extension Specialist (n=70)			Program Administrator (n=27)		
Competency Area	**Mean**	**SD**	**Rank**	**Mean**	**SD**	**Rank**	**Mean**	**SD**	**Rank**
Information Technologies	2.17	.74	1	2.16	.82	3	2.13	.79	6
Program Evaluation	2.04	.76	2	2.35	.69	1	2.37	.80	1
Human Development	2.01	.74	3	2.16	.72	3	2.33	.80	2
Research	1.95	.68	4	2.11	.79	5.5	1.99	.72	8
Educational process	1.91	.66	5	2.11	.67	5.5	2.17	.63	4
Communication	1.90	.57	6	2.09	.62	7	2.15	.66	5
Prog/Plan/Dev/Imp	1.90	.64	7	2.06	.73	8	2.20	.94	3
Effective Thinking	1.80	.72	8	2.16	.82	3	2.12	.79	7
Social Systems	1.79	.58	9	1.92	.69	9.9	1.95	.66	9
Ext/Org/Admin	1.68	.56	10	1.92	.68	9.9	1.82	.66	10

Individual analysis of the 10 competency areas provided more insight. As a general trend, individual competency-area subcomponents received higher mean scores in perceived importance than the need for continuing education and training.

Extension Organization and Administration

Seven of nine subcomponents of Extension organization and administration received mean scores above 2.5 in perceived relative importance, whereas every subcomponent of Extension organization and administration was given a mean score below 2.5 for continuing education and training. Within this competency area, National Extension policy and how it is formulated was ranked the highest by both Extension agents and program administrators.

Program Planning, Development, and Implementation

For each subcomponent of this competency, program administrators identified a greater need for continuing education and training than did either Extension agents or specialists. Program evaluation was rated relatively high across all subcomponent areas, with the greatest needs in continuing education and training expressed by specialists and program administrators. Extension agents and specialists ranked the interaction of research and Extension in Extension programming highest, while program administrators identified understanding situation analysis as the greatest need.

Program Evaluation

Extension agents identified continuing education and training in understanding Extension education evaluation study design as the most important need. Specialists needed education and training most in Extension program evaluation, and program administrators in correlating program results and program accountability.

Communication

Both Extension agents and specialists requested continuing education and training in conducting Web-based education programming. Program administrators identified the ability to interact effectively with the media as the greatest need.

Research

Extension agents and specialists identified knowledge of procedures for applying research results to clientele as most necessary for continuing education and training. Program administrators identified the ability to conduct surveys as a need?.

Human Development

Extension agents, specialists, and program administrators alike identified the development of leadership abilities as most necessary for continuing education and training.

Educational Processes

Extension agents identified knowledge of principles and procedures in teaching adults as most needed for continuing education and training. Specialists and program administrators alike identified how people are motivated as their greatest continuing education and training need.

Social Systems

Extension agents and specialists identified understanding the interactions of individuals within groups as their greatest continuing education and training need. Specialists ranked this component equally with understanding the functions of agricultural organizations.

Effective Thinking

Extension agents identified understanding of problem-solving methods as their greatest continuing education and training need. Specialists and program administrators alike rated knowledge of techniques for developing effective thinking in Extension groups as their greatest continuing education and training need.

Information Technology

Extension agents identified the knowledge and use of publishing software to generate Extension reports as their greatest continuing education and training need. Both specialists and program administrators alike identified implementing computer-based Extension as their greatest continuing education and training need.

Objective Two

Fifty-two percent of Extension agents, 71% of specialists, and 81% of program administrators reported having used AquaNIC. However, the average number of times individuals accessed specific AquaNIC resource areas was less than once every three to four months. The AquaNIC resource with the highest access rates by all three groups was publications. Species information had the second-highest access rate by each group.

Objective Three

The largest percentage of each professional group fell into the "50â— 59"-year age group. Fifty-nine percent of Extension agents had Master's degrees. The majority of specialists and program administrators, 63% and 72% respectively, had earned doctoral degrees. The mean number of years Extension agents had held their present employment positions was 13.4. Specialists and program administrators had spent means of 13.2 and 8.41 years, respectively, in their present positions.

The last demographic evaluated was the total number of years in either Extension or Sea Grant. Extension agents had spent a mean of 16.6 years in service to one or the other. For specialists and program administrators, the means of total years in either Extension or Sea Grant were 16.1 and 15.5, respectively.

From these demographics, the typical profession profiles generated for the AQUA-EXT population were:

1. The majority of aquaculture Extension agents are 50 â— 59 years of age, have a Master's degree, have been in their present position for 13 years, and in Extension or Sea Grant for a total of 16 years;

2. Likewise, most aquaculture Extension specialists are also in the 50 â— 59 year age bracket, have been in their present position for 13 years, and in Extension or Sea Grant for a total of 16 years; and

3. Typical aquaculture Extension program administrators are 50 â— 59 years old and have a doctorate degree; however, they have only been in their present position for 8 years, and in either Extension or Sea Grant for a total of 15 years.

No significance difference (P<0.05) was obtained regarding how these demographics related to individual continuing education and training needs.

Conclusions and Recommendations

All professional areas identified need for continuing education and training in program evaluation, despite a lower ranking by all groups with regard to perceived importance. This is likely due to the perceived greater importance of the program planning, development, and implementation, as well as human development competencies on a day-to-day programming basis when compared with program evaluation. However, with recent trends of increasing emphasis on program accountability, the program evaluation competency has risen to the top with regard to perceived need for additional education.

In addition, all professional groups identified IT as among the lowest ranked competency area with regard to perceived importance, but among the highest competency area regarding perceived need for continuing education and training. This may be indicative of new trends that are yet to be recognized as important, but

already identifiable as components that all profession areas perceive as beneficial. Specific continuing education and training needs identified by AQUA-EXT were:

- Evaluation in Extension programming;

- Knowledge of correlation between program results and program accountability;

- Correlation between program results and accountability;

- Web-based education programming;

- Effective interaction with the media;

- Development of leadership abilities;

- Use of publishing software for generating Extension reports;

- Implementation of computer-based Extension programming;

Regarding the AquaNIC Web site, greater than 50% never used most resource areas, and such use was infrequent. Recommendations provided by respondents to enhance Web site utility were to update it, be more comprehensive and timely, and incorporate in-depth materials in all resource areas. Specific recommendations were identified for individual resource areas of the AquaNIC Web site:

- Discussion groups: knowledgeable oversight;

- Species: more species-specific information;

- Job services: structural hierarchy, as well as an email service to notify subscribers when new positions are posted;

- Contacts: greater Extension personnel representation;

- Publications: keyword search;

- Media: searchable database;

- Educators: youth-education section;

- Classified ads: categorization of posting;

- Online resources: greater linkage to other online materials;

Given the relatively high level of education in the AQUA-EXT population, this continuing education may likely be conducted effectively with a variety of media at an accelerated instructional pace. National meetings such as the annual World Aquaculture Society Aquaculture America meeting and the National Aquaculture Extension Conference that occur every few years may serve as excellent opportunities to engage these aquaculture Extension populations for education and training opportunities. If AquaNIC is to serve as a viable information resource for Extension agents, specialists, and program administrators, then a significant increase in focus, effort, and funding will likely be required to accomplish this goal.

References

Cooperative State Research, Education, and Extension Service. (CSREES). (2004). *Introduction to Extension.* Retrieved December 3, 2004 from: http://www.csrees.usda.gov/qlinks/extension.html

Dillman, D. A. (2000). *Mail and Internet surveys, The tailored design method* (2nd ed.). New York: John Wiley & Sons.

Food and Agricultural Organization of the United Nations. (2003). FISHSTAT plus.

Retrieved March 23, 2005 from: http://www.fao.org/fi/statist/FISOFT/FISHPLUS.asp

Gibson, J. D. (1992). *Training needs of area specialized Extension agents in the North Caroline Cooperative Extension Service*. Unpublished doctoral dissertation, Virginia Tech, Blacksburg.

Gibson, J. D., & Hillison, J. (1994). Training needs of area specialized Extension agents. *Journal of Extension* [On-line], 32(3) Article 3FEA3. Available at: http://www.joe.org/joe/1994october/a3.php

Gregg, J. A., & Irani, T. A. (2004). Use of information technology by county Extension agents of the Florida Cooperative Extension Service. *Journal of Extension* [On-line], 42(3) Article 3RIB2. Available at: http://www.joe.org/joe/2004june/rb2.php

Ilieva, J., Baron, S., & Healey, N. M. (2002). Online surveys in marketing research: Pros and cons. *International Journal of Market Research*, 44(3), 361-382.

Jensen, G., & Murray, J. (2003). *National Extension questionnaire: Aquaculture and related disciplines*. Unpublished.

Jensen, G., Murray, J., & Mayeaux, M. (2005). *Highlights and assessment of joint USDA/NOAA national aquaculture Extension questionnaire*. Proceedings of the World Aquaculture Society — Aquaculture America, New Orleans, LA.

National Marine Fisheries Service (NMFS). (2004). *Current fisheries statistics No. 2004-2*. Retrieved March 23, 2005 from: http://www.st.nmfs.gov/st1/trade/documents/TRADE2004.pdf

O'Neill, B. (2004). Collecting research data online: Implications for Extension professionals. *Journal of Extension* [On-line], 42(3) Article 3TOT1. Available at: http://www.joe.org/joe/2004june/tt1.php

Radhakrishna, R., & Martin, M. (1999). Program evaluation and accountability training needs of Extension agents. *Journal of Extension* [On-line], 37(3) Article 3RIB1. Available at: http://www.joe.org/joe/1999june/rb1.php

Seafood consumption rose again in 2003. (2004, September 27). Retrieved December 14, 2004 from: http://www.noaanews.noaa.gov/stories2004/s2322.htm

Stickney, R. R. (1996). *Aquaculture in the United States*. New York: John Wiley & Sons.

Swann, D., & Morris, J. (2001). *A white paper on the status and needs of aquaculture Extension outreach for the north central region*. Retrieved November 28, 2004 from: http://ag.ansc.perdue.edu/aquanic/nrac/wpapers/ext0901.doc

Taylor, C. L., & Summerhill, W. R. (1994). *Concept of state major programs and design teams (Fact Sheet PE-56)*. Gainesville, University of Florida.

United States Department of Agriculture/Agricultural Research Service (USDA/ARS). (2003). *National programsâ— aquaculture action plan*. Retrieved January 29, 2005, from: http://www.ars.usda.gov/research/programs/programs.htm?np_code=106&docid=276