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ORACBA News

United States Department of Agriculture Office of Risk Assessment and Cost-Benefit Analysis

The Development of Agro-Ecosystem Ecological Risk Assessment in the USDA: Part I

by Sue Ferenc, ORACBA, and Evert Byington, EPA

This is the second article in a two-part series on agro-ecosystem ecological risk assessment in USDA's conservation programs. In *ORACBA News* Vol. 2 No. 5, the development and use of agro-ecosystem ecological risk assessment was introduced. The article discussed the process developed for conducting the required ecological risk assessments for two of the USDA conservation programs, the Conservation Reserve Program (CRP) conducted by the Farm Service Agency and the Environmental Quality Incentives Program (EQIP) conducted by the Natural Resources Conservation Service. Here we present a brief synopsis of these first ever, national-scale ecological risk assessments.

Environmental Quality Incentives Program

Background

In creating EQIP, Congress, in the Federal Agriculture Improvement and Reform Act of 1996, provided an initial identification of environmental resources considered at risk. These resources were identified as soil, water, and related natural resources, including wetlands, grazing lands, and wildlife habitats. However, while conducting this assessment, several additional resources were identified at risk: 1) air quality; 2) cultural and historic resources; and 3) landscape resources.

The assessment consists of technical evaluations and analyses which attempt to characterize the relationships between agricultural production activities, ecosystem stressors, and resulting adverse ecological effects on particular natural resources. The assessment has three sections: 1) problem formulation; 2) analysis of ecological effects; and 3) risk characterization.

Problem Formulation

During the problem formulation stage, data were gathered and used to identify those agricultural practices or activities posing the greatest risks to the environment. Conceptual diagrams were developed to hypothesize the cause-and-effect pathways of environmental risk. Identified in the conceptual diagrams are the specific assessment endpoints associated with the resources at risk. A detailed discussion of the risk initiators, system stressors, ecological effects, and assessment endpoints identified in the diagrams is included in the assessment. The problem formulation includes an analysis plan, a brief discussion on identification of missing data, and recommendations for additional data collection, analysis, and evaluation.

Analysis of Ecological Effects

The second stage of the assessment involved analyzing

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the ecological effect of certain agricultural practices. Due to the lack of comprehensive data and the uncertainties associated with extrapolation of site-specific data to a landscape scale, the analysis of the hypotheses developed through the conceptual diagrams is in qualitative, narrative form. The discussion centers around the previously identified resources at risk and provides an overall evaluation of the types and kinds of agricultural activities found to place natural resources at risk. With available data, and in cooperation with the Natural Resources Inventory (NRI) staff, maps of the continental United States were generated indicating the current status (based on 1992 data) of agriculture-related land uses, and potential or actual impacts of agricultural activities.

Risk Characterization
The risk characterization section of the assessment identifies the magnitude of environmental consequences and delineates how those consequences can be addressed by proven on-farm conservation strategies. The main focus of the risk characterization is on recommendations to risk managers. The assessment team attempts to analyze where the cumulative effects or impacts of agricultural activities are occurring across the United States.

Using an ecoregion approach, specific farm production regions of the country facing significant environmental risks are identified. These risks are due to a combination of factors, including high-intensity agriculture, geologic/geographic conditions, and climate, all acting simultaneously to exacerbate the on-farm and off-site environmental impacts identified in the conceptual diagrams.

The team found that the best solutions to reduce risks to environmentally stressed resources would be conservation measures applied in concerted, concentrated efforts in priority areas, with smaller scale efforts going to sectors outside priority areas.

Several sources of uncertainty were identified during the three stages of analysis. One is associated with the interrelationships between all the resources of the ecosystem, not just the agricultural community. Time also adds a dimension of uncertainty. Long-term on- and off-farm effects may not be noticed until the resource has been so damaged that the productive capacity is beyond mitigation or restoration; also the effects of applied resource conservation practices may not be seen immediately. From a cumulative standpoint, what is done on one farm, tract, or ranch may register little to no effect when assessing a watershed, hydrologic unit, or ecosystem. In addition, there is vast uncertainty associated with the role of agricultural production in landscape- and watershed-scale ecological degradation.

Conservation Reserve Program

Background
Review of the CRP legislative provisions included in the Food Security Act of 1985, the Food, Agriculture, Conservation and Trade Act of 1990, and the Federal Agriculture Improvement and Reform Act of 1996 (the Farm Bill) provided the major environmental endpoints for this assessment. These endpoints are: 1) soil productivity and quality; 2) water quality; 3) wildlife habitat; 4) wetland functions and values; and 5) air quality.

Problem Formulation
The problem formulation section of the CRP risk assessment is functionally identical to that of the EQIP risk assessment. The only difference is that the CRP conceptual diagrams and accompanying discussion are limited to crop production activities only and do not include livestock and grazing components. Pertinent conceptual diagrams developed by the EQIP risk assessment team were recreated for the CRP risk assessment.

Analysis of Ecological Effects
The analysis section of the CRP risk assessment is very similar to the parallel section of the EQIP risk assessment. Water impairment tables and data, and pertinent NRI maps were incorporated. In addition, maps of the continental United States, developed by the Economic Research Service, were included for discussion of air quality issues. Air quality was stipulated in the legislation of this program as a resource to be considered at risk.

The main difference between the CRP analysis and the EQIP analysis is the reference point for presentation of some of the data. The CRP analysis is based, in places, on evaluating the potential environmental impacts of crop production activities had there not been a CRP in place for over 10 years; whereas the EQIP analysis is based on an analysis of existing activities and their risks to the environment.

Risk Characterization
The assessment team intended to present information that would be useful in making decisions about the identity and location of the type of cropped acreage that should receive priority for enrollment in CRP. The principal contribution of the risk assessment is to present and combine information that will allow national-level policymakers to generally target the situations and areas where participation in the program is most likely to address environmental degradation.

Time scales for natural resource recovery as a result of program actions were addressed in similar fashion to the EQIP risk assessment. However, recovery is estimated to occur much faster, when compared to EQIP, because of the almost complete cessation of the production activities creating the environmental stressors. A chronicle of uncertainties associated with a risk assessment of this type is also presented in similar fashion to that of the EQIP risk assessment.

Discussion of the CRP assessment is centered around the topics of erosion-related impacts, wildlife habitat, fertilizer and pesticide application, and wetlands. Patterns of fertilizer and pesticide use, areas for their potential impacts, and estimates of reductions in their use as a result of the previous CRP sign-ups were presented. The same NRI maps associated with fertilizer and pesticide applications that are presented in this risk characterization were included in the analysis section of the EQIP risk assessment. Finally, a discussion of the location and acreage of cropped wetlands was presented.

In contrast to the EQIP risk assessment, this assessment made no direct recommendations to risk managers.

Peer Review of the Risk Assessments
It is a primary role of ORACBA to review proposed USDA regulations on human health, human safety, and the environment to ensure that statutory requirements are achieved. This includes review of the agro-ecosystem risk assessments for EQIP and CRP. ORACBA is also responsible for establishing a peer review process for these documents. As a result, the risk assessments have been reviewed by a non-governmental organization. Comments and suggestions from this review report will be used to improve future risk assessments.

Conclusions
These two risk assessments are the first of their type, both for USDA and for the Federal government. They attempt to characterize the risks to on-site and off-site natural resources posed by a variety of agricultural activities occurring across the United States. The role that risk assessments like these will play in the development of future conservation programs will depend to some degree on the result of an annual evaluation of the risk management and cost-effectiveness of the programs, and on how well the information provided by the risk assessments assisted in meeting program objectives.

Ecosystem Monitoring for the EQIP and CRP Programs by Clifford Rice, ARS/ORACBA

What does ecosystem monitoring have to do with USDA's EQIP and CRP programs? These resource conservation programs are broad in scope, and consequently a risk assessment was conducted to guide program development. Monitoring the environmental impacts of the programs provides

information on the effects of risk mitigation activities. These assessments identified significant risks, their consequences, and key assessment endpoints. Such information is needed to improve program performance. A risk management assessment is also required for both the Environmental Quality Incentives Program (EQIP) and the Conservation Reserve Program (CRP). The purpose of the risk management assessments is to identify the costs and benefits (including risk reduction) of the programs as they have been implemented. USDA resource conservation agencies will need to consider monitoring strategies.

Environmental monitoring is an obvious approach to identifying program benefits. And, since the benefits are aimed at protecting our natural resources, monitoring should be directed to one or more of the measures of resource quality that the improved agricultural practices are intended to protect. Resources identified for protection in these programs include soil, water, air, and related resources including wetlands, grazing land and wildlife. But selection of those measures which best reflect the risk reduction effects of the program raise many questions. Taking soil as an example, does one monitor on-site (the farm) or off-site effects? And what is the program supposed to protect? Historically, the CRP was primarily founded to protect against soil erosion, with a bias toward minimizing on-site effects. However, the wording of the newer legislation is such that these programs are intended to emphasize reductions in off-site effects. These off-site effects are not easy to measure. For example, many of the impacted ecological systems involve watersheds where measurement of program effects is influenced by many other factors. Also, there are confounding issues surrounding combined non-point source impacts, especially nutrients, on these systems. Monitoring in the traditional sense will not provide any clearcut answers, especially when ecosystem functions are being considered. Managers, policymakers and scientists must get together and begin to craft the questions they want to address. For example, are there adequate baseline data to compare before and after implementation is started? How well are natural perturbations understood and separable from the impacts caused by the conservation program activities? The list of questions goes on from here and can become seemingly endless when one considers how interrelated all of the multiple processes are in complex ecosystems. So what can be done? What I would like to do is outline where data may be available within USDA for carrying out these monitoring activities and some possible strategies for addressing these problems.

A valid question at this point might be: what is the current state of science concerning ecosystem functioning and monitoring? To quote some authors of a recent conference proceedings on this subject, “Ecosystem monitoring is not a fully developed science. Much is not yet known about what the best ecosystem indicators are; what the most cost-effective sampling and plot designs are; and how to analyze the results to provide concrete information upon which to base management decisions.” (Management Topic 29 of the Forestry Services Ecological Stewardship Workshop, Feb. 1996). Improved methods to study these questions are actively being pursued. There is a national study underway by the Committee on Environment and Natural Resources (CENR) of the White House’s National Science and Technology Council to look at the role of ecosystem monitoring from a national perspective. From a 1996 workshop, a proposed framework was produced, “Integrating the Nation’s Environmental Monitoring and Research Networks and Programs.” This 102-page report contains several excellent ideas for coordinating monitoring across agencies. It also outlines what kinds of data are useful for conducting such monitoring activities. Among the 20 recommendations listed, 6 major points are made for implementing an improved monitoring approach to address ecosystem issues: 1) integration with existing government programs; 2) more emphasis on remote sensing; 3) tying everything together with the Federal Geographic Data Committee; 4) relying on existing surveys and modifying them to better coordinate across agency boundaries; 5) setting priorities to identify critical regions and resources not currently addressed (whole-system emphasis rather than the parceled approach as in the past); and 6) collecting at similar locations and collecting common data at these

sites, i.e. “Index Sites.”

The dilemma facing the managers of the new EQIP and CRP programs is how to assess the impacts of these programs. One solution to this question would be to better understand the types of data that are already available and what monitoring programs are already in place for these activities. Recalling the CENR’s initial recommendation, we need to integrate existing programs and use what we have in place as a starting point. Therefore, I would suggest that we examine the information already available within our agency. These data need to be reevaluated in the context of ecosystem concerns. For example, the NRCS has several watershed projects identified in “Assessment of Progress of Selected Water Quality Projects of USDA and State Cooperators”(NRCS, 1996), and there are five watershed-level projects (Management Systems Evaluation Area (MSEA) projects) highlighted in CSREES’s review of water quality projects (USDA Water Quality - A Report of Progress, 1995). There are also several sources of survey data that are generated within USDA. The following subset of USDA programs was extracted from a listing of all Federal monitoring activities identified in the CENR report mentioned above. USDA had one activity in the remote sensing category, the NRCS soil survey program which was started in the 1930's. In the resource survey area, USDA had 4 of the 12 listed programs; these include the Natural Resources Inventory (NRI) program started in 1956, the Forest Health Monitoring Survey started in 1990, the Forest Inventory started in 1909 and NRCS’s Snowpack Survey started in 1978. In the area of intensive monitoring, the document listed the Forest Service’s experimental program started in 1909 and ARS’s hydrology studies started in 1937.

Monitoring is an integral part of risk management, and it is clear that USDA has much monitoring data and expertise to bring to bear on this problem. The real challenge is bringing these skills to focus on proper issues to obtain a better understanding of what the problems are and how best to address them. The challenge will be to apply environmental monitoring in the most cost-effective and efficient way. It is critical that we know what the questions are and appreciate the overall “connectiveness” of the systems that are to be assessed.

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Director’s Corner by Nell Ahl

Manure (mə-nō͡or´, -nyō͡or´) *n*. Animal dung, compost, or other material used to fertilize soil. *American Heritage Dictionary.*

Animal manure is a lowly, humble substance which has become a focus of renewed interest and concern in recent years. Originally, neolithic farmers observed that seeds grew better in or near manure piles, and that observation led to planned use of animal manures to increase soil fertility. Early Native Americans used whole fish as slow-nutrient-release fertilizers for corn and other crops.

Green manure, that is, composted plant materials, are also good fertilizers.

Use of animal manure as fertilizers for growing crops and enhancing pasture grass fertility has long been practiced in the United States. Recycling manure to support crop growth also serves to dispose of the odorous product. After World War II, the use of chemical fertilizers came into wide usage and animal manures were less frequently used. One reason for the change from natural to chemical fertilizers is that the composition of manure nutrients is quite variable while chemical fertilizers are well defined. Chemical fertilizers can be applied with precision to complement the existing nutrients in the soil. Therefore, chemical fertilizers have more consistent and predictable effect on crop growth. However, organic farmers and many gardeners have continued to use manure as a primary fertilizer, though larger commercial agricultural enterprises rely primarily on chemical fertilizers.

Whether from manure storage, manure use on crops, or chemical fertilizers, a prime concern has been the runoff of nutrients into waterways. Excessive nutrients in the water set up a chain of events which result in algal overgrowth and consequent fish kills along with other undesirable effects in lakes and estuaries. The effects of nutrient runoff remain a challenging problem which will be intensified as the United States assumes larger responsibilities for providing food to world populations through its agricultural exports.

Other than its odor and generally offensive character, animal manure has not been considered a direct human health hazard. This has not been so for human feces, which have been associated with disease and parasite transmission for a hundred years or longer. In the United States, recognition that *Salmonella typhi* (the cause of typhoid fever) is transmitted by human feces led to sanitary sewage public health management and communication efforts in the first half of the 20th century. By mid-century, the number of typhoid fever cases dwindled to insignificance. As the illnesses caused by *S. typhi* declined, however, there were concomitant rises in diseases caused by other *Salmonella* types.

It was not until the middle of the 1980's when a new realization began to dawn: meat- and poultry-derived products can harbor bacteria which are harmful to human health even though the bacteria may have no effect on animal health. First came foodborne disease outbreaks in humans from *Listeria* (soft cheeses from raw milk), then *Salmonella enteritidis* (in eggs), followed shortly by *Escherichia coli* O157:H7 (beef, especially hamburger). Reexamination of other foodborne pathogens such as *Campylobacter* and *Toxoplasma* showed that there could be complications beyond the acute illnesses generally reported to public health agencies. As a result of these and other recent events, USDA's Food Safety Inspection Service has developed the Pathogen Reduction and Hazard Analysis and Critical Control Points (HACCP) Rule which empowers industry to assume responsibility for avoiding even minute and invisible amounts of manure on meat and poultry. The role of all segments of the food chain in transmitting one or more organisms which can cause human illness is currently being carefully reexamined using principles of risk analysis (assessment, management, communication). However, even as the FSIS paradigm has changed from organoleptic (sight, odor, touch) inspection to HACCP, there are new scientific discoveries which may require yet another paradigm shift.

Manure organisms grow and develop in the gastrointestinal (GI) tract of farm animals. Once the GI tract contents are evacuated, the organisms associated with the manure were thought to die quickly unless they were deposited on a growth-friendly surface such as an animal carcass. However, new scientific work shows that manure-borne pathogens can be extraordinarily resistant. Some of the more recently recognized pathogens appear to be very persistent in the environment. Pathogens in animal manure can survive when spread on pastures. Days or weeks later, when animals graze, the pathogens are transferred to a new host. Pastures used by wild ruminants such as deer may infect wildlife populations and ultimately infect humans (e.g., Odwalla apple juice case). Because of frequent

manure contamination, animal watering troughs should be cleaned and disinfected regularly because the slick scum in these troughs can harbor*E. coli* O157:H7. Manure "teas" made from raw or improperly composted manure can result in the spread of pathogens to fruit and vegetable crops. Even decomposed manure can still harbor pathogens. One study showed that some pathogens on the surface of a manure pile may remain viable for 120 days.

Our increasing knowledge about the environmental persistence of manure-borne pathogens brings a clearer understanding of public health principles: contact with animal manure can make us sick, just as contact with human waste can. Therefore, what was thought to be only an environmental health problem now becomes one for human health as well. Control of the use, recycling and treatment of animal manure is an urgent issue. Perhaps in the new millennium we will have truly come to understand that not only human wastes but also animal manure carries pathogens we best avoid.

USDA Risk Assessor in Profile: Susan Fox

Until recently, Susan Fox was Program Manager of the Southern Global Change Program at the USDA Forest Service Research (FSR) Southern Research Station's facility at North Carolina State University. Prior to that, Susan, who had been with FSR for nearly a decade, managed the Southern Commercial Forest Research Program. Both research programs were among the first designed to assess the regional-scale, cumulative impacts of multiple stressors on forest productivity and ecology.

The Southern Commercial Forest Research effort was part of the National Acid Precipitation Assessment Program (NAPAP). It focused on the effects of acid deposition and tropospheric ozone. Several research projects funded by the program evaluated current impacts and made projections over the 10- 20-year timeframe, considering the trends in acid deposition and ozone levels on the commercially and ecologically valuable southern forest region.

Both the completed Southern Commercial Forest Research Program and the ongoing Southern Global Change Program represent efforts to strategically combine modeling and experimental studies. The objective of the regional assessments is to integrate predictive models across multiple levels of biological organization. Experiments are targeted at problems identified as contributing the greatest uncertainty at each level of the integrated model. Such integrated assessments pose some formidable challenges. One is to ensure that the output of each of the biological models provides

appropriate input to subsequent models in the tree-stand-landscape-region hierarchical sequence. Another is to structure the biological models such that they interface cleanly with socioeconomic models. Ultimately, Susan views the goal of these assessments as identifying which of multiple stressors are most important and what the expected magnitude of the cumulative impacts would be for regional-scale, long-term forest resource planning decisions.

According to Susan, the first phase of the Southern Global Change Program focused on the forest changes observed over existing environmental gradients in carbon dioxide, temperature, moisture, ozone, and nutrients throughout the region. The second phase of the program, begun in 1995, expanded the set of stressors evaluated to include the effects of land use change, damaging insects, and diseases. A principal aim of the program is to project regional forest effects resulting from a doubling of atmospheric carbon dioxide concentrations.

Susan recently stepped down from her research program management duties and is currently working with scientists at Duke University to develop vegetative dynamic models that are components of the integrated regional assessment. Dr. Steven McNulty has taken over the reins as the new Program Manager of the Southern Global Change Program. For further information about the Southern Global Change Program at the USDA Forest Service Research (FSR) Southern Research Station, point your web browser to http://sgcp.arrc.ncsu.edu/.

September Risk Forum: Dr. Dave Cleaves

The September Risk Forum was presented by Dr. Dave Cleaves, Decision Science Specialist in Ecosystem Management of the USDA Forest Service. The title of his presentation was "Decision Making in the USDA Forest Service: Experiences with a New Protocol and Outlook for Decision Science Applications."

Dr. Cleaves discussed an approach the USDA Forest Service is using to incorporate risk assessment and risk management into decisions concerning the use of forest resources. Ecological risk assessment and risk management are part of a complex, more diffuse set of processes of decision making that involve many human judgements and organizational interactions. Cleaves discussed a new project to improve Forest Service decision processes. The decision protocol incorporates decision science concepts such as decision quality, problem framing, risk and uncertainty assessment, information value analysis, and tradeoff evaluation into a structured dialogue for interdisciplinary teams.

Cleaves believes that the decision protocol being developed will lead to improved decisions because the process is more likely to solve the right problem; better describe the decision criteria, alternatives, and choices; evaluate more relevant alternatives; make choices that are consistent with the criteria; and provide for learning. There are 11 phases in the decision protocol, which begins with a decision appraisal and ends with an implementation schedule. Each phase is comprised of a set of questions which is designed to elicit responses from teams of experts and managers, or which must be addressed by further analysis. The 11 phases incorporate many of the activities encountered in risk assessment, risk characterization, risk management and communication. The protocol developed by Cleaves more closely integrates these risk analysis activities, provides added emphasis at critical steps and facilitates an adaptive system of program management.

He indicated that the experiences from 15 development and pilot tests are helping refine the protocol into a basic framework and language for diagnosing and reporting decision process problems. The decision protocol is part of a larger effort to apply decision science to ecosystem management problems and opportunities. Cleaves discussed implications for interagency decision processes and the prognosis for incorporating risk assessment and cost-benefit analysis into mainstream agency practice.

October Risk Forum: Drs. Bonnie Buntain and Will Hueston

The October ORACBA Risk Forum was presented by Dr. Bonnie Buntain, Director of Animal Production and Food Safety, FSIS, and Dr. Will Hueston, Associate Dean of the Virginia-Maryland Regional College of Veterinary Medicine. The title of their presentation was "Current Issues in Production Food Safety."

Dr. Buntain first discussed the impacts of our changing world and how these impacts are changing how we look at food safety issues. Previously, the focus of food safety concerns has been at or near the end of the food production chain that leads to the consumer. With the Pathogen Reduction and Hazard Analysis and Critical Control Points Rule (PR/HACCP; see the September-October 1996 *ORACBA Newsletter* for further information about this rule), processing plants must control food safety hazards associated with the animals coming into their plants. Because of this, the processors will demand some assurances from the farmers that chemical and microbial hazards are being controlled. This may require that farmers develop a HACCP plan or some similar program, such as a quality assurance program,

in order to have access to markets.

To support this process, Dr. Buntain's office has guided the selection of research proposals to gather information on the effectiveness of existing pathogen reduction methodologies. FSIS has awarded four large research projects to look at sheep, poultry, swine and non-fed beef (sometimes called "cull cows"). All of these projects are looking at multiple geographic areas and will gather data over several seasons. It is hoped that these projects will provide information about efficacy of various risk reduction strategies as well as the cost-effectiveness of the different strategies. Dr. Hueston used his broad background in government and academia as a platform to evaluate current use of risk assessment and analysis for food safety. The title of his segment was "Paradigms and Pitfalls of Risk Analysis in Food Safety." He opened with several examples of food safety/public health paradigms which have proven to be wrong. One example he cited was the historical use of meat and bone meal as a feed supplement for animals. Now, with the new information on the connection between Bovine Spongiform Encephalopathy and new variant Creutzfeld-Jakob Disease (nvCJD), it appears that this product is not safe to use as feed for ruminants. Thus, an old paradigm must be abandoned.

In this same context, he pointed out that we must evaluate food safety issues in the larger context of all areas that may be impacted by any changes in our practices. We should not be making decisions about food safety without considering such other areas as the environment, society, ethics and trade issues, to name a few.

Dr. Hueston cited Stephen Covey's book, "The Seven Basic Habits of Highly Effective People," as a framework for evaluating our food safety paradigms, especially our government regulatory history. He provided examples of how several of USDA past risk analyses and their impacts may not have been very effective. He addressed each of Covey's seven habits by discussing examples of contrary behavior. The presentation returned to a focus of questioning our paradigms. Paradigms may be useful for a time but they should not prevent us from seeking a better understanding of food safety issues in the greater context of our changing world.

News of ORACBA

FSIS Sponsors Course in Quantitative Risk Analysis

From September 2-12, FSIS sponsored a 2-week course in quantitative risk analysis with a focus on animal health and food safety issues in the Washington, DC area. The course was taught by David Vose of the United Kingdom (for additional information about the contents of his course, see July-August 1997 *ORACBA News*). Vose has been presenting various versions of this course for the last few years and continues to refine his ideas and materials.

The course was limited to only 10 participants from FSIS, including the FSIS *Salmonella enteritidis* Risk Assessment Team, and ORACBA. It was presented in a computer teaching laboratory that allowed computer access to all participants for hands-on experience in modeling risk assessment problems. Vose alternated between informal lectures and presentations of challenging problems to illustrate the material. While the course is designed to challenge those with extensive computer modeling and risk assessment skills, the course also reviews the basic concepts of each subject area for those with less experience.

ORACBA has asked Vose to do another iteration of his 2-week course in April 1998 in Washington, DC. Exact dates and details are yet to be determined. Attendance will be strictly limited so it is unknown whether any slots will be available to non-USDA people. However, if you have an interest, you may contact ORACBA at (202) 720-8022 for further

information.

Risk Resources

Society for Risk Analysis Workshop and Symposium: The Society for Risk Analysis (SRA) meeting will be in Washington, D.C., December 7-10, 1997. The Specialty Group on Food Safety is sponsoring a Workshop and a Symposium on food safety topics. Michael McElvaine of ORACBA, as President of the Food Safety Specialty Group, has coordinated the organization of these activities.

The workshop, titled "Microbial Risks from Food: Quantification and Characterization," is scheduled for Sunday, December 7, 8 a.m. to 5 p.m. Dr. Charles Haas of Drexel University will be the lead instructor for this program. The Symposium, "Risk Assessment of Food Contamination," is scheduled for Wednesday, December 10, from 8:30 a.m. to noon. Both events will present a variety of views and approaches to risk assessment for food safety.

If you would like to have more information about SRA and the coming meetings, please contact The Secretariat: (703) 790-1745 or by fax (703) 790-2672.

Introduction to Risk Assessment Short Course: Due to an overwhelming number of applications to attend the USDA Graduate School short course "Introduction to Risk Assessment" in October, the course will be offered again December 15-18 in Arlington, VA. The course is being sponsored by ORACBA and FDA/CFSAN and is designed for USDA and FDA staff members, but others are welcome to attend. For more information, see the attached flyer and call Al Officer, USDA Graduate School at (703) 312-7299. Space is limited so act now!

Food Safety Web Site: The College of Veterinary Medicine at the University of Illinois has created the "Food Safety CAI (computer assisted instruction)" Web site, <http://sable.cvm.uiuc.edu/>, to provide distance learning exercises in food safety and foodborne diseases for those whose current or future employment includes direct or indirect involvement in foods of animal origin. The site provides a set of food safety-related exercises focusing on the investigation of foodborne disease outbreaks. Other lessons and exercises are also available on the site.

Risk Calendar

November 1997

The Fifth Asia Pacific Food Analysis Workshop will be held at the Queensland Health Scientific Services Laboratory, Brisbane, Australia on November 7-14. For information, contact Mr. Graham Craven at FAX: +61-7-32749119; or E-mail: craveng@health.gld.gov.au

The ORACBA Risk forum will be Wednesday, November 12, from 10-11:30 a.m. in Whitten 107-A. Dr. Clifford Rice of the Environmental Chemistry Laboratory at the Agriculture Research Laboratory will present "Environmental Monitoring and Ecological Risk Assessment." For more information, please call (202) 720-8022.

SENES Oak Ridge, Inc. will host a 1-day workshop on "Quantifying Uncertainty in the Analysis of Exposure, Dose, and Risk" on Thursday, November 13 at the Garden Plaza in Oak Ridge, TN. For information contact Leslie Pickar or Willow Reed, SENES Oak Ridge, Inc., Center for Risk Analysis, 102 Donner Drive, Oak Ridge, TN 37830; phone: (423) 483-6111; FAX: (423) 481-0060; or E-mail: 73304.3262@compuserve.com

The annual meeting of the Society of Environmental Toxicology and Chemistry (SETAC) is scheduled for November 16-20 in San Francisco, CA. The theme for the meeting is "Bridging the Global Environment: Technology, Communication, and Education." For more information, contact SETAC at (904) 469-1500 or visit their homepage: http://www.setac.org

December 1997

The ORACBA Risk Forum will be Friday, December 5, 1997, from 10-11:30 a.m. in Whitten 107-A. [Please note the change from our usual Wednesday schedule.] Dr. Lynn J. Frewer from the Institute of Food Research, Reading Laboratory, Reading, United Kingdom, will present "Public Acceptance of Genetically Modified Food in the UK and Europe." For more information, contact (202) 720-8022.

The annual meeting of the Society for Risk Analysis (SRA) is scheduled for December 7-10 in Washington, DC. For more information, contact SRA at (703) 790-1745; or E-mail: sraburkmgt@aol.com or visit their website: http://www.sra.org

January 1998

The annual meeting for the Society for Integrative and Comparative Biology (SICB) is scheduled for January 3-7 in Boston, MA. For more information, contact the SICB business office at (800) 955-1236 or (312) 527-6697; FAX: (312) 245-1085; or E-mail: sicb@sba.com

The ORACBA Risk Forum will be Wednesday January 14, 1998, from 10-11:30 a.m. in Whitten 107-A. Dr. Stephen Crutchfield of the Food Safety Branch, ERS, will present, "ERS Research on the Economics of Food Safety Risks." For more information, contact (202) 720-8022.

February 1998

Call for Papers: The second International Conference on Marine Pollution and Ecotoxicology will be held June 10-14 in Kowloon, Hong Kong. Proposals are sought for presentations and submissions are due February 15, 1998. For information, contact the conference secretary at (852) 2788-7402; FAX: (852) 2788-7406; or E-mail: bhconf@cityu.edu.hk

March 1998

The annual meeting of the Society of Toxicology (SOT) is scheduled for March 1-5 in Seattle, WA. For more information, contact SOT at (703) 438-3115; FAX: (703) 438-3113; or E-mail: sothq@toxicology.org

An International Conference on Emerging Infectious Diseases will be convened on March 8-11, 1998 at the Marriott Marquis Hotel, Atlanta, GA. Major topics will include surveillance, epidemiology, research, communications and training, and prevention and control of emerging infectious diseases as well as topics related to emergency preparedness and response. For information, call (202) 942-9248 or send an E-mail message to: meetinginfo@asmusa.org

The ***ORACBA** News* reports risk analysis activities in the U.S. Department of Agriculture, upcoming meetings and events, and other activities supporting the development and use of risk assessment in USDA. This bimonthly newsletter is available at no charge to risk assessment professionals in USDA. Send comments or address changes to: USDA, ORACBA, Room 5248-S, Mail Stop 3811, 1400 Independence Avenue, SW, Washington, D.C. 20250-3811. Call (202) 720-8022, or fax (202) 720-1815.