The National Agricultural Law Center

NatAgLaw@uark.edu $ (479) 575-7646

An Agricultural Law Research Article

The Industrialization of Agriculture: Implications for Public Concern and Environmental Consequences of Intensive Livestock Operations

by

Charles W. Abdalla

Originally published in PENN STATE ENVIRONMENTAL LAW REVIEW
10 PENN ST. ENVTL. L. REV. 175 (2002)

www.NationalAgLawCenter.org

The Industrialization of Agriculture: Implications for Public Concern and Environmental Consequences of Intensive Livestock Operations

Charles W. Abdalla*

I. Introduction

The industrialization of the United States animal agriculture sector is bringing about significant change and giving rise to concerns about environmental degradation and other issues. The concentration of animals on fewer, larger farms and increased ownership, contracting, and joint ventures of adjacent food system functions or stages among agribusinesses are changing the structure of agriculture and the public perceptions about farming: Larger animal production units are increasingly leading to conflicts between producers and neighbors, and communities are faced with many actual and potential environmental and nuisance threats.[1]

Current conflicts over Intensive Livestock Operations (ILOs)[2] can

* Charles W. Abdalla is an Associate Professor of Agricultural Economics in the Department of Agricultural Economics and Rural Sociology at Penn State University, University Park, Pennsylvania. His research and extension programs address public choices about natural resources and the environment. Dr. Abdalla received a Ph.D. and M.S. in Agricultural Economics and M.A. in Economics from Michigan State University and a B.S. in Environmental Resource Management from Penn State University. He is a recipient of Resources for the Future's Gilbert F. White Fellowship and the Soil and Water Conservation Society's Berg Fellowship. Dr. Abdalla received the Farm Foundation's Outstanding Public Issues Education Awards for extension programs on animal waste policies and land use conflicts in 2000 and 2001. He would like to thank Katie Bavoso, a Symposium Articles Editor, and Lauren Carothers, Editor-in-Chief, for editing his article.

1. M.C. Hallberg, C.W. Abdalla, & P.B. Thompson, *Performance in Animal Agriculture: A Framework for Multi-Disciplinary Analysis* 11-13 (Texas A&M Univ. Center for Biotechnology, Policy and Ethics, Working Paper No. 96-8, 1996).

2. The term Intensive Livestock Operation (ILO) is used here as a generic term referring to larger poultry and livestock operations. Some traits of ILOs would include increased scale and intensity at a given site, increased use of off-farm inputs, and in a few distinct cases of confinement of animals. There is no attempt made here to link the ILO term to the federally defined Concentrated Animal Feeding Operations (CAFO) or any

be better understood in the context of the history of the animal agricultural sector. Part of the controversy emanates from the expanded scale of animal production facilities, while other parts stem from the practice of animal agriculture at new locations. Thus, it is necessary to understand both the industrialization process and its indirect impact on the regional and national structure of the animal industries since World War II.

This paper provides historical background on the industrialization of animal agriculture that has led to current public concern and conflict over ILOs. Specifically, this paper addresses:

1. When and where did industrialized agriculture and ILOs come into being, and
2. What are the driving forces behind the agricultural industrialization process?

In the last section of the paper, the consequences of industrialization are considered from a broader institutional economics perspective. The discussion concludes that the choice of jurisdictional boundaries is a critical decision variable affecting resolution of conflicts arising from industrialization of animal agriculture. Specific jurisdictional decisions are identified that will affect the successful resolution of differences over ILOs.

II. Agricultural Industrialization and ILOs in the United States

The United States animal production and marketing system is undergoing significant structural change. Although this transformation has been underway for more than forty years, the pace of change has recently accelerated. Farm structure is generally evolving from a situation of many diversified crop-livestock farms that are spread out to a conglomeration of fewer specialized larger farms that are geographically concentrated. For example, poultry and livestock producers are more closely integrated into marketing functions and tend to be located in clusters near processing or infrastructure specialized to their needs.[3] As the scale of operations has increased and production has become geographically concentrated, the potential burden placed on local environments by animal waste has increased. In some locations, this

other federal, state, or local definition.

3. A. P. Pagano & C. W. Abdalla, *Clustering in Animal Agriculture: Economic Trends and Policy*, *in* BALANCING ANIMAL PRODUCTION AND THE ENVIRONMENT 193(Great Plains Animal Agriculture Task Force Conference, Oct. 19-21, 1994) (on file with author).

increased burden has led to neighbor and community concern over water and air noxious odors and insect infestation.[4]

A. Separation of Crop and Livestock Production

One of the more important developments related to animal agriculture is the trend toward increasing separation of crop and livestock production. This trend has affected the scale and intensity of production and the geographic location of agricultural production activities.[5]

Breimyer observed that in the early 1960s there were three distinct economies within the United States agricultural sector: crop, livestock, and marketing.[6] He noted that the livestock economy then was at an intermediate stage between a traditional agrarian structure and a more industrialized model.[7] Later in the same decade, Shaffer argued that a major transformation of the United States food system was under way in which specialized off-farm activities and products were being substituted for general farm work.[8] Industrialization generally had the effect of decreasing agriculture's reliance on a fixed land resource and increasing the sector's dependence on manufactured off-farm resources.[9] Breimyer further stated, "Livestock enterprises have been undergoing progressive organizational detachment from feed production . . . . Broiler production is not only semifactory style but seems to gravitate locationally to areas of the country where costs are lowest . . . . Feeder pig production now rings the Corn Belt as a halo."[10]

The relative emphasis of crop and animal agriculture within major United States production regions changed significantly as a result of industrialization. The upper Midwest shifted from animal to crop agriculture and the Northeast, Southeast, South Central, and Great Plains favored animal production over crop agriculture.[11] From 1930 to 1990,

4. M. C. Hallberg, C. W. Abdalla, & P. B. Thompson, *Performance in Animal Agriculture: A Framework for Multi-Disciplinary Analysis* 1 (Texas A&M Univ. Center for Biotechnology, Policy and Ethics, Working Paper No. 96-8, 1996).

5. H. F. Breimyer, *The Three Economies of Agriculture*, 64 J. FARM ECON. 679, 679-99. (Aug. 1962); M. C. Hallberg, POLICY FOR AMERICAN AGRICULTURE: CHOICES AND CONSEQUENCES, 62-63 (1992); L. E. Lanyon, *Does Nitrogen Cycle? Changes in the Spatial Dynamics of Nitrogen with Industrial Nitrogen Fixation*, 8 J. PROD. AGRIC. 70, 70-8 (1995).

6. H. F. Breimyer, *The Three Economies of Agriculture*, 64 J. FARM ECON. 679, 679-99 (Aug. 1962).

7. *See id*.

8. J. D. Shaffer, *The Scientific Industrialization of the U.S. Food and Fiber Sector: Background for Market Policy*, *in* AGRICULTURAL ORGANIZATION IN THE MODERN INDUSTRIAL ECONOMY 1-14 (P. Farris ed., NCR-20-68, Dept. of Agric. Econ., 1968).

9. *See id*.

10. H. F. Breimyer, *The Three Economies of Agriculture*, 64 J. FARM ECON. at 689.

11. L. E. Lanyon, *Does Nitrogen Cycle? Changes in the Spatial Dynamics of*

the increasing dependence on capital and the diminishing role of the inherent capacity of land as factors of production were reflected in the concentration of corn production and the associated use of nitrogen fertilizer.[12] That trend also illustrated the shift to purchased inputs for farm production from the 1950 to 1990 period.[13]

Industrialization forces, most particularly efficiencies gained from increases in operation size, have led to greater uses of technologies and practices, such as the proliferation of feedlots for cattle in the Midwest and Southwest in the 1960s. The United States Environmental Protection Agency (EPA) classified feedlots as point sources of water pollution in 1973 under its regulations to implement the Federal Clean Water Act of 1972.[14] Therefore, National Pollution Discharge Elimination System (NPDES) permits were required for discharges from these Concentrated Animal Feeding Operations (CAFOs).[15]

B. Increased Integration of Production and Marketing/Geographical Concentration

An important development in the agricultural industrialization process was the use of production contracts and integration of vertically aligned input supply, production, and marketing stages. Such change had the impact of transferring the locus of decision-making for important production from the farm-level to elsewhere in the food processing and agri-business systems. Contracted producers typically owned land and buildings, supplied labor and electricity, and handled manure disposal and disposal of dead birds. The first major application of this integration in the animal industries occurred in the poultry (or broiler) industry in the

Nitrogen with Industrial Nitrogen Fixation, 8 J. PROD. AGRIC. 70, 70-8 (1995).

12. *Id*.

13. M. C. HALLBERG, POLICY FOR AMERICAN AGRICULTURE: CHOICES AND CONSEQUENCES 61 (1992).

14. *See* Clean Water Act, 33 U.S.C.A. §§ 1251-1387 (2002).

15. B. Eghball & J.F.Power, *Beef Feedlot Manure Management*, 49(2) J. SOIL & WATER CONSERV. 113, 113-22 (Mar.-Apr. 1994). A CAFO is defined as an operation that falls under the federal Animal Feeding Operation definition and has more than 1,000 animal units. National Pollutant Discharge Elimination System Permit Regulation and Effluent Limitations Guidelines and Standards for Concentrated Animal Feeding Operations, 66 Fed. Reg. 2960, 2962 (proposed Jan. 12, 2001) (to be codified at 40 C.F.R. pts. 122 & 412). An Animal Feeding Operation is defined as a "lot or facility where animals have been, are, or will be stabled or confined and fed or maintained for a total of 45 days or more in any 12 month period; and where crops, vegetation, forage growth, or post-harvest residues are not sustained over any portion of the lot or facility in the normal growing season." National Pollutant Discharge Elimination System Permit Regulation and Effluent Limitations Guidelines and Standards for Concentrated Animal Feeding Operations, 66 Fed. Reg. 2960, 2967 (proposed Jan. 12, 2001) (to be codified at 40 C.F.R. pts. 122 & 412).

1960s.

The need to achieve economies of scale in processing appears to have been the factor that drove vertical integration to its present level in the poultry industry in the 1950s and 1960s and in the swine industry in the late 1980s and 1990s.[16] Today, economies from the industrialization process have affected the geography of production and have led to clustering where agglomeration economies exist.[17]

Examining the southern United States, Martin and Zearing described the process of change for the broiler industry as revolutionary.[18] Prior to 1950, the broiler industry did not exist because chickens sold for meat were largely a by-product of laying flocks.[19] The industry quickly emerged after World War II and rapidly evolved into a tightly coordinated and intensive industrial sector.[20] Technological advances in housing, breeding, and disease control were important factors affecting its explosive growth.[21] Marketing innovations, such as contracts, emerged to address producer price risks for live broilers and to allow feed dealers a secured market for their products.[22] These arrangements evolved into production contracts in which two parties jointly produce a product with each contributing inputs to the process.[23]

Because live chickens could not be transported at great distances, growers had to be located close to the integrator or processing facilities. For example, in Delaware, Maryland, and Virginia, eight firms were documented in 1994 to have annually produced under contract over 500 million chickens, and about 6,000 chicken factories operated within a 16,000 square kilometer region.[24] Poultry contract producers were typically located within twenty-five miles of the integrator's processing facilities in the Delmarva Peninsula.[25]

16. A. P. Pagano & C. W. Abdalla, Clustering in Animal Agriculture: Economic Trends and Policy, *in* BALANCING ANIMAL PRODUCTION AND THE ENVIRONMENT 193 (Great Plains Animal Agriculture Task Force Conference, Oct. 19-21, 1994) (on file with author).

17. *Id*. at 195.

18. L. L. Martin & K. D. Zearing, *Relationships Between Industrialized Agriculture and Environmental Consequence: The Case of Vertical Coordination in Broilers and Hogs*, 29(1) J. AGRIC. & APPLIED ECON. 45, 45-56 (July 1997).

19. *Id*. at 45.

20. *Id*.

21. *Id*.

22. *Id*.

23. Martin & Zearing, *Relationships Between Industrialized Agriculture and Environmental Consequence: The Case of Vertical Coordination in Broilers and Hogs*, 29(1) J. AGRIC. & APPLIED ECON. at 45-56.

24. C. Narrod et al., Potential Options for Poultry Waste Utilization: A Focus on the Delmarva Peninsula, 23 (1994) (unpublished manuscript, jointly sponsored by the Univ. of Pa., USDA, and EPA, Office of Pollution Prevention and Toxics, on file with author).

25. *Id*. at 14.

Since the 1900s, significant shifts in location of the broiler industry have occurred. Between the 1930s and 1940s, traditional production centered around the Delmarva region but after World War II, due to less expensive land, labor, and capital; attractive credit from feed dealers; and the willingness of southern farmers to accept broiler production contracts, processing shifted toward the southern region. In the mid-1990s, more than ninety percent of broilers were contracted and the sector was highly industrialized.[26] The major integrators consolidated with about twenty firms controlling eighty percent of production and four major firms dominating the market.[27]

More recently, the swine industry began a similar but more gradual transformation toward greater integration of marketing and production through contracts, consolidation, concentration, and geographic shifts of production.[28] Hog production used to be a value-added activity to corn production and was historically concentrated in the mid-western Corn Belt. All of this has changed with the advent of new technologies and marketing practices. Improved housing, disease control, nutrition, and feeding are important technological changes that allowed specialization of production and increases in factory size and efficiency. Such hog production facilities, like those for broilers, needed to be located close to processing plants. New marketing arrangements include contract production, which is not yet used as extensively as it is for broilers. However, much more of North Carolina's significant swine production is contracted than in the traditional mid-western areas.[29]

As the hog industry structure has been transformed, it also shifted in location from the historically strong Midwest to the South and more recently to the Great Plains and West.[30] Growth in production and processing has been especially strong in southern states and in North Carolina, the nation's second leading hog production state. One

26. Martin & Zearing, *Relationships Between Industrialized Agriculture and Environmental Consequence: The Case of Vertical Coordination in Broilers and Hogs*, 29(1) J. AGRIC. & APPLIED ECON. at 45.

27. *Id*.

28. C. Hurt, *Industrialization in the Pork Industry*, 9 CHOICES 9-13 (4th Quarter, 1994); M. Drabenstott, *This Little Piggy Went to Market: Will the New Pork Industry Call the Heartland Home*?, FED. RESERVE BANK KANSAS CITY ECON. REV. 79-97 (3rd Quarter, 1998), *at* http://www.kc.frb.org/Publicat/econrev/pdf/3q98drab.pdf (last visited May 31, 2002).

29. Martin & Zearing, *Relationships Between Industrialized Agriculture and Environmental Consequence: The Case of Vertical Coordination in Broilers and Hogs*, 29(1) J. AGRIC. & APPLIED ECON. at 45-56.

30. M. Drabenstott, *This Little Piggy Went to Market: Will the New Pork Industry Call the Heartland Home*?, FED. RESERVE BANK KANSAS CITY ECON. REV. 79-97 (3rd Quarter, 1998), *at* http://www.kc.frb.org/Publicat/econrev/pdf/3q98drab.pdf (last visited May 31, 2002).

implication of the shift of hog production to new areas is that production is increasingly occurring in areas not accustomed to hog farming, which in effect leads to a potential for misunderstanding and conflict.

Hog industry consolidation and geographical shifts in production have received much attention by researchers and policymakers. Researchers generally agrees less about the key factors affecting swine industry developments in the last ten to fifteen years compared to the important factors surrounding the broiler industry in the 1950s and 60s. Some researchers emphasize market forces and consumer demand,[31] but others point to entrepreneurial or policy factors affecting the consolidation production and geographical shifts.[32]

At least two points raised in these discussions are worth noting. First, while there is considerable agreement that structural change is being driven to a large degree by technology and efforts to achieve economies of scale, there is some disagreement about the role of consumer demand and other factors. Barkema, Cook, Boehlje, and Schrader emphasize an increase in consumer-driven forces and the benefits of greater vertical integration in terms of improved information flow and reduced transaction costs.[33] Rhodes, however, argues that growth in hogs is driven more by entrepreneurial producers who are expanding horizontally to control production costs and increase their returns.[34]

Second, several factors have been suggested as being important in affecting these geographical shifts: a need for new farm enterprises, few barriers to adoption of new technology, a receptive political and social environment, and lack of barriers in the form of public policies (environmental, anti-corporate farming, and local zoning).[35]

There is some disagreement about the relative importance of the factors causing geographical shifts in swine production. For example, different industry observers and researchers have offered different conclusions about the importance of environmental regulations. The evidence regarding these factors is largely anecdotal. Some industry

31. A. Barkema & M. L. Cook, *The Changing U.S. Pork Industry: A Dilemma for Public Policy*, 78 FED. RESERVE BANK KANSAS CITY ECON. REV., 49, 49-66 (2nd Quarter, 1993).

32. V. J. Rhodes, *The Industrialization of Hog Production*, 17 REV. AGRIC. ECON. 107, 107-08 (1995).

33. A. Barkema & M. L. Cook, 78 FED. RESERVE BANK KANSAS CITY ECON. REV. at 49-66; M. Boehlje & L. F. Schraeder, The Industrialization of the Food System: Questions of Coordination 32 (June 5, 1995) (unpublished manuscript, presented at conference on Vertical Coordination in the Food System, Washington, D.C., on file with author).

34. Rhodes, 17 REV. AGRIC. ECON. 107, 107-08.

35. Martin & Zearing, 29(1) J. AGRIC. & APPLIED ECON. 45-56.

observers believe that movement of the swine industry may be due to environmental constraints. For instance, Drabenstott said that the North Carolina legislature passed stronger water quality protection laws after large lagoon breaks caused extensive water pollution in the mid-1990s[36] and have since been a factor slowing the rapid growth of that industry.[37] Such policy developments, as well as evidence of danger of locating large animal facilities in flood plains as revealed by Hurricane Floyd in September 1999, has caused some researchers to predict that hog production will shift to areas with fewer environmental rules.[38] The little systematic research conducted on this issue shows that economic factors along with other factors may be relatively more important than state environmental policy in determining growth and expansion in swine production.[39]

III. Drivers of Agricultural Industrialization

The process of structural change in agriculture is complex. Below, the author explains the importance that structural change in economies is given before addressing agricultural industrialization processes. A central theme of economics and the rationale for capitalism is the concept of economic transformation from less productive to more productive systems. This transformation is based upon advantages of specialization in human activity and trade. It is driven by competition leading to profits for the innovators and lower costs for the producers resulting in higher average real incomes. Industrialization is the organization of production to take advantage of the increased productivity that results from investing in capital goods. Scientific industrialization is based upon specialization in and investments in knowledge to be used to increase productivity. Differences in the capacity to develop and use knowledge are critical factors explaining differences in productivity among groups or countries. In many ways, the industrialization of livestock production rests on recently acquired and applied technical and organizational knowledge (*e.g.*, genetics and

36. R. Smothers, *Waste Spill Brings Legislative Attention*, N.Y. TIMES, June 30, 1995, at A-10.

37. M. Drabenstott, FED. RESERVE BANK KANSAS CITY ECON. REV 79-97 (3rd Quarter, 1998), *at* http://www.kc.frb.org/Publicat/econrev/pdf/3q98drab.pdf (last visited May 31, 2002).

38. J. Bernick, *A Farewell to Farms: Geographic Shift in Livestock Production is in the Wind*, FARM J. (Jan. 2000), *at* http://www.farmjournal.com.

39. Y. Mo & C. W. Abdalla, *An Analysis of Swine Industry Expansion in the US: The Effect of Environmental Regulation*, 39 (Dept. of Agric. Econ. & Rural Sociology staff paper no. 316, Mar. 1998); J. Sullivan, *Environmental Regulation and the Location of Hog Production*, 19-23 AGRIC. OUTLOOK (U.S. Dept. of Agric., Sept. 2000).

management practices).[40]

A. Stages of the Agricultural Industrialization Process

United States Department of Agriculture (hereinafter USDA) researchers examined the industrialization process through case studies of the poultry sector and several other sectors.[41] They identified three sets of external forces: new mechanical, biological, or organizational technology; shifting market forces and demand; and new government policies and programs that initiated the structural change process.[42] *Technological* factors that were changing in the broiler industry in the 1950s and 1960s included mechanical and engineering advances in bird-housing, materials-handling and processing, and adaptable organizational technology such as contracting and vertical integration.[43] Important *market-related* factors were the existence of alternative production areas eager to accept new enterprises, potential for expanded consumption, high product-market risks with respect to both price and access, high input risk in the form of difficulty in accessing capital, and ease of entry into production.[44] *Policy* factors conditioning these market shifts included reduced feed grain costs due to the federal commodity programs, federal tax provisions favorable to agriculture, and antitrust rules that were not prohibitive of past industry activities.[45]

B. The Four Stages of Industrial Evolution

Reimund, Martin, and Moore, USDA researchers, concluded that structural change is catalyzed by one or more external factors prompting an adjustment process that occurs in four stages:

(1) *technological change*-innovators adopt new technology;

(2) *locational shifts*-production of the commodity moves to areas more amenable to changed methods than to traditional ones;

(3) *growth and development*-output rises as a result of newly gained efficiencies; and

(4) *adjustment to risks*-new institutions for coordination emerge and relationships within the sector evolve to manage new risks. The shifts of

40. C. W. Abdalla & J. D. Shaffer, *Politics and Markets in the Articulation of Preferences for Attributes of the Rapidly Changing Food and Agricultural Sectors: Framing the Issues*, 29(1) J. AGRIC. & APPLIED ECON. 57, 57-71 (July 1997).

41. *See* D. A. Reimund et al., *Structural Change in Agriculture: The Experience for Broilers, Fed Cattle and Processing Vegetables,* USDA-ERS TECHNICAL BULLETIN NO. 1648, at 65 (1981).

42. *See id*.

43. *See id*.

44. *See id*.

45. *See id*.

the poultry industry out of New England and to the Delmarva Peninsula and other areas of the country can be explained by this progression.[46]

While acknowledging that their model needed further validation, Reimund et al. identified a set of structural control variables for influencing the structural change process.[47] These policy "levers" included commodity programs, tax policy, reclamation policies in the West, consumer protection, antitrust policy, environmental policy, and public spending on research on new technologies.

The researchers cautioned that it would be difficult to control agricultural structure by manipulating existing policy variables, noting that "[t]he policy factors appeared to influence the structure of the three sub-sectors largely through their interaction with technological development and market forces." In this respect, they were influential in attracting new entrants and equity capital to the sub sectors and in causing the geographic shifts in production regions.[48] An important conclusion of this study is that public policy change could indirectly provide a basis for influencing the structural change process through impacts on such structural dimensions as adoption of technology, producer risks, and geographic location.

IV. Why ILOs Have Become Controversial

Changes in animal agriculture have created third-party or external impacts for society at large.[49] Water and air quality degradation are frequently cited examples. The conflicts themselves can be very complex and may involve a broad set of concerns. During a recent study in Pennsylvania, researchers identified the following six general areas of public concern:

Environmental Use,
Health and Safety,
The Role of Government Officials,
Economic Impact,
Community Conflicts About Farming and Our Food Supply, and
Decision-making Processes About Intensive Livestock Operations.[50]

46. *See* Reimund et al., USDA-ERS TECHNICAL BULLETIN NO. 1648, at 65.
47. *See id*.
48. *See id*.
49. Thomas N. Urban, *Agricultural Industrialization: It's Inevitable*, 6 CHOICES 4-6 (4th Quarter, 1991); D. E. Ervin & Katherine R. Smith, *Agricultural Industrialization and Environmental Quality*, 6 CHOICES 9 (4th Quarter, 1994).
50. C. W. Abdalla et al., *Alternative Conflict Resolution Strategies for Addressing Community Conflicts over Intensive Livestock Operations*, FINAL REPORT FOR PENNSYLVANIA DEPARTMENT OF AGRICULTURE CONTRACT ME 228432, at 12 (Sept. 2000).

Researchers developed these areas by analyzing data compiled from personal interviews with representatives of diverse stakeholder groups.[51]

The conflict resolution literature suggests there are at least three broad issues that people can disagree about concerning the creation of ILOs.[52] First, a disagreement may be about the people, including their personalities, behaviors, or past relationships.[53] Second, a dispute may occur over processes or the informal or formal rules guiding patterns of interaction among parties and possibly patterns that escalated the conflict.[54] Third, a conflict may be about the problem or the substance of the issue causing a conflict.[55] This dimension of conflict is about the actual issues and interests that are the reason for the dispute.[56] The major emphasis here will be on the third dimension of the conflict, the *content* of problems that have been the consequences of the industrialization process that have led to the creation of ILOs.

A. Adjusting to the Impacts of Industrialization

Adjustment to industrialization is a dynamic and ongoing process. New interdependencies and third-party or external effects brought about by industrialization can create outcomes that are less desirable in addition to positive outcomes such as expanded employment or increased profits. Existing institutions and policies may become inadequate or obsolete as a result. New institutional arrangements may be needed to articulate consumer and citizen preferences and to coordinate economic activities to better meet societal goals.[57]

In the case of animal agriculture, industrialization often changes relationships among the firms in the vertical chain and can lead to new or more extensive external effects from agricultural production. Nearby residents or farm-related businesses that perceive they will be harmed by these effects may attempt to protect themselves or take advantage of opportunities resulting from industrialization. The interaction of these actors in the political arena produces changes in policies and institutions that will determine the extent to which external effects of animal production are taken into account by farmers and input suppliers or processors and the distribution of benefits and costs to food and

51. *Id*.
52. J. E. BEER & E. STIEF, THE MEDIATOR'S HANDBOOK 12 (3rd ed. 1997).
53. *Id*.
54. *Id*.
55. *Id*.
56. *Id*.
57. J. D. Shaffer, *On Institutional Obsolescence and Innovation-Background for Professional Dialogue on Public Policy*, 51 AM. J.AGRIC. ECON. 245, 245-67 (May 1969).

agricultural firms, consumers, or nearby residents and communities.[58]

At least part of the controversy over ILOs stems from the possibility that facilities may be located in areas that the animal species is not common or in areas that the production or marketing (and implicitly ownership and decision-making) practice is not familiar to the residents. The recent advances of technologies and practices and the uncertainty about the environmental impact of ILOs may play a role in the willingness of neighbors or community members to accept facilities in their area. For example, in the case of marketing arrangements, a neighbor may prefer a local farmer's manure management practices over an integrated or contracted facility's manure management where more decision control rests outside the community.

B. The Public Policy Response

Structural change in animal agriculture has important ramifications for local and regional environmental, health, and community well-being. Environmental quality issues, particularly water quality issues, have been primarily addressed by federal and state laws. Policies and jurisdiction for other environmental issues, such as water allocation or air quality, vary on a state-to-state basis and are often less clear.

1. Nutrient/Water Quality Issues

As animal production becomes more specialized and intensified, more nutrients in the form of animal feed are brought into a region than when the farm was an integrated crop-livestock operation. Typically, only about one-third of these nutrients leave the farm with the animal or animal products.[59] As a result of expanded contract production that has accompanied industrialization, responsibility for dealing with the residual nutrients generally lies with the producer. Since most animal manure is costly to transport and usually has low economic value, it often is spread on or near farm fields. In many areas and regions, expansions in animal agriculture have dramatically increased the burdens placed on local environments to accept these wastes, leading to degradation of water supplies with nitrogen, phosphorus, or bacteria. Available evidence, while not complete, suggests that animal production has significantly contributed to the pollution of surface and groundwater

58. C. W. Abdalla & J. D. Shaffer, *Politics and Markets in the Articulation of Preferences for Attributes of the Rapidly Changing Food and Agricultural Sectors: Framing the Issues*, 29(1) J. AGRIC. & APPLIED ECON. at 61-2 (July 1997).

59. L. E. Lanyon, *Implications of Dairy Herd Size for Farm Material Transport, Plant Nutrient Management, and Water Quality*, 74 J. DAIRY SCI. 334, 334-44 (1992).

supplies.

2. Federal Clean Water Act[60]

The federal approach to addressing environmental problems attributable to animal agricultural has been largely piecemeal, decentralized, and typically reactive. Under the Federal Clean Water Act, permits for discharging waste into surface water are required only for confined animal feeding operations with greater than one thousand animal unit equivalents.[61] Implementation of the permitting process varies by EPA region. Moreover, the implementation of the permitting process varies greatly across the country. As of 1995, 1987 of an estimated 6600 feedlots with greater than one thousand animal units had discharge permits.[62] As an overall national program, this program's implementation has been limited in scope.[63] The lack of nationwide implementation of the CAFO permit program has been an additional factor that has fueled controversy about ILOs and diminished some citizens' and organizations' faith in the ability of government officials to effectively regulate them.

In December 2000, the EPA proposed the first major revisions to the federal CAFO permitting program.[64] This was in part due to environmental groups' lawsuits to enforce EPA's implementation of the Clean Water Act.[65] In addition, EPA noted that the structure of the farm animal industry had significantly changed since the rules were developed in the 1970s.[66]

C. Policy Responses to Other Consequences from Industrialization

A variety of policy initiatives have emerged at the local and state levels in response to the effects of industrialization. Citizen concern about expansion of animal facilities often extends beyond environmental

60. Clean Water Act, 33 U.S.C.A. §§ 1251-1387 (2002).

61. National Pollutant Discharge Elimination System Permit Regulation and Effluent Limitations Guidelines and Standards for Concentrated Animal Feeding Operations, 66 Fed. Reg. 2960, 2962 (proposed Jan. 12, 2001) (to be codified at 40 C.F.R. pts. 122 & 412).

62. UNITED STATES GOVERNMENT ACCOUNTING OFFICE, ANIMAL AGRICULTURE: INFORMATION ON WASTE MANAGEMENT AND WATER QUALITY ISSUES, S. REP. NO. 95-200, at 3 (June 1995).

63. K. R. Smith & P. J. Kuch, *What We Know about Opportunities for Intergovernmental Institutional Innovation: Policy Issues for an Industrializing Animal Agriculture Sector*, 77 AM. J. AGRIC. ECON. 1244, 1244-49 (Dec. 1995).

64. *See* 66 Fed. Reg. at 2960.

65. *See id*.

66. *See id*.

degradation to include noxious odors; negative impact upon existing farms, jobs, businesses, infrastructure and property values; and change in the character of the rural landscape.[67] In some states or regions, no state or local law exists to regulate odor control, insect population growth, and water quantity appropriation, and there is no "institutional home" for these concerns. Citizens who feel they have been hurt have no state agency to complain to or go to for help. In some cases, frustrated citizens with heightened concerns about animal operations, particularly large hog farms, have pressured local politicians to impose stringent local environmental or land use controls, moratoria, or other ordinances that regulate animal agriculture. Such decisions have led to disputes over state-local control and preemption and increased uncertainty about who can make decisions about ILOs.[68]

V. Industrialization Impacts Challenge Our Institutions and Policies

In the last section, the consequences of industrialization are considered from a broader institutional economics perspective. Specifically, insights from a framework developed by Shaffer are applied to animal agricultural issues.[69] Emphasis is upon how industrialization leads institutions to become obsolete, citizens' tendency to perceive only the negative impacts of animal industrialization of import to them, and problems citizens face in articulating the concerns about such impacts.

A. Institutional Obsolescence

While current policies lead to achievement of certain food system performance goals such as providing low cost meat and milk of the kind desired by consumers, they fall short in meeting environmental quality goals. As a result of many prior policy decisions, an elaborate infrastructure and incentive system currently exists for hauling animal feed and other inputs long distances for use in specialized animal production. While residuals in the form of manure are significant by-products, little incentive exists for relocating nutrients away from the farm. Thus, they accumulate on or near farms, leading to environmental

67. N. D. Hamilton, *Trends in Environmental Regulation of Agriculture*, *in* INCREASING UNDERSTANDING OF PUBLIC PROBLEMS AND POLICIES 111 (1995); Smith & Kuch, 77 AM. J. AGRIC. ECON. at 1245-46.

68. C. W. Abdalla & J. D. Shaffer, *Politics and Markets in the Articulation of Preferences for Attributes of the Rapidly Changing Food and Agricultural Sectors: Framing the Issues*, 29(1) J. AGRIC. & APPLIED ECON. at 67.

69. J. D. Shaffer, *On Institutional Obsolescence and Innovation-Background for Professional Dialogue on Public Policy* 51 AM. J. AGRIC. ECON. 245-267; J. D. Shaffer, *Food System Organization and Performance: Toward a Conceptual Framework*, 62 AM. J. AGRIC. ECON. 310, 310-18 (May 1980).

degradation and other concerns.

Another indicator of institutional obsolescence is that some concerns that do not yet have legal or regulatory status, such as odor, are often bundled and expressed with those that do, such as water quality. Academics or government agency staff can partition the complex issues and discuss the "water quality" issue or the "odor" issue. In the real world, such distinctions are blurred. In impacted areas for which no rules exist to deal with new or newly perceived consequences from industrialized animal agriculture, there are important barriers for those who wish to express their concerns about such issues. Nuisance issues, such as odor, have no existing legal framework to either define them or force them to be taken into account. People concerned about them get frustrated and attempt to get their suggestions registered by whatever means open to them. One way this can be accomplished is by attaching one issue to another issue that already is recognized as legitimate, such as protecting water quality.[70] Interest group politics and selective perception of rights may result in preferences being worked out in unexpected jurisdictions. In some instances, odor may be the real local issue, but the preferences for protection from odor of livestock enterprises may be expressed by support for more stringent state water quality rules.

B. A Call for Institutional Innovation

Viewed in a structural context, the institutions that have evolved are incomplete; the current system's markets and institutions provide no incentives for producers to relocate nutrients off-farm where environmental harm may be reduced. An urgent research and policy education challenge is the design and testing of new institutions that effectively allow stakeholders affected by manure (*i.e.*, nearby residents and communities) to articulate their concerns and have their preferences considered by decision-makers. Since one perspective is that ILOs are a locally unwanted land use, research and education could benefit from experiences in using negotiation and compensation that have been met with success in dealing with the conflict associated with sitting landfills and other locally unwanted land uses.

70. N. D. Hamilton, *Trends in Environmental Regulation of Agriculture*, *in* INCREASING UNDERSTANDING OF PUBLIC PROBLEMS AND POLICIES 111 (1995); C. W. Abdalla & T. W. Kelsey, *Breaking the Impasse: Helping Communities Cope with Change at the Rural-Urban Interface*, 51 J. SOIL & WATER CONSERV. 462, 462-66 (Nov.-Dec. 1996).

VI. Conclusion: Greater Attention on Boundary Issues Needed

Jurisdictional boundaries are a key concept in analyzing animal waste issues and a critical choice variable in designing institutions and policies to address the consequences of industrialization. This section discusses three levels at which jurisdictional boundaries are a critical decision variable affecting the resolution of ILO conflicts: within firms, within governments (vertically within federal, state, and local units), or within agencies (horizontally within different government agencies). For controversies over ILOs to be more effectively resolved, public policy makers will need to emphasize boundaries at each of these levels.

1. Firm Boundaries

At the firm level, a business makes decisions that spill over its property boundaries. Current policies and institutions dictate what effects firms have to take into consideration as costs and what effects they can ignore. Public policies about water quality, nutrient management, or nuisance issues are essentially defining the boundary of the firm's domain. Effectively, such policies cause firms to take third-party effects into their internal cost accounting. Moreover, such public policy decisions redefine property rights and thereby determine the burdens (costs) and benefits of particular decisions and actions.

2. Governmental (federal, state, and local) Boundaries

The external effects may also cross governmental boundaries and are borne by nearby residents (or future residents). Concerns about pollution are often expressed in local government units and result in changes at the county or municipal level where the authority to control land use lies. Since the boundaries do not coincide with the decision-making domain of firms to which the producer is linked or within which he or she operates (*i.e.*, regional, national, and global markets), a local jurisdiction may have little recourse in affecting the problem. Enactment of a local land-use law may cause production to shift to other areas where less stringent rules exist rather than changing the firm's behavior to modify operations within the jurisdiction. If the alternate location has less appropriate physical conditions, greater nutrient surpluses, or sensitive or unique ecosystems, even greater net environmental damage may result from the change. However, a shift could also reduce total environmental damage. At this point, no higher authority coordinates change and attempts to ensure that regional shifts will be made to places where environmental harm is the least. Federal policy has been moving in the direction of transferring authority to the states. Also, some states,

including Pennsylvania, have enacted laws limiting local governments' abilities to regulate animal operations. Such approaches have had some advantages in uniformity within a state, but they may also inhibit development of policies appropriate to local conditions and preferences. It is at this level that many of the conflicts over animal agricultural issues arise.

The institutions that allow expression of concerns about the positive or negative effects of animal operations and procedures for mediating conflicts vary considerably by state and local areas. Given that the federal government is moving toward decentralizing authority and that important federal policies (*e.g.*, farming taxes) continue to encourage industrialization processes, the variation among policies affecting animal agriculture is likely to be even greater in the future. A critical policy issue is the possible effect that differences in local and state institutions and policies for water quality laws, land use laws, right-to-farm laws, and public participation have on location of production. Hurt and Zearing suggest that in the early 1990s, less stringent water quality regulations in North Carolina were an important factor influencing movement of hog farms into that state.[71] Additional research is needed to better document these relationships.

3. Government Agency Boundaries

A third level at which boundary issues are important is related to inter-agency decisions. A horizontal perspective on such issues looks at the different agencies that tackle a particular issue or concern. For animal waste issues at the federal level, the answer to this boundary question relates to the relative degree of involvement of the USDA and EPA. At a state level, the choice of different agencies is the Department of Agriculture, Department of Environmental or Natural Resources, or the Department of Health and Economic Development. Because each agency's mission, approach, operating procedures, and organizational structure differ, the answers for resolving controversy over ILOs and developing and implementing policy will likely differ depending on each agency's role.

71. C. Hurt & K. Zering, *Hog Production Booms in North Carolina: Why There? Why Now?*, PURDUE AGRIC. ECON. REP. 13 (Aug. 1993).

The National Agricultural Law Center

NatAgLaw@uark.edu $ (479) 575-7646

An Agricultural Law Research Article

Federal Regulation of Animal and Poultry Production Under the Clean Water Act: Opportunities for Employing Economic Analysis to Improve Societal Results

by

Theodore A. Feitshans, J.D. and Kelly Zering, Ph.D.

Originally published in PENN STATE ENVIRONMENTAL LAW REVIEW
10 PENN ST. ENVTL. L. REV. 193 (2002)

www.NationalAgLawCenter.org

Federal Regulation of Animal and Poultry Production Under the Clean Water Act: Opportunities for Employing Economic Analysis to Improve Societal Results

Theodore A. Feitshans, J.D.* and
Kelly Zering, Ph.D.**

I. Introduction

The Clean Water Act became law in 1972 as an amendment to the Federal Water Pollution Control Act.[1] The declared purpose of Congress was to "restore and maintain the chemical, physical, and biological integrity of the Nation's waters."[2] To achieve this purpose Congress established a comprehensive regulatory program to address all sources of surface water pollution. This program included deadlines that have generally not been met by the Environmental Protection Agency (EPA). As a result, various interested groups have brought numerous lawsuits in federal courts against the EPA to force it to comply with the requirements of the Clean Water Act.

II. The Framework Established by the Clean Water Act

Several sections of the Clean Water Act apply to livestock and poultry production. The sections cited as authority in EPA's January 12, 2001 *Proposed Rule for the National Pollutant Discharge Elimination System Permit Regulation and Effluent Limitations Guidelines and Standards for Confined Animal Feeding Operations* are sections 301,

* Dr. Theodore A. Feitshans is a Lecturer and Extension Specialist at the Department of Agricultural and Resource Economics at North Carolina State University.

** Professor Kelling Zering is an Associate Professor at the Department of Agricultural and Resource Economics at North Carolina State University. Professors Feitshans and Zering would like to thank Professor Terence J. Centner, University of Georgia, for his comments on the article and John Porter, a Symposium Articles Editor, and Lauren Carothers, Editor-in-Chief, for their role in editing the article.

1. Clean Water Act, 33 U.S.C.A. §§ 1251-1387 (2002).
2. 33 U.S.C.A. § 1251(a).

304, 306, 307, 308, 402, and 501.[3] These sections apply to livestock and poultry operations that may be considered point sources of water pollution. The Clean Water Act makes important distinctions between point and nonpoint sources of water pollution. Point sources are defined in section 502(14) of the Clean Water Act:

> The term "point source" means any discernable, confined and discrete conveyance, including but not limited to any pipe, ditch, channel, tunnel, conduit, well, discrete fissure, container, rolling stock, concentrated animal feeding operation, or vessel or other floating craft, from which pollutants are or may be discharged. This term does not include agricultural stormwater discharges and return flows from irrigated agriculture.[4]

Animal and poultry production operations that are not point sources are regulated under other sections of the Clean Water Act with section 319 being of paramount importance. Regulation of nonpoint sources is far less stringent and restrictive than regulation of point sources. There is a very significant cost advantage to being regulated as a nonpoint source. Regulation of these nonpoint sources is beyond the scope of this paper. This is not to give the impression that other dischargers are regulated as nonpoint sources; indeed most industries, all sewage treatment plants, and cities and others discharging storm water from storm sewer systems are required to have national pollutant discharge elimination system (NPDES) permits. This topic, however, is also beyond the scope of this paper.

Once it is determined that an animal or poultry production operation is a point source, the entire production operation is regulated as a point source.[5] To provide an example, a dairy may be deemed a confined animal feeding operation (CAFO) because the dairy cows are confined in a milking facility for part of the day. Once the threshold test for CAFO status (discussed further in this paper under *Threshold Considerations*)[6] is met, the required permit will include not only the area of confinement but also all other areas involving the dairy cows, including the land upon which they graze.

3. National Pollutant Discharge Elimination System Permit Regulation and Effluent Limitations Guidelines and Standards for Concentrated Animal Feeding Operations, 66 Fed.Reg. 2960 (Jan. 12, 2001). As will be discussed later in this paper under TMDLs, section 303(d) was not cited as authority.

4. Clean Water Act, 33 U.S.C.A. § 1362(14) (2002).

5. National Pollutant Discharge Elimination System Permit Regulation and Effluent Limitations Guidelines and Standards for Concentrated Animal Feeding Operations, 66 Fed. Reg. 2960, 3029-3032 (proposed Jan. 12, 2001) (to be codified at 40 C.F.R. pts. 122 & 412).

6. *Infra* pp. 5-8.

Section 402 establishes the permitting system for point sources of surface water pollution.[7] Congress denominated this system the national pollutant discharge elimination system (NPDES). The general requirements for issuance of a NPDES permit include specific controls on the release of recognized pollutants and the opportunity for the public to comment on the terms of each permit prior to issue. There are two basic types of NPDES permits: general and individual. General permits are issued, after the opportunity for public comment to cover dischargers whose discharges are relatively minor. Once a general permit is issued, anyone covered under the terms of the general permit need not apply for an individual permit. There are, however, usually conditions in general permits, including notice to EPA of the discharge and, in some instances, an allowance for public comment prior to the discharge being authorized. Individual permits are required of all other NPDES permittees. Public comment is always required for each individual permit application.

EPA is authorized to conduct the NPDES program in each state in the absence of an approved state program.[8] Once a state program has been approved, the EPA is required to suspend its program within ninety days after submission of the state program. States that wish to either operate their own programs or joint programs with other states under the terms of interstate compacts must submit a full and complete description of the proposed program to the EPA. A competent legal authority within the state, usually the state attorney general, must also submit a statement that the laws of the state, or the applicable interstate compact, provide adequate authority to operate the program proposed. State permits, under any program proposed, must comply with all requirements of the Clean Water Act including regulations promulgated by EPA under its authority; must be of fixed term with a duration not to exceed five years; must be terminable for violation of a permit condition, false statement or inadequate disclosure on the permit application, or changed conditions that require temporary or permanent suspension of the permitted discharge; and must control the discharge of pollutants into wells.[9] State programs are also required to provide for adequate enforcement, including civil and criminal sanctions.[10] State programs must include a variety of reporting and coordination requirements to ensure an adequate flow of information to the EPA, the U.S. Army Corps of Engineers, and other states that may be affected by permits issued. Where a state fails to meet the requirements of the Clean Water Act, the EPA may withdraw

7. 33 U.S.C.A. § 1342.
8. These programs are conducted by EPA's regional offices.
9. 33 U.S.C.A. § 1342(b).
10. 33 U.S.C.A. § 1342(b)(7).

the state's authority to issue permits.[11] The existence of a state program does not limit the authority of EPA to bring enforcement actions.[12] In section 101(b) of the Clean Water Act, Congress recognized the primacy of the state role in the protection of surface water quality. Thus, the Clean Water Act represents a minimum standard for water quality protection with states allowed and encouraged to set their own higher standards. A frequent criticism of EPA is that it takes no action against states that operate lax programs; of course, critics, subject to limitations in the Eleventh Amendment, are free to bring citizen suits against such states to test their program, or against EPA or the alleged violators.[13]

Section 301 of the Clean Water Act[14] provides authority for the effluent limitations that form permit conditions under NPDES permits issued under section 402. Section 301 requires that each NPDES permit holder adopt "best practicable control technology."[15] Best practicable control technology is defined by the EPA in section 304(b).[16] Section 304(b)(1)(B) authorizes EPA to consider "the total cost of application of technology in relation to the effluent reduction benefits."[17] An effluent reduction benefit is not defined in the Clean Water Act. Other factors that the EPA is authorized to consider when assessing the best practicable control technology include the age of the equipment and facilities involved, the process employed and other engineering considerations, non-water quality environmental impacts, and other factors as determined by the EPA.[18] From this authority, EPA has developed a complex approach for evaluating and approving technologies.

Understanding the regulatory approach to CAFOs is assisted by the knowledge that Congress drafted the Clean Water Act with the belief that elimination of the discharge of pollutants to surface waters was both desirable and possible.[19] This approach is reflected in the performance standards for the control of discharges established in section 306.

A. Citizen Suits

Section 505 of the Clean Water Act provides a powerful tool to

11. 33 U.S.C.A. § 1342(c)(3).
12. 33 U.S.C.A. § 1342(i).
13. 33 U.S.C.A. § 1365.
14. 33 U.S.C.A. § 1311.
15. 33 U.S.C.A. § 1311(b)(1)(A).
16. 33 U.S.C.A. § 1314(b).
17. 33 U.S.C.A. § 1314(b)(1)(B).
18. 33 U.S.C.A. § 1314(b)(1)(B).
19. 33 U.S.C.A. § 1251(a)(1). When Congress enacted the Clean Water Act in 1972, it set as its goal that discharges be eliminated by 1985!

environmental organizations and others seeking to enforce the terms of the Clean Water Act. Section 505(a)(1) authorizes suits to enforce effluent limits or standards, or orders of the EPA or a state.[20] These suits may be brought against any person including an instrumentality of the United States or a state, except to the extent limited by the Eleventh Amendment. Such suits may also be brought against the EPA where the EPA has failed to perform an act under the Clean Water Act that is not discretionary.[21] Citizen suits to enforce a standard, limitation, or order may not be commenced "prior to sixty days after the plaintiff has given notice of the alleged violation (i) to the Administrator [of EPA], (ii) to the State in which the alleged occurs, and (iii) to any alleged violator . . . ."[22]

If the EPA or a state is already diligently pursuing a criminal or civil action against an alleged violator, no citizen suit may be commenced except that any citizen may intervene as of right.[23] Actions against the EPA for failure to perform an act may be commenced only after sixty days notice.[24] Citizens who may bring citizen suits are restricted to those who have been or may be adversely affected by the alleged violation or failure of the EPA to act.[25]

Citizen suits must be brought in the district court of the district in which the alleged violation occurred.[26] The EPA is permitted to intervene in any such suit as of right. In any such suit, even if the EPA elected not to intervene, no consent judgment may be entered by the court prior to forty-five days after the proposed consent judgment has been served upon the EPA and the U.S. Attorney General. The right to bring a citizen suit does not limit any right that might have existed under state or common law.[27]

Citizen suits have been a driving force behind EPA's proposed revisions of its CAFO regulation and effluent limitations guidelines. The current proposed rules are the result of a consent decree settling litigation. The Clean Water Act authorizes the court to award the costs of litigation including reasonable attorney fees and expert witness fees to the prevailing or substantially prevailing party.[28] To prevail against the owner or operator of a livestock farm, the party bringing the citizen suit must prove that the owner or operator is a CAFO and demonstrate that

20. 33 U.S.C.A. § 1365(a)(1).
21. 33 U.S.C.A. § 1365(a)(2).
22. 33 U.S.C.A. § 1365(b)(1)(A).
23. 33 U.S.C.A. § 1365(b)(1)(B).
24. 33 U.S.C.A. § 1365(b)(2).
25. 33 U.S.C.A. § 1365(g).
26. 33 U.S.C.A. § 1365(c)(1).
27. 33 U.S.C.A. § 1365(e).
28. 33 U.S.C.A. § 1365(d).

the operator was either operating without a permit or in violation of an existing permit.

B. CAFO Regulations and Effluent Limitations Guidelines Currently in Force: Threshold Considerations

The initial determination is whether a livestock or poultry production operation is an animal feeding operation (AFO). The definition of an AFO is:

> [L]ot or facility . . . where . . . (i) Animals have been, are, or will be stabled or confined and fed or maintained for a total of 45 days or more in any 12 month period, and . . . [where c]rops, vegetation forage growth, or post-harvest residues are not sustained in the normal growing season over any portion of the lot or facility.[29]

Any day that an animal is confined for any part of that day is counted as a whole day for the purpose of the 45-day calculation. The forty-five days per twelve-month period need not be consecutive; they may be scattered throughout the twelve-month period at issue. Facilities where the animals or poultry are kept on a paved surface or dirt floor and the waste is removed to a vegetated area are not considered kept on a vegetated area. Likewise, animals or poultry kept on a dirt lot with minimal vegetation and some vegetation around the fringes of the lot will not be considered kept in a vegetated area.[30]

EPA defines the AFO area as the area where the animals are confined plus the areas necessary to support the operation, including waste storage areas.[31] The definition of the AFO area is important because it determines the geographical area covered by the NPDES permit should the AFO be a CAFO that requires such a permit. Vegetated areas used for spreading waste are not included in the AFO area although improper handling of waste in such areas can give rise to a NPDES permit violation. Separate operations under the same ownership or management that are either contiguous or use the same waste handling system are treated as a single unit for waste handling purposes.

The critical step in determining whether an AFO is a CAFO that requires a NPDES permit is to determine the total number of animal units

29. 40 C.F.R. 122.23(b)(1).

30. EPA, Guidance Manual and Example NPDES Permit for Concentrated Animal Feeding Operations, Review Draft, Washington, D.C. (August 6, 1999).

31. National Pollutant Discharge Elimination System Permit Regulation and Effluent Limitations Guidelines and Standards for Concentrated Animal Feeding Operations, 66 Fed. Reg. 2960 at 2993-2996, 3135-3136 (explaining that EPA's proposed regulation would clarify existing practice).

in the AFO. EPA defines animal units[32] for slaughter and feeder cattle as 1.0; for mature dairy cattle as 1.4; for swine weighing over twenty-five kilograms as 0.4; for sheep or lambs as 0.1; and for horses as 2.0. Thus one horse is counted as two animal units, while it takes twenty sheep or lambs to equal two animal units. The conversion to animal units facilitates the determination of whether or not a facility with mixed species is a CAFO. Generally any facility that meets the definition of an AFO is a CAFO if it confines more than one thousand animal units at any given time during a twelve-month period.

The regulations also set levels for individual species. If the AFO exceeds these numbers of any individual species then the facility is a CAFO without regard to the total number of animal units. The chart below lists these numbers.

Category of livestock or poultry	Number
Slaughter and feeder cattle	1,000
Mature dairy cattle (milked or dry)	700
Swine (weighing over 25 kilograms)	2,500
Horses	500
Sheep or lambs	10,000
Turkeys	55,000
Laying hens or broilers if the facility has continuous overflow watering[33]	100,000
Laying hens or broilers if the facility has a liquid manure system[34]	30,000
Ducks	5,000

Laying hen and broiler facilities that have neither overflow watering systems nor liquid manure handling systems are not CAFOs under the current regulations; these are dry litter systems. It is EPA's position that dry litter poultry operations either that are improperly operated through storage of litter in improper stack storage systems or conduct improper spreading operations such that rainwater or runoff turns the manure into

32. Note that EPA's definition of an Animal Unit differs from that used by the U.S. Department of Agriculture.

33. A continuous overflow watering system is one that flows constantly as opposed to one that only provides water when a chicken triggers a mechanism, or one that provides stagnant water that is cleaned and refilled on a periodic basis. A liquid manure system is generally similar to the technology used for hogs in contrast to dry litter systems where the chickens are kept on litter and the manure is removed with the litter between flocks. A dry litter system is typically used for broilers, whereas a liquid manner system is typically used for layers.

34. *See supra* note 31.

a liquid slurry can be deemed to have crude liquid manure-handling systems. EPA considers such AFOs to be CAFOs that must make a NPDES permit application. The regulations do not provide animal unit conversion factors for poultry so these species levels are the sole criteria for determining whether poultry facilities are CAFOs.

There is an exemption for large (over one thousand animal units) AFOs if the operator can prove that there has never been nor ever will be a discharge from the AFO, with a limited exemption for extraordinarily heavy rains.[35] It is EPA's position that large AFOs cannot meet this burden. Discharges may occur not only through obvious means such as ditches and pipes but also by direct hydrologic connection to groundwater[36] and by re-concentration of spread waste by storm water runoff. This latter type of discharge occurs when waste is spread but is not yet incorporated into the soil. Rainfall then conveys the dispersed, spread waste to furrows, hence to be concentrated in ditches, etc., and then discharged to surface waters.[37]

AFOs from 301 to 1,000 animal units may also be defined as CAFOs if:

> Pollutants are discharged into waters of the United States through a man-made ditch, flushing system, or similar man-made device; or pollutants are discharged directly into waters of the United States that originate outside of and pass over, across, or through the facility or come into direct contact with the confined animals.[38]

The limited exemption for extraordinary rains applies to these smaller AFOs as it does to the larger AFOs. This, however, is likely to be no easier for the operator to prove than for the operator of a larger AFO. As with the larger AFOs, the regulations also list specific numbers of animals and poultry that will place an operation in this category.

Category of livestock or poultry	Number
Slaughter and feeder cattle	300

35. 40 C.F.R. 122, App. B (a).

36. National Pollutant Discharge Elimination System Permit Regulation and Effluent Limitations Guidelines and Standards for Concentrated Animal Feeding Operations, 66 Fed. Reg. 2960, 3015-3023 (proposed Jan. 12, 2001) (codified at 40 C.F.R. pts. 122 & 412).

37. Concerned Area Residents for the Environment v. Southview Farm, 34 F.3d 114, 117-118 (2d Cir. 1994); Water Keeper Alliance, Inc. v. Smithfield Foods, Inc., No. 4:01-CV-27-H(3), No. 4:01-CV-30-H(3), 2001 U.S. Dist. LEXIS 21314, slip op. (E.D. N.C. Sept. 20, 2001) (holding that the questions of whether a spray field is a point source under the CWA and whether a spray field violates the Resource Conservation Recovery Act (RCRA) are questions of fact to be decided at trial).

38. 40 C.F.R. 122, App. B (a).

Mature dairy cattle (milked or dry)	200
Swine (weighing over 25 kilograms)	750
Horses	150
Sheep or lambs	3,000
Turkeys	16,500
Laying hens or broilers if the facility has continuous overflow watering	30,000
Laying hens or broilers if the facility has a liquid manure system	9,000
Ducks	1,500

There is also a third category of AFO that may be a CAFO.[39] These are AFOs designated on a case-by-case basis because they are significant contributors to surface water pollution. This determination is always made after inspection of the AFO. Factors the regulations require that EPA consider when making this determination are the size of the operation and the amount of waste reaching surface water; the location of the operation relative to surface water; the means by which the waste is conveyed into the surface water; and the slope, vegetation, rainfall, and other factors affecting the likelihood of a discharge. EPA may also consider other factors that it finds relevant. There is no lower size limit on animal and poultry operations that may be required to obtain an NPDES permit under this category.

Section 502(14) of the Clean Water Act states that:

> The term 'point source' means any discernable, confined and discrete conveyance, including but not limited to any pipe, ditch, channel, tunnel, conduit, well, discrete fissure, container, rolling stock, concentrated animal feeding operation, . . . from which pollutants are or may be discharged. This term does not include agricultural storm water discharges and return flows from irrigation agriculture.[40]

The second sentence of the definition of a point source has often been erroneously interpreted to exempt livestock and poultry operations from the NPDES program. If the livestock or poultry operation is a CAFO referred to in the first sentence of the definition, then the agricultural storm water exception will generally not apply. It is EPA's interpretation that for AFOs of three hundred animal units or less, as well as for larger units, storm water that passes in direct contact with animal waste and then into a surface water will convert the AFO into a CAFO

39. 40 C.F.R. 122-23(c).
40. 33 U.S.C. § 1362(14) (2001).

that is not protected by this exemption.[41] EPA's interpretation of the agricultural storm water exemption is narrow and does not apply when:

> The discharge is associated with the land disposal of animal manure and wastewater originating from a CAFO (which is defined as a point source in the CWA and is regulated as a point source); and the discharge is not the result of proper agricultural practices (*i.e.*, in general, the disposal occurred without a [comprehensive nutrient management plan] CNMP developed by a public official or a certified private party or in a manner inconsistent with the CNMP).[42]

The courts have generally followed EPA's interpretation of the agricultural storm water exemption.[43] Therefore, the handling of storm water must be addressed in the application for the NPDES permit.

III. The NPDES Permitting Process under Existing Regulations

As indicated in the previous discussion of the Clean Water Act CAFOs must either apply for an individual NPDES permit or fit within one of the general NPDES permits already established by EPA or the state permitting authority. The elements of an individual permit include the cover page, effluent limitations, monitoring and reporting requirements, record-keeping requirements, and special and standard conditions. The cover page provides legal notice of the applicability of the permit, the authority under which it is issued, and the applicable dates and signatures. The second element of the permit is the effluent limitations. Effluent limitations are the primary means for controlling discharges of pollutants to surface waters. Effluent limitations go to the heart of the NPDES permitting process and will be discussed separately. The third element of an NPDES permit includes monitoring and reporting requirements. The fourth element includes record-keeping requirements. The fifth and sixth elements are special conditions and standard conditions. Standard conditions are those required in all NPDES permits; these are legal, administrative, and procedural requirements. Special conditions are requirements in addition to the effluent limitations. For CAFOs the most important special condition is that operators develop and implement comprehensive nutrient management plans (CNMPs).

CNMPs were described in EPA's Guidance Manual and Example NPDES Permit for Concentrated Animal Feeding Operations. CNMPs

41. USDA & EPA, *Unified National Strategy for Animal Feeding Operations*, 15, *at* http://www.epa.gov/owm/finafost.htm (Mar. 9, 1999).

42. *Id.* at 17-18.

43. Concerned Area Residents for the Environment at 117-118; Water Keeper Alliance, Inc., slip op. at 7-10.

are based upon guidance developed jointly by EPA and the U.S. Department of Agriculture's (USDA) Natural Resources Conservation Service (NRCS).[44] CNMPs are designed to be flexible to reflect new technologies and research on manure management practices. CNMPs are always specific to the applicant's site. A general principle of CNMP development is that nutrients in manure applied to crops or forage should not exceed agronomic rates. An agronomic rate for a nutrient is the recommended quantity of nutrient to produce the optimum yield for that crop or forage. CNMPs address not only the geographic area covered by the AFO but also the areas to which the waste is transported for land application.

The first CNMP component addresses the manure and wastewater handling and storage system. It must be designed to divert clean water, including rainwater and runoff from adjacent land, away from the CAFO site. Leakage from the system must be prevented. There must be adequate storage for liquid manure to provide a margin of safety in the event of heavy rain or other precipitation. Dry manure must be stored in such a way that mixing with rainwater or runoff is prevented. The location decision of both liquid and dry manure facilities must be made considering the location of surface waters, flood plains, and other environmentally sensitive areas. Manure should be treated in a manner that reduces losses to the atmosphere, limits a spawning area for pathogens and vectors, confines noxious odors, and stabilizes nutrients to be applied to land as fertilizer. Dead animals and birds must be properly handled to avoid contamination of either ground or surface waters and to avoid risks to public health. Composting and rendering are often acceptable ways for handling dead animals and birds.

The second CNMP component addresses land application of manure and wastewater. Manure is an effective, albeit dilute, fertilizer source, particularly for nitrogen and phosphorus; however, it must be properly handled to minimize environmental damage. Manure has an added advantage over chemical fertilizers in that it is also an excellent source of supplemental organic matter for soils. The EPA views as critical to this CNMP component that nutrient balance be maintained (nutrients must not be applied in excess of "the capacity of the soil and planned crops to assimilate nutrients and prevent pollution.")[45] The EPA also views as critical that the timing and method of application minimize

44. *See* USDA, *Part 402- Nutrient Management*, *at* http://www.nhq.nrcs.usda.gov /BCS/nutri/gm-190.html (last visited Apr. 25, 2002); *see also* USDA, *Nutrient Management, Code 590*, *at* http://www.nhq.nrcs.usda.gov/BCS/nutri/590.html (last visited Apr. 25, 2002).

45. USDA & EPA, *Unified National Strategy for Animal Feeding Operations*, *at* http://www.epa.gov/owm/finafost.htm (Mar. 9, 1999).

contamination of surface waters with organic matter, minimize the loss of nutrients to ground and surface water, and minimize the loss of nitrogen to the air.[46] Loss of nitrogen to the air reduces the fertilizer value of the manure and, where the nitrogen is in the form of ammonia, contributes to air pollution.

The third CNMP component addresses management of the site where the manure or wastewater is applied. Various cropping practices and conservation measures may be used to minimize movement of nutrients, organic matter, and pathogens from the site of application. The fourth CNMP component addresses record keeping. Detailed records must be kept, retained, and made available to EPA or the state agency upon request. These records must include the amount of manure produced and how it was utilized, including the land to which applied; the date and timing of the application; and the amount of nutrients applied. Records must include both the results of manure and soil testing. The fifth CNMP component addresses alternative utilization options that include transfers to third parties. The sixth CNMP component addresses feed management to reduce the nutrient content of manure.

Every NPDES permit application must be made available for public comment before the EPA or state agency in states with delegated authority can approve it. Generally, the permit, associated permit application, and any required reports that the operator makes to the regulatory authority are public records. The only exception made is for trade secrets. The burden is on the applicant to follow established procedure for designating information to be protected as a trade secret and to prove to the satisfaction of the EPA or state agency that the information is a trade secret. Blanket claims that provide information in support of a permit application as trade secrets are unacceptable.

A. Effluent Limitations

EPA has issued Effluent Limitations Guidelines (ELG) regulations only for feedlots.[47] The ELG regulations permit no discharges. There is no lower limit on the prohibition against discharges so that, in theory, a single molecule of manure from a CAFO detected in surface water constitutes a violation of the CAFO's NPDES permit. These ELG regulations apply only to the confinement and associated areas for CAFOs with over one thousand animal units. Where land application of manure and wastewater is employed, the land application area is not

46. *Id.*
47. 40 C.F.R. 412 (2001).

covered by the existing ELG regulations. CAFOs permitted for one thousand animal units or less are also not covered by the existing ELG regulations. For smaller CAFOs effluent limitations, guidelines must be developed on an individual basis. Where the technology-based ELG regulation is not sufficient to meet water quality standards, the EPA or state agency may require an additional site-specific, water quality standard-based effluent limitation to ensure that water quality standards are met. While the CNMPs and the collection of best management practices (BMPs) that they contain should ensure that effluent limitations guidelines are met, compliance with the CNMPs is not compliance with the ELG regulations.

B. Total Maximum Daily Loads (TMDLs)

In addition to controls on the activities of specific polluters that are implemented through the NPDES permitting process, Congress envisioned ambient water quality standards and plans to meet those standards as part of the Clean Water Act. The Clean Water Act provided for retention of existing state water quality standards and development of new standards.[48] Section 303(d) of the Clean Water Act[49] requires the EPA to develop TMDLs, if the states have failed to act, for all bodies of water that do not meet water quality standards. The EPA's failure to develop TMDLs in the absence of state action has been the source of many citizen suits against the EPA.[50]

The EPA's neglect of TMDLs is a result of its (and society's) decision to focus on the performance standards or proxies for standards embodied in the NPDES program.[51] The NPDES program focuses on what comes out of the pipe (or the edge of a field) rather than the effects of those effluents on the bodies of water into which they are discharged (or may eventually drain into). While much of the language of the NPDES sections of the Clean Water Act is written to pertain to entities that actually discharge directly into surface waters, its meaning and relevance to those that apply wastewater directly to land is far less clear. The NPDES program is an effluent-based program that uses performance standards (or in the case of CAFOs, proxies defined by prescribed

48. 33 U.S.C. §§ 1313(a)-(c)(2001).

49. 33 U.S.C. §§ 1313(d)(2001).

50. EPA, *Total Maximum Daily Load (TMDL) Program*, *at* http://www.epa.gov /owow/tmdl/lawsuit1.html (last visited Apr. 25, 2002). This EPA site summarizes TMDL litigation over waters in 42 states.

51. COMMITTEE TO ASSESS THE SCIENTIFIC BASIS OF THE TOTAL MAXIMUM DAILY LOAD APPROACH TO WATER POLLUTION REDUCTION, NATIONAL RESEARCH COUNCIL, ASSESSING THE TMDL APPROACH TO WATER QUALITY MANAGEMENT, 1 (2001) (hereinafter THE NRC REPORT).

technology and practices) to meet its goals. The TMDL program reflects an approach that is much older than the performance standards approach of the NPDES program.[52] In enacting the Clean Water Act, Congress chose to shift the focus from ambient water quality to performance standards because the earlier focus on water quality standards had failed to produce results. It was often difficult to tie one polluter's effluents to an overall failure to meet water quality standards. Without this nexus, enforcement proved difficult since a polluter could avoid an enforcement action if regulators could not show this nexus. Additionally, enforcing ambient water quality standards is very expensive. Standards for each body of water must first be set based upon the expected uses of that body of water. Then each body of water must be monitored to ensure that water quality standards have been met. Issues such as appropriate monitoring methods, frequency of monitoring, location of monitoring sites, and others have greatly complicated this approach. It has been asserted that in 1972 when Congress passed the Clean Water Act an ambient water quality approach to improving water quality was neither scientifically nor economically feasible.[53]

The NPDES program has the advantage that there are a finite number of point source polluters, and these polluters can be required to engage in significant self-monitoring and reporting as a condition of receiving a permit. A performance-based program has the considerable advantage that there is no specific requirement that particular pollutants be tied to particular harms. A permittee either meets performance standards or does not, and, if not, may be found in violation. The NPDES program has resulted in enormous progress in improving surface water quality as it has cleansed the worst sources of water pollution; however, it has not met the Clean Water Act goal of fishable and swimmable water throughout the United States.[54] Even with the reduction of pollutants from point sources, many bodies of water remain seriously impaired as the result of unregulated or under-regulated discharges from point and nonpoint sources.[55] Litigation by citizen groups against the EPA has shifted the focus back toward obtaining improvements through the TMDL program.[56]

On July 13, 2000, in response to litigation, the EPA published a final rule to revise its TMDL rule.[57] As the result of controversy and litigation that this rule created, Congress forbade EPA to use any funds

52. *Id.* at 12-13.
53. *Id.*
54. *Id.* at 1.
55. *Id.*
56. THE NRC REPORT at 1-2.
57. 65 Fed. Reg. 43586 (July 13, 2000).

to implement the rule in either FY2000 (federal fiscal year, October 1 through September 30) or FY2001.[58] EPA intends to delay implementation of its TMDL rule until April 30, 2003 in order to consider the National Research Council Report (The NRC Report).[59] The lack of application of economic principles to the design and implementation of TDML rules may be contributing to their controversial reception.

To develop useful ambient water quality standards, two basic requirements must be met: There must be a designated use and there must be criteria against which it may be measured whether or not the designated use is being achieved.[60] For a designated use to be effective, it must be sufficiently specific such that measurable criteria can be established.[61] Vague goals, such as fishable, swimmable, and supporting recreation or aquatic life are not specific enough to support the development of criteria against which the success or failure of a program to improve impaired waters can be measured.[62] Developers of ambient water quality standards, as well as courts that will ultimately review those standards, must recognize that science cannot eliminate all uncertainty.[63] Any model of water quality in a body of water must include five factors: "alterations in physical habitat, modifications in the seasonal flow of water, changes in the food base of the system, changes in interactions within the stream biota, and release of contaminants (conventional pollutants)."[64] A change in a single one of these five factors may introduce uncertainty into the system. Moreover, social and economic decisions as to the desired conditions of particular bodies of water cannot be avoided.[65] The process of developing TMDLs must be continuous (adaptive implementation) because economic and social conditions, including the uses of land in a watershed and the state of scientific understanding, is constantly changing.[66]

The NRC Report states that many current water quality standards are seriously flawed.[67] Many are unmeasurable.[68] Some are non-exceedance standards or flow restriction standards that are statistically

58. 66 Fed. Reg. 53044 (Oct. 18, 2001).
59. *Id.*
60. THE NRC REPORT at 23.
61. *Id.*
62. *Id.*
63. *Id.* at 31.
64. *Id.* at 28.
65. THE NRC REPORT at 30.
66. *Id.* at 89.
67. *Id.* at 46, 90.
68. *Id.*

incapable of being met.[69] The NRC Report states that flaws in standard setting under the TMDL program may have resulted in substantially more bodies of water being listed as impaired than is merited with a resultant failure to concentrate resources on those bodies of water truly in need of improvement.[70]

The NRC Report recommends that a mechanism be established (by act of Congress if necessary) to confine listed waters to those for which the need for improvement is confirmed.[71] The NRC Report notes that there may be a mechanism in the Clean Water Act for analysis of the sort that the NRC Report recommends, including uncertainty analysis and social and economic analysis, through use attainability analysis (UAA); however, the EPA has failed to develop usable standards for this process.[72] It also notes, by way of footnote, that there is considerable debate over whether 303(d) is a planning exercise only or carries with it the means for enforcing compliance to achieve water quality standards.[73] Even if the TMDL program as required by 303(d) is a planning exercise only, states have the discretion through their legislation to establish enforcement mechanisms. Such an approach would be piecemeal and would make little sense in watersheds that extend across state boundaries. The NRC Report suggests "a cautious approach of taking low-cost actions with a high degree of certainty about the outcome, while taking parallel long-term actions to improve model capabilities and revise control strategies."[74]

IV. EPA's Proposed CAFO NPDES and Effluent Limitations Guidelines Rule

On January 12, 2001, the EPA proposed to modify 40 CFR Parts 122 and 412, the NPDES permit regulation and effluent limitations guidelines and standards for CAFOs.[75] Under a settlement of litigation, the EPA is required to issue a final rule no later than December 15, 2002.[76] The comment period for the proposed rule was extended from its original deadline and closed on July 30. EPA's proposed ELG

69. *Id.*
70. The NRC Report at 5.
71. *Id.*
72. *Id.* at 90-93.
73. *Id.* at 21.
74. *Id.* at 99.
75. National Pollutant Discharge Elimination System Permit Regulation and Effluent Limitations Guidelines and Standards for Concentrated Animal Feeding Operations, 66 Fed. Reg. 2960, 3015-3023 (proposed Jan. 12, 2001) (codified at 40 C.F.R. pts. 122 & 412).
76. National Resources Defense Council, Inc., et al. v. Reilly, Civ. No. 89-2980 (RLC) (D.D.C.).

regulations extend its current approach of allowing no discharges.

EPA's proposed rule included alternatives but would in any case dramatically expand oversight of AFOs by treating many AFOs as CAFOs for the first time. EPA estimates that 12,660 CAFOs with more than one thousand animal units exist and almost all of those require a NPDES permit under current regulations.[77] Of these, only 2,500 have NPDES permits, suggesting a huge noncompliance problem.[78] For EPA's two-tier option, EPA estimates that 19,100 AFOs would be defined as CAFOs that require NPDES permits. Under the three-tier option, EPA estimates as many as 39,330 AFOs would require NPDES permits. Under both sets of proposed regulations, many dry litter poultry operations that are not currently regulated under the CWA would require NPDES permits.

V. The Clean Water Act as a Constraint on Social Welfare

As noted, above, the Clean Water Act sets a goal, but not a statutorily mandated requirement, that all discharges to surface waters be eliminated. Although the goal of eliminating all discharges may not be a statutory mandate, it suffuses the CWA and has set the tone for litigation. This section will demonstrate that this approach is inconsistent with economic principles and the maximization of social welfare.

Economics is the study of optimal resource allocation to maximize the welfare of people. The purpose of policy and regulation is to improve the welfare of the governed people. The primary measure of whether or not a policy or change in policy improves social welfare is whether or not the value of the benefits created exceeds the costs imposed. We make a few points based on these concepts in the following section of the paper.

First, the CWA does not require EPA to maximize social welfare improvement nor even to avoid social welfare loss in regulatory design. Instead, the CWA arbitrarily replaces the goal of social welfare improvement with the goal of 'discharge elimination.' As a result, EPA is allowed and may even be required by the CWA to adopt regulations that significantly reduce social welfare in order to reduce 'discharges.'

A second point made below is that EPA is not required under the CWA to be efficient in the consumption of resources to achieve the goal of 'discharge elimination.' Basic principles of economics imply that in order for a regulation to be efficient, no other regulation should provide

77. National Pollutant Discharge Elimination System Permit Regulation and Effluent Limitations Guidelines and Standards for Concentrated Animal Feeding Operations, 66 Fed. Reg. 2960, 2984.

78. *Id*. at 3080.

the same benefits at lower cost. In contrast, EPA is allowed and may even be required by the CWA to adopt regulations that create "deadweight loss"[79] for society by inefficient attainment of stated goals.

A third point made below is that EPA is not required under the CWA to address social equity considerations in regulatory design. Principles of welfare economics imply that if a regulatory change is truly socially beneficial, then the beneficiaries of the change can compensate those bearing the costs of the change such that no person is left 'worse off' after the change. Conversely, EPA is allowed and may even be required by the CWA to adopt regulations that create significant welfare loss for individuals and/or regions of the country.

The combined effect of the three points listed above is that EPA is allowed and may even be required by the CWA to adopt regulations that impose a significant welfare loss on a small number of individuals and/or regions of the country to produce benefits of considerably less value. Our comments below are also intended to highlight how EPA might maximize social welfare subject to the constraints of the CWA and how Congress might amend the CWA to require EPA to maximize social welfare in regulatory design.

Regarding the first point, while EPA considers costs and benefits in regulatory revisions, there is no legal requirement that such revisions improve social welfare. For example, for the currently proposed revision of the AFO/CAFO rules, EPA estimates "costs of the proposed regulations range from $847 to $949 million annually" while EPA estimates that the "monetized benefits of the proposed regulations range from $146 million to $182 million annually."[80] Costs are roughly 5 to 6 times benefits. Allowing that estimates of costs and benefits may be incomplete and subject to estimation error, the current estimates suggest that the proposed rule change will reduce the welfare of the people of the U.S.A. by $665 million to $803 million per year. Clearly, 'discharge elimination' has supplanted social welfare improvement as the goal of regulation in this case. In practical terms, this means that $665 to $803 million per year will not be available to society for other purposes including reducing pollution from other sources.

EPA (or probably Congress) can substantially improve the social

79. A 'deadweight loss' is defined as a loss "to the devil of inefficiency which is *of no benefit whatsoever to anybody.*" PAUL A. SAMUELSON, ECONOMICS 517, n.10 (9th ed.1973).

80. National Pollutant Discharge Elimination System Permit Regulation and Effluent Limitations Guidelines and Standards for Concentrated Animal Feeding Operations, 66 Fed. Reg. 2960, 3098; *see* Notice of Data Availability, 66 Fed. Reg. 58555 (Nov. 21, 2001). EPA has indicated the availability of new data as the result of the public comment process that may change these and other estimates.

welfare effects of regulation under the CWA by revising their interpretation of 'pollutant discharge' and by developing social welfare-based criteria for the degree to which 'pollutant discharges' will be eliminated. The CWA lists "agricultural waste discharged into water" as a pollutant although it does not address the question of manure or any compound derived from manure as a pollutant. Subsequent judicial decisions have established that manure can be a pollutant.[81] Agricultural storm water discharges are excluded from the definition of a point source;[82] however, CAFOs are included within the definition of a point source[83] so that all discharges (and potential discharges), including most storm water discharges, must be permitted under the NPDES permit system. The term 'pollutant discharge' seems well defined when the pollutant is a toxic substance and the discharge is a direct release into surface water from a 'point source' such as a sewage discharge pipe. That definition has been greatly expanded under current and proposed CAFO rules to include loss of nutrients from a field and loss of nitrogen to the air. Such a definition imposes social welfare loss when it specifies goals under the CWA that, in many cases, have no social benefit. For example, reduction of the loss of the nutrient phosphorus from a field that does not drain to a phosphorus-limited water body produces no social benefit. Similarly, reduction of 'loss' of elemental nitrogen gas (which makes up seventy-eight percent of the atmosphere) from a field produces no social benefit. A 'dead weight loss' to society is sustained to the extent that any net costs are incurred to achieve those reductions. Society's goal under the CWA should be to reduce environmental damage caused by the discharge of pollutants, thereby creating a social benefit. In this stated goal, a substance is only a 'pollutant' when it causes environmental damage upon introduction to a specific environment. For example, phosphorus is only a pollutant when it is introduced to phosphorus-limited water bodies. Also in this stated goal, a 'discharge' is the release of a pollutant into a specific environment (water body) where it causes damage. Loss of phosphorus from a field that does not reach a phosphorus-limited water or the loss of elemental nitrogen gas are not discharges to be regulated.[84]

Indeed, it has been estimated that, for the United States as a whole,

81. Concerned Area Residents for the Environment v. Southview Farm, 834 F. Supp. 1410 (W.D.N.Y 1993), *rev'd*, Concerned Area Residents for the Environment v. Southview Farm, 34 F.3d 114, 1994 U.S. App. LEXIS 24248, 117-118 (2d Cir. 1994).

82. 33 U.S.C.A. § 1362(14).

83. *Id*.

84. Application rates of nitrogen and phosphorus in excess of agronomic rates will not inevitably result in environmental damage. In order for environmental damage to occur, nutrients must be transported from an application site to nutrient-sensitive water.

thirty-five counties have excess nitrogen and 107 counties have excess phosphorus.[85] EPA has conceded that its proposed CAFO regulations could be more precise.[86] EPA has indicated that part of the justification for revision of its CAFO regulations is the changes in the livestock and poultry industries that have led to greater 'industrialization.'[87] EPA fails to provide proof that 'industrialization' of the livestock and poultry industries has made them more polluting, and its proposed CAFO regulation applies equally to 'industrialized' operations and family farms of the same size (of which there are many).[88] Court decisions also imply that it is the change in the structure of the livestock and poultry industries that has necessitated greater regulation under the CWA.[89]

VI. Conclusions

As stated in the previous paragraph, Congress (and EPA) can also substantially improve the social welfare effects of regulation under the CWA by developing social welfare-based criteria for the degree to which 'pollutant discharges' will be eliminated. As a practical matter, EPA does not require total elimination of pollutant discharges since permitted point source dischargers such as municipal sewage treatment plants and industrial waste treatment plants are routinely discharging pollutants in accord with their NPDES permits. Social welfare can be improved if EPA and state regulatory authorities establish reasonable maximum concentrations and cumulative daily quantities that can be discharged by each discharger directly into water bodies. Social welfare-based criteria for determining the degree of pollutant discharge reduction from municipal dischargers or livestock farms are based on cost of reduction versus benefits of reduction. Beyond the revised definitions of 'pollutant' and 'discharge' in the previous paragraph, EPA should classify CAFOs by their characteristics that determine the marginal environmental damage caused by their 'discharges'. Social welfare

85. Terence J. Centner, *Evolving Policies to Regulate Pollution from Animal Feeding Operations,* 28 ENVTL. MGMT. 5, 599, 606 (2001). These estimates range from 35 up to 266 counties for nitrogen and from 107 up to 485 counties for phosphorus, depending on the assumptions made about the availability of land for the application of waste. A further limitation of this analysis is that an individual producer may not have adequate land available for waste application, even if that person is located in a county that, overall, has adequate land. This analysis also does not account for operators who may be applying waste improperly.

86. *Id.*

87. 66 Fed. Reg. 2960, 2974-5.

88. VUKINA, TOMISLAV, THE RELATIONSHIP BETWEEN CONTRACTING AND LIVESTOCK WASTE POLLUTION (Dept. Agric. & Res. Econ., Working Paper, Oct. 2001) (noting that the existing literature does not support the widely held belief that contract livestock producers are larger than independent producers).

89. Water Keeper Alliance, Inc. at slip op. *4.

criteria imply that CAFOs with discharges that cause marginal environmental damage should incur additional costs under revised regulation that do not exceed the reduction in value of environmental damage. In other words, if discharges from a CAFO cause environmental damage of miniscule value, then revised regulations should impose additional costs no greater than the reduction in that miniscule value of damage. These criteria would impose considerable costs on those CAFOs that, due to location (*e.g.*, immediately proximal to points of environmental damage) and perhaps technology and practices, have discharges that cause environmental damage of considerable value. These criteria would not impose significant costs on CAFOs that do not cause environmental damage of significant value. Social welfare-based criteria would eliminate much of the 'deadweight loss' imposed by blanket imposition of practices and technology. A second point is that EPA is not required under the CWA to be efficient in the consumption of resources to achieve the goal of 'discharge elimination.' Given specific goals of discharge elimination or reduction of environmental damage, efficient regulation would stimulate dischargers and others to attain the goals in the least costly manner. Regulatory costs include costs born by dischargers plus government costs such as monitoring and enforcement plus other environmental damage and other damage to the economy (job loss, income loss, tax revenue loss, asset devaluation, etc.). An example of this type of inefficiency is the blanket imposition of "Best Available Technology (Economically Affordable)" (BAT), zero discharge, the Comprehensive Nutrient Management Plan (CNMP), and the proposed Permit Nutrient Plan (PNP) as the minimum standard for CAFOs to comply with NPDES and ELG requirements. The specified technology and practices impose costs on all CAFOs without regard for the social benefits generated at each individual CAFO. CAFOs that may have been able to achieve similar social benefits through use of lower cost technology and practices incur incremental costs that are 'dead weight loss' to society. Congress should modify the CWA to require that regulations allow CAFOs real flexibility in attaining specified environmental damage reduction goals at the least cost. Specific characteristics of individual farms such as size, type, location, climate, soils, and others determine which technology and practices are sufficient. Another element of efficiency is introduced by integrating NPDES programs with TMDLs to allow trading of discharge "rights" and to allow determination of discharge standards in conjunction with TMDL goals.

A third point is that EPA is not required under the CWA to address social equity considerations in regulatory design. Change in regulations can create significant welfare loss for individuals and/or regions of the

country without compensation. For example, new regulations that require that manure nutrients be conserved and spread over a much greater land area disproportionately impact CAFOs in regions characterized by farms of small acreage scattered over numerous non-contiguous fields. The effects of the regulatory change in such a region with a high density of CAFOs are multiplied. Potential damage to the local economy arises from the inability of CAFOs to comply with rules and the termination of operations at some locations. EPA is required to examine the effect of proposed regulations on the distribution of CAFOs and the effect on communities. However, there is no requirement for compensation of individuals as long as only a small proportion of the affected population experience 'severe financial stress.' If the impact on individual communities is found not to be severe, the regulatory change can proceed. No compensation of communities or regions is required for damage to the local economy arising from regulatory change. Analyses of the proportion of the affected population incurring financial stress and analyses of the impact on communities are prone to error and omission. Congress could improve the equity implications of the CWA by requiring that impacts on individuals, communities, and regions be analyzed and that compensation (such as cost share, buy-outs, or transition period payments for compliance) be made available to offset imposed costs. If the regulatory change is truly welfare-improving, society will be 'better off' even after compensation, and no individual or small group will bear a disproportionate share of the costs.

Since the regulatory framework of the CWA as interpreted (probably correctly) by the EPA and the courts does not include maximization of social welfare, socially efficient attainment of goals, or equitable distribution of the costs of regulation (and compliance may in any event be technically impossible), it is hardly surprising that many disputes over CAFOs are resolved through litigation. This problem is exacerbated by the limitations of the CWA to address pollution other than water pollution. For example, CAFO odor is often one of the chief (and legitimate) complaints of plaintiffs in CAFO litigation.[90] The CWA was also never intended to address changes in the structure of agriculture that may form part of the underlying complaint of many plaintiffs in CAFO litigation.[91] Given the stated and unstated objectives of many of the parties to CAFO disputes and the rather narrow confines into which the CWA forces these disputes, owners of livestock and poultry

90. Odor is also not adequately addressed by the Clean Air Act, 42 U.S.C. §§ 7401-7671q. Odor control also poses serious technical problems of measurement and control.

91. National Pollutant Discharge Elimination System Permit Regulation and Effluent Limitations Guidelines and Standards for Concentrated Animal Feeding Operations, 66 Fed. Reg. 2960, 2974.

operations may be forgiven for their widely held belief that their opponents seek not to prevent pollution but to use the CWA to put them out of business. Revision of the CWA and related environmental protection legislation to promote social welfare maximization, efficient attainment of goals, and equity would reduce conflict over environmental improvement and remove constraints on social welfare.

The National Agricultural Law Center

NatAgLaw@uark.edu $ (479) 575-7646

An Agricultural Law Research Article

Searching for a Sense of Control: The Challenge Presented by Community Conflicts Over Concentrated Animal Feeding Operations

by

Nancy A. Welsh and Barbara Gray

Originally published in PENN STATE ENVIRONMENTAL LAW REVIEW
10 PENN ST. ENVTL. L. REV. 295 (2002)

www.NationalAgLawCenter.org

Searching for a Sense of Control: The Challenge Presented By Community Conflicts Over Concentrated Animal Feeding Operations

Nancy A. Welsh* and Barbara Gray**

I. Introduction

The growth in the number of concentrated animal feeding operations ("CAFOs"), particularly those involved in swine production, has brought with it increased community concern and outright conflict in many communities across the United States.[1] Most commentators have focused upon anticipated outcomes to explain the contentiousness of CAFO-related disputes.[2] Meanwhile, even though the social dynamics that contribute to the development and escalation of conflicts over

* Associate Professor of Law and Associate Director of the Center for Dispute Resolution, The Dickinson School of Law, The Pennsylvania State University; B.A. *magna cum laude*, Allegheny College, 1979; J.D., Harvard Law School, 1982.

** Professor of Organizational Behavior and Director, Center for Research in Conflict and Negotiation, Smeal College of Business, The Pennsylvania State University; B.S. *magna cum laude*, University of Dayton, 1968; Ph.D., Organizational Behavior, Case Western Reserve University, 1979.

1. *See* B. J. Hubbell and R. Welsh, *An Examination of Trends in Geographic Concentration in U.S. Hog Production*, 30 JOURNAL OF AGRICULTURAL AND APPLIED ECONOMICS 285-99 (1998).

2. Particularly, commentators have focused on concerns regarding economic viability, environmental contamination, and over-regulation. *See e.g.*, D. L. Bartlett & J. B. Steel, *The Empire of Pigs,* TIME, Nov. 30, 1998, at 52-64; A. Thurow, *An Industrializing Animal Agriculture: Challenges and Opportunities Associated with Clustering, in* PRIVATIZATION OF TECHNOLOGY AND INFORMATION TRANSFER IN THE U.S. AGRICULTURE: RESEARCH AND POLICY IMPLICATIONS (S. Wolf ed., 1997); J. E. Ikerd, LARGE SCALE, CORPORATE HOG OPERATIONS: WHY RURAL COMMUNITIES ARE CONCERNED AND WHAT THEY SHOULD DO (Sustainable Agriculture Systems Program, Univ. of Mo., Working Paper, 1998); U.S. GOVERNMENT ACCOUNTING OFFICE, GAO/RCED-95-200BR, ANIMAL AGRICULTURE: INFORMATION OF WASTE MANAGEMENT AND WATER QUALITY ISSUES (briefing report to the Committee on Agric., Nutrition, & Forestry, U.S. Senate, June 1995).

CAFOs parallel those exhibited in other kinds of community conflicts,[3] little research has systematically examined the social dynamics associated with CAFO conflicts. One exception to this deficiency is recent work conducted by a team of researchers that examined CAFO-related disputes in Pennsylvania in order to make recommendations for alternative models for the resolution of such disputes.[4] The researchers found that Pennsylvania stakeholders' perceived loss of direct and indirect control in the decision-making processes governing CAFOs was at the root of these conflicts.[5] This Article highlights stakeholders' concerns about the procedural fairness of the governmental decision-making surrounding CAFOs, including the negotiation, passage, and implementation of the Pennsylvania Nutrient Management Act ("Act 6"); decisions regarding CAFOs' requests for permits; and townships' adoption of CAFO-related ordinances. The Article argues that these perceptions of procedural unfairness are among the primary factors contributing to Pennsylvania stakeholders' perception of loss of control. Alternative mechanisms for the resolution of CAFO-related disputes, therefore, must respond quite explicitly to the need for procedural justice.

In Part I, based on interviews with stakeholders in Pennsylvania, this Article will describe the model of how conflicts over CAFOs arise and will provide an overview of the stakeholders' perceptions regarding uncertainty, risk, unfairness, threats to identity, and mistrust, and it will demonstrate the effect of these cognitive and affective responses upon perceptions of control. In Part II, the Article will explore the procedural justice implications of the central issues of fairness, identity maintenance, and trust, as well as stakeholders' preferences for more productive resolution of CAFO-related conflicts. Finally, in Part III, the Article will propose five community participation and dispute resolution processes that have the potential to increase the reality and perception of procedural justice for all members of the communities affected by decision-making regarding CAFOs. The analysis in this Article is intended to help policy makers, regulators, and the disputants themselves

3. *See, e.g.*, W. GAMSON, THE STRATEGY OF SOCIAL PROTEST 30-32 & 72-88 (1975); Edgar Schein, *Intergroup Problems in Organizations, in* ORGANIZATIONAL PSYCHOLOGY 96-99 (David Kolb et al. eds., 2d ed 1970); M. SHERIF & C. SHERIF, GROUPS IN HARMONY AND TENSION 105-8 (1966).

4. CHARLES ABDALLA, JOHN BECKER, CELIA COOK-HUFFMAN, BARBARA GRAY & NANCY WELSH, ALTERNATIVE CONFLICT RESOLUTION STRATEGIES FOR ADDRESSING COMMUNITY CONFLICTS OVER INTENSIVE LIVESTOCK OPERATIONS: FINAL REPORT FOR PENNSYLVANIA DEPARTMENT OF AGRICULTURE CONTRACT # ME 448432 [hereinafter ABDALLA ET AL., PENNSYLVANIA REPORT]. *See also*, Charles Abdalla, John Becker, Ralph Hanke, Celia Cook-Huffman, Barbara Gray, and Nancy Welsh, *Community Conflicts Over Intensive Livestock Operations: How and Why Do Such Conflicts Escalate?*, 7 DRAKE J. OF AGRICULTURAL LAW (forthcoming) (2002).

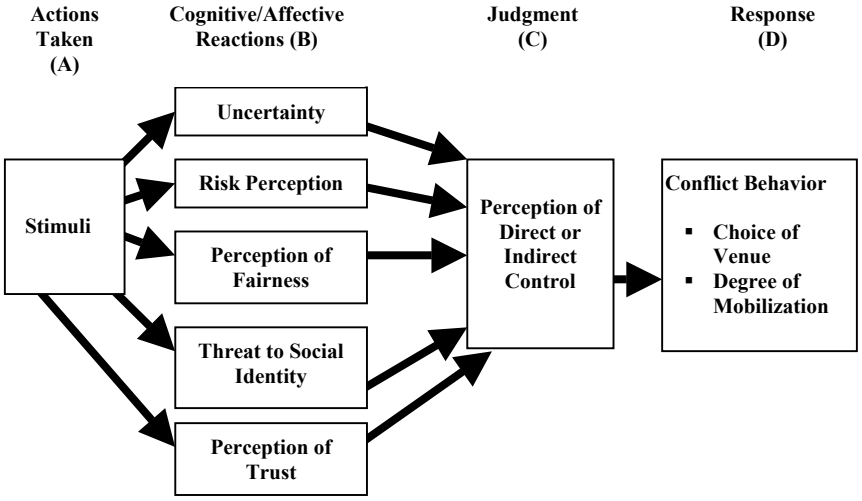
5. *Id.*

to anticipate the social dynamics of these conflicts and to make informed choices about how to address them constructively.

II. Community Conflicts over CAFOs

In 1999-2000, Abdalla et al.[6] conducted in-depth interviews with Pennsylvania stakeholders who have been involved in CAFO-related disputes, including local farmers, community activists, environmentalists, representatives of agribusiness, and local, state, and federal officials.[7] Based on these interviews, Abdalla et al. proposed a model of how conflicts over CAFOs arise.[8] This Article begins with a brief overview of this model before looking more closely at the procedural justice issues embedded within it. Abdalla et al.'s model of community conflicts over CAFOs focuses on the inter-relationships between: 1) the stimuli that motivate people to become involved in the conflict, 2) their cognitive and affective reactions to the conflict (perceptions, feelings, interpretations, attributions, etc.), 3) their subsequent perceptions regarding their direct or indirect control in the situation, and 4) the actions they take based upon their interpretations and perceptions. Figure 1 shows the four main steps in the model.[9]

Figure 1. The Four Main Steps Leading to How Conflicts Over CAFOs Arise



6. *See supra* note 4.

7. We conducted interviews with 28 stakeholders, including local farmers; environmentalists; representatives of agribusiness; Farm Bureau representatives; local, state, and federal officials; and concerned citizens, determined through a snowball sampling procedure. *See id.*

8. *See id*. at 316-34.

9. *See id.*

Initially, a stimulus or precipitating action occurs (see A in Figure 1), such as the passage of a state or federal law regulating CAFOs, a proposal for siting a CAFO in a community, or an incidence of environmental damage from a particular site. The stimulus generates responsive actions by other stakeholders that either fuel or circumvent conflict.[10] Although the model presents only one cycle of stimulus and reaction, it is understood to be cumulative, occurring against an existing backdrop of history and established relationships among the stakeholders.

The stimulus triggers one (or more) of five critical cognitive or affective reactions from concerned stakeholders (see B in Figure 1). These cognitive reactions, alone or in combination, cause stakeholders to experience perceptions of more or less control over the situation. The interviews with Pennsylvania stakeholders revealed that they experienced less control over the situation when (1) their perception of uncertainty about the situation, including the legal, scientific and/or economic issues implicated in the situation increased; (2) their perception of the risk associated with CAFOs increased; (3) they believed the actions taken by others were unfair; (4) an important aspect of their own identity was threatened; and/or (5) their mistrust of other parties increased.[11]

Using portions of the interviews with stakeholders, this Article will now briefly explain the underpinnings of stakeholders' perceptions regarding uncertainty, risk, fairness, social identity, and trust.

A. Perceptions of Uncertainty and Risk

A stimulus or precipitating action (A in Figure 1) may either increase or reduce the level of uncertainty an individual feels about a situation, as well as how much risk the individual perceives as associated with the situation. In Pennsylvania, one such stimulus was the negotiation and passage of the Nutrient Management Act.[12] This state legislation, which became law in 1993, was intended to define the terms for legitimate public decision-making regarding the impacts of manure generated by CAFOs in Pennsylvania.[13] The Act protects water quality by requiring certain CAFOs to develop nutrient management plans and to

10. *See id.* at 18-19.
11. *See id*. at 19-32.
12. *See id.* at 18-19.
13. *See* The Pennsylvania Nutrient Management Act, 3 P.S. § 1702 (1999) ("The purposes of this act are as follows: (1) To establish criteria, nutrient management planning requirements and an implementation schedule for the application of nutrient management measures on certain agricultural operations which generate or utilize animal manure. . . .").

operate in a manner consistent with those plans, once they are approved, or face sanctions.[14] The Act also pre-empts local government authority to pass regulations or ordinances that are inconsistent with or more stringent than the requirements of the Nutrient Management Act.[15]

Because the Nutrient Management Act specifies precisely how CAFO operators can achieve compliance with Pennsylvania's environmental requirements, agribusinesses and farmers who wish to build CAFOs have experienced an increased level of certainty regarding their obligations in managing animal nutrients.[16] For other stakeholders, however, the new statute presents a confusing morass of information that creates discomfort and uncertainty about what rights they have, how enforcement will occur, and what is or is not covered by the law.[17] This confusion generates uncertainty regarding the protection provided by the law and also appears to lead to a decreased sense of control for these stakeholders, especially when they perceive that their efforts to clarify the confusion produce little or no result.[18]

As community activists in Pennsylvania discussed the concerns triggered by the passage of Act 6, their comments centered around perceptions of uncertainty regarding the safety of CAFO-generated odors, the impact of state pre-emption of local authority to regulate CAFOs, and the likelihood of enforcement of environmental regulations.[19] For example, one community stakeholder said, "Pennsylvania's Nutrient Management legislation has some pre-emptive language which has left a lot of questions in the minds of people as to what rights they really do have . . . . . A lot of municipalities are just struggling with this thing as to what they're legally allowed to do."[20] Others noted:

> Here is a new program to oversee these large operations to require a permit, and nobody knows where to call to get the answers for that . . . . You're supposed to go to the regional offices to get your answers and the regions haven't been trained on it yet. They don't know what the answers are. People are calling conservation districts that don't have authority under that for knowing what the answers

14. *See id.* at § 1706, 1711-12.

15. *See id.* at § 1717. *See also* Michael Meloy, *An Overview of Nutrient Management Requirements in Pennsylvania*, 10 Penn St. Envtl. L. Rev. 249 (2002).

16. *See* ABDALLA ET AL., PENNSYLVANIA REPORT, *supra* note 4 at 19. It should be noted, however, that agribusinesses and farmers experience uncertainty in other areas. *See id.* at 18-21.

17. *See id.* at 18-21.

18. *See id.* at 21.

19. *See id.*

20. *Id.* at 20.

are.[21]

> We require the [state agency] to get the answers on that. They don't know. They don't know where to go to get the answers themselves. There is no recognized regulatory authority for agriculture and how this relates to agriculture . . . [w]ater consumption . . . nobody knows where to go for that. Do you go to SRBC for that? Do you go to [a state agency]? And it's very confused about what to do for water consumption.[22]

Consistent with studies of risk perception,[23] different Pennsylvania stakeholders demonstrated distinctively different assessments of the level of risk presented by CAFOs. Most important was the difference between the perceptions of technical and lay observers. Previous studies have found that the former focus more on expected risks while the latter emphasize extreme possibilities.[24] For community members who were concerned about the potential long-term health effects of the odors associated with CAFOs, perceptions of risk were quite high. In the words of one stakeholder:

> The first thing I did was I went to the medical literature to see whether they really did represent a risk. Despite what the CAFO operators say and despite what everyone else says, the literature in the scientific community is pretty well established that these things do represent a substantial risk, environmentally and from a lot of other perspectives; particularly some of the research that has been done in Europe is rather compelling.[25]

Farmers too indicated that the current situation in Pennsylvania involved risks, but the farmers focused primarily upon the economic risk of not being permitted to operate CAFOs:

> You [have] got this farmer that built this building, and has this mortgage, and if that thing is empty, they've lost. The building is worthless. The land doesn't sell for more, a lot more, just because it has a building on it. There is no return on that thing short of growing birds . . . . They're [the farmers] taking a lot of the risk . . . . They

21. *Id.* at 21.
22. *Id.* at 14.
23. *See, e.g.*, M. Elliott, The Effect of Differing Assessments of Risk in Hazardous Waste Facility Siting Negotiations 6-8 (unpublished manuscript, Ga. Inst. of Tech.) (1988); Gregory Fischer, M. Granger Morgan, Baruch Fischoff, Indira Nair, & Lester B. Lave, *What Risks Are People Concerned About?*, 11 RISK ANALYSIS 303, 309-10 (1991).
24. *See* Elliott, *supra* note 23 at 6-8.
25. ABDALLA ET AL., PENNSYLVANIA REPORT, *supra* note 4 at 8.

feel vulnerable.[26]

B. Perceptions of Unfairness and Threats to Identity

A stimulus or precipitating action also triggers perceptions regarding fairness, and it can pose a threat to particular stakeholders' social identity (*e.g.*, as farmers, environmentalists, community members, or even citizens). When people believe that they (or their social group) have been treated disadvantageously, *i.e.*, unfairly, in relation to other groups, they are less willing to accept existing social policy and more inclined to take legal action and engage in protest.[27] Fairness concerns or identity threats often provoke conflict or exacerbate already existing conflictual relationships. Examples of this dynamic can be found in the environmental justice movement, for instance, in which African-Americans have been spurred to protest over the disproportionate number of toxic sites in their communities.[28]

The interviews with Pennsylvania stakeholders revealed that nearly all stakeholder groups perceived themselves as being treated unfairly and/or that their social identity was under attack.[29] Community activists and environmentalists insisted that they had not been allowed to play a meaningful role in decision-making at the state level. Meanwhile, agribusiness representatives and local farmers indicated that local government officials were treating them unfairly by passing new ordinances to regulate CAFOs. All of these stakeholders perceived a lack of respect for their rights and roles as valuable members of communities and as citizens in a democracy. These perceptions of unfairness and threats to social identity are significant, and the Article will return to them in Part II.

C. Perceptions of Mistrust

Finally, a stimulus or precipitating action may generate an increase or reduction in the level of trust that one stakeholder group feels toward other stakeholders in the dispute. Trust arises when parties can rely on

26. *Id.*

27. *See* Kelly Mollica & Barbara Gray, *Layoff Survivors Become Layoff Victims: Propensity to Litigate*, 24 HUMAN RESOURCE MANAGEMENT 4-5 (2001); GAMSON, *supra* note 3 at 193-4. *See also* Craig McEwen & Richard Maiman, *Mediation in Small Claims Court: Achieving Compliance Through Consent,* 18 LAW & SOC'Y REV. 11 (1984); Nancy Welsh, *Making Deals in Court-Connected Mediation: What's Justice Got to Do With It?*, 79 WASH. U. LAW. Q. 1, 819-20 (2001).

28. *See* R. D. BULLARD, DUMPING IN DIXIE: RACE, CLASS AND ENVIRONMENTAL QUALITY 10-20 (1990).

29. *See* ABDALLA ET AL., PENNSYLVANIA REPORT, *supra* note 4 at 24-27.

others to fulfill their expectations; conversely, mistrust arises when a violation of one's expectations about another's expected behavior occurs.[30] Classic research on intergroup relations has shown that ruptures in trust are difficult to repair because competing groups develop stereotypes of each other as the enemy and engage in selective listening that reinforces those stereotypes.[31]

The interviews with Pennsylvania stakeholders revealed substantial perceptions of mistrust.[32] Most dramatic was mistrust toward governmental agencies, which were perceived as, at best, incapable of fulfilling their responsibilities and, at worst, biased and not committed to protecting the welfare of all affected stakeholders.[33] This perception will be examined in greater detail in Part II.

D. The Effect of Cognitive and Affective Perceptions

Collectively, these cognitive and affective reactions play a key role in the progression of conflicts over CAFOs. The reactions in Step 2 lead an individual or a group to reach a critical judgment in Step 3 regarding the degree to which they are able to exercise control, direct or indirect, over the situation (see C in Figure 1). The individual stakeholder or group exercises *direct* control when there will be no outcome unless the individual or the group agrees to such an outcome. In contrast, the individual stakeholder or group exercises *indirect* control if they can influence the outcome or provide input that will be considered by the decision-maker. Stakeholders whose cognitive or affective reactions are negative (feel threatened, distrustful, etc.) are likely to feel that they have little control, either direct or indirect, over their situation.

Stakeholders' behavior in Step 4 of the model (see D in Figure 1) stems directly from their perceived ability (or lack thereof) to exert control over the situation. Loss of self-efficacy and control leaves people feeling extremely vulnerable and provokes self-protective, defensive behavior.[34] Thus, it affects the extent to which they become mobilized in the conflict and the mechanisms they select to pursue their goals. The less control they perceive they have, the more likely they will be to engage in some form of conflict behavior in order to protect or restore their own sense of well-being and control. And, if they believe they have been denied any meaningful level of control in the traditional decision-

30. *See* R. Bhattacharya, T. M. Devinney & M. M. Pillutla, *A Formal Model of Trust Based on Outcomes*, 23 ACADEMY OF MANAGEMENT REVIEW 459-72 (1998).

31. *See* SHERIF, *supra* note 3 at 194-5.

32. *See* ABDALLA ET AL., PENNSYLVANIA REPORT, *supra* note 4 at 27-29.

33. *See id.*

34. *See* JAY ROTHMAN, RESOLVING IDENTITY-BASED CONFLICT 7-13 (1997).

making process, they will be more likely to select an alternative forum in which to raise their concerns and effect change. In Pennsylvania, this dynamic helps to explain why disgruntled stakeholders have pressed township boards to adopt anti-CAFO ordinances, have engaged in boycotts, and have even committed acts of violence.[35] On the other hand, stakeholders who perceive themselves as having a high degree of control are unlikely to feel any need to seek alternative forums or take protective actions that might lead to conflict.

While all five cognitive and affective factors affect the degree to which CAFO stakeholders perceive they have control over the issues in CAFO conflicts, the remainder of the Article will focus on the three affective and cognitive reactions regarding fairness, identity, and trust and their relationship to procedural justice research and theories.

III. Procedural Justice and Its Relationship to the Perceptions of Pennsylvania Stakeholders

A. A Brief Overview of the Procedural Justice Literature

Often, fairness or justice is defined in terms of the substantive fairness of a decision ("distributive justice"). Equally important is the fairness of the procedure used for reaching the decision ("procedural justice").[36] Indeed, a significant body of research in psychology, law and management has been devoted to the concept of procedural justice.[37] Significantly, this research has shown that fair procedures affect perceptions of distributive justice and, indeed, can mitigate unfair outcomes.[38] Applying this finding to community conflicts, if citizens believe that an authority's decision-making process was procedurally just, they are more likely to conclude that the process produced a substantively just result.[39] Further, an authority's decision-making procedures, by themselves, strongly influence whether citizens will

35. *See* ABDALLA ET AL., PENNSYLVANIA REPORT, *supra* note 4 at 7.

36. *See* Morton Deutsch, *Justice and Conflict*, *in* THE HANDBOOK OF CONFLICT RESOLUTION 41-42 (Morton Deutsch & Peter Coleman eds., 2000) (discussing distributive justice, procedural justice, a "sense of justice," retributive or reparative justice, and the scope of justice).

37. *See* J. Thibaut & L. Walker, PROCEDURAL JUSTICE: A PSYCHOLOGICAL APPROACH (1975); G. S. Levinthal, *What Should Be Done With Equity Theory? New Approaches to the Study of Fairness in Social Relationships, in* SOCIAL EXCHANGE: ADVANCES IN THEORY AND RESEARCH 27-55 (Kenneth Gergen, M.S. Greenberg & R. H. Willis eds., 1980); E. ALLAN LIND & TOM R. TYLER, THE SOCIAL PSYCHOLOGY OF PROCEDURAL JUSTICE (1988).

38. *See* Lind & Tyler, *supra* note 37 at 66-70, 205.

39. See *id.*

comply with the authority's decisions.[40] To the extent that citizens perceive that the decision-making procedures are fair, citizens are more likely to comply with the decisions reached through those procedures, even when the decisions are disadvantageous to them.[41] Additionally, perceptions of procedural justice affect whether citizens judge the decision maker's authority to be legitimate.[42]

Because perceptions of procedural justice are so influential, decision makers should consider what procedural "markers" matter. Citizens base their assessment of the procedural fairness of governmental decision-making on four process characteristics: 1) Opportunity for voice (*i.e.*, Was the citizen given the opportunity to tell her story and to control the telling of that story?);[43] 2) Consideration (*i.e.*, Did the authority demonstrate that s/he had considered the citizen's story?);[44] 3) Even-handed treatment (*i.e.*, Did the authority demonstrate that s/he was trying to be fair and even-handed?);[45] and 4) Dignity and respect *(i.e.*, Did the authority treat the citizen with dignity and respect?)[46] Importantly and perhaps surprisingly, research has found that citizens' perceptions of fairness are influenced as much[47] or more[48] by their

40. *See* E. Allan Lind, *Procedural Justice, Disputing and Reactions to Legal Authorities, in* EVERYDAY PRACTICES AND TROUBLE CASES 185-91 (Austin Sarat et al. eds., 1998); T. R. Tyler & P. Degoey, *Conflict Restraint in Social Dilemmas: Procedural Justice and Identification Effects on Support for Authorities,* 69 J. PERSONALITY & SOC. PSYCHOL. 493 (1995).

41. *See* McEwen & Maiman, *supra* note 27 at 44-45.

42. *See* Lind & Tyler, *supra* note 37 at 209; Lind, *Procedural Justice, Disputing and Reactions to Legal Authorities, supra* note 38 at 185-91; Tyler & Degoey, *supra* note 40 at 493.

43. *See* Lind & Tyler, *supra* note 37 at 101-04.

44. *Id.* at 236.

45. *See* Tom R. Tyler, *Psychological Models of the Justice Motive: Antecedents of Distributive and Procedural Justice*, 67 J. PERSONALITY & SOC. PSYCHOL. 850, 853 (1994).

46. *See* Lind & Tyler, *supra* note 37 at 214, E. ALLAN LIND ET AL., THE PERCEPTION OF JUSTICE: TORT LITIGANTS' VIEWS OF TRIAL, COURT-ANNEXED ARBITRATION, AND JUDICIAL SETTLEMENT CONFERENCES 66 (1989).

47. *See* P. Christopher Earley & E. Allan Lind*, Procedural Justice and Participation in Task Selection: The Role of Control in Mediating Justice Judgments*, 52 J. PERSONALITY & SOC. PSYCHOL. 1148, 1154 (1987); Tom R. Tyler, *Psychological Models of the Justice Motive, supra* note 45 at 859 (finding that "both decision and process control mattered" in the legal arena while decision control mattered less in the managerial setting).

48. *See* Stephen LaTour et al., *Procedure: Transnational Perspectives and Preferences*, 86 YALE L.J. 258, 283 (1976) (finding that United States "participants prefer to control the process of evidence presentation themselves while a third party controls the result); E. Allan Lind et al*., In the Eye of the Beholder: Tort Litigants' Evaluations of Their Experiences in the Civil Justice System*, 24 LAW & SOC'Y REV. 953, 965 (1990) (reporting that litigants perceived trial and arbitration as fairer than bilateral settlements or judicial settlement conferences).

process control than by their control over the ultimate decision.[49]

Together, two theories help to explain the profound importance of voice, consideration, and even-handed, dignified treatment. First, the opportunity to express one's views permits citizens to influence the final outcome of decision-making or dispute resolution processes.[50] This opportunity for voice reassures citizens that the final decision will be fully informed and increases the likelihood that it will be substantively fair. Citizens are able to conclude that they have thus exercised *indirect*, yet meaningful, control over the final decision. Indeed, some scholars theorize that perceptions of procedural fairness represent a heuristic, or mental shortcut, for assessments of substantive fairness.[51] Second, citizens use procedural "markers" to judge whether they can trust that the decision-maker respects them and will try to be fair. The decision-maker is an authority who represents the larger society. When the authority manages the process so that citizens *feel* heard and respected, this signals to the citizens that they are acknowledged as valued members of society.[52] The citizens' loss of direct control over the final outcome thus becomes less worrisome. "If people are able to infer a benevolent disposition, they can trust that in the long run the authority with whom they are dealing will work to serve their interests."[53] In contrast, when the procedural attributes described above are absent, the authority sends the message that society considers these citizens to be undeserving or inferior. Consequently, trusting the fairness of the society's decision-makers, their processes, and the outcomes of those processes becomes more difficult.

Because procedures have such influence upon citizens' perceptions of substantive fairness and legitimacy, as well as the likelihood of their compliance, some decision-makers may be tempted to cloak intended unfairness in procedural niceties. Others may pledge to citizens that their

49. *See e.g.,* E. Allan Lind et al., *Voice, Control, and Procedural Justice: Instrumental and Noninstrumental Concerns in Fairness Judgments*, 59 J. PERSONALITY & SOC. PSYCHOL. 952, 957 (1990) (finding that people's fairness judgments are enhanced by the opportunity to voice their opinions even when this opportunity does not occur until after a decision has been made; having a "voice with the possibility of influence . . . leads to even greater perceived fairness); Tom Tyler et al., *Influence of Voice on Satisfaction with Leaders: Exploring the Meaning of Process Control*, 48 J. PERSONALITY & SOC. PSYCHOL. 72, 80 (1985) (based on field study and laboratory studies, concluding that voice heightens procedural justice judgments and leadership endorsement even when disputants perceive that they have little control over the decision).

50. *See* Lind, *Procedural Justice, Disputing and Reactions to Legal Authorities, supra* note 40 at 179.

51. *See id.* at 177, 185.

52. *See id.* at 182; Tyler, *Psychological Models of the Justice Motive, supra* note 45 at 852.

53. Tyler, *Psychological Models of the Justice Motive, supra* note 45 at 854.

voice will influence the decision-making process when, in fact, the decision-makers do not intend to be influenced. The procedural justice literature suggests that citizens are aware of their vulnerability to intentional and unintentional manipulation and, if they perceive any evidence of unfair treatment or perceive "false representations of fair treatment[,]" they respond with "extremely negative reactions."[54] Thus, the temptation to engage in proceedings that could be characterized as "sham" carries a high potential cost, in terms of triggering both severe mistrust and doubts regarding the legitimacy of public officials and institutions.

B. The Procedural Justice Implications of Stakeholders' Perceptions Regarding Unfairness, Threats to Social Identity and Mistrust

Concerns regarding procedural justice appear to underlie many of the affective and cognitive perceptions of the Pennsylvania stakeholders who have been involved in CAFO-related disputes. Virtually every stakeholder group in Pennsylvania raised doubts regarding governmental authorities' real consideration of all stakeholders' voices and the authorities' commitment to behaving in a fair and even-handed manner. For example, as the following quote illustrates, many of the community activists and environmentalists who objected to the unfairness of the regulatory scheme established by the Nutrient Management Act perceived that they had never been given a real opportunity for voice in the state or federal decision-making processes governing CAFOs or in the changes occurring in their communities as a result.[55] They also perceived that state officials were not treating them in an even-handed and fair manner:

> It was clear that at a federal and state level, there are so many people giving lip service to protecting the family farm, protecting the environment, regulating these industries and it's all hogwash. The industry is well entrenched with the politicians and the farm laws are designed to protect the corporate farms and there is no question about that. That was disgusting and it was very clear that if anything was going to be done politically, we had to do it at a grassroots level. That's where it had to happen.[56]

54. E. Allen Lind, *Procedural Justice, Disputing and Reactions to Legal Authorities, supra* note 40 at 187. *See* Tom Tyler et al., *Influence of Voice on Satisfaction with Leaders, supra* note 49 at 74 (explaining that under certain conditions, voice without decision control heightens feelings of procedural injustice and dissatisfaction with leaders, a result described as the "frustration effect").

55. *See* ABDALLA ET AL., PENNSYLVANIA REPORT, *supra* note 4 at 16, 24-25.

56. *Id.* at 13.

State pre-emption of local government authority to regulate CAFOs particularly led community members to perceive that they had been denied meaningful voice and even-handed, fair treatment. One such community member declared, "[O]ur rights are being taken away very much. We don't even get a vote on it. Nobody is getting a vote on this piggery. Nobody at all has a vote."[57]

Meanwhile, agribusiness representatives and farmers also perceived that governmental decision-makers were not giving them voice, consideration, and even-handed treatment. These stakeholders, however, focused upon local government officials who they perceived as ignoring the Nutrient Management Act's provisions regarding pre-emption. As the next three quotes demonstrate, farmers and agribusiness representatives expressed skepticism regarding these authorities' fairness and even-handedness because they saw the townships as trying to change the "rules of the game:"[58]

> [T]wo townships passed township ordinances which are illegal. They are definitely contrary to Act 6. They are going beyond Act 6, which they are not allowed to do . . . illegal, plain and simple . . . . Well it's frustrating to me that we have regulations passed by the Senate and the House that deal with farm rules, and [education about] Act 6, and how things work and this is the way it is supposed to be. A township cannot put an ordinance in place that is contrary to that . . . .[59]

> [B]ut the worst of it is that the townships are putting regulations in, a couple that they know are not correct. Especially Nutrient Management. And they are sitting there smiling waiting for someone to sue them. We know that as a fact . . . even though we have the Nutrient Management law in this state. It's being violated, being violated a lot.[60]

> There is no question about it. They're illegal. But yet they pass them and then they say, "Well, let's see if they're [challenged] or not. Let's see if anyone has the guts to challenge us. Well, how are we supposed to challenge them when we have township ordinances passed?[61]

Stakeholders come into these conflicts with a specific set of expectations for their elected and appointed government officials. Citizens expect public officials to help them, to protect their interests, to

57. *Id.* at 24.
58. *See id.* at 24-26, 27-29.
59. *Id.* at 24-25.
60. ABDALLA ET AL., PENNSYLVANIA REPORT, *supra* note 4 at 29.
61. *Id.* at 29.

be responsive to their concerns, to follow the statutes and regulations that have been established, and to be honest in their dealings with constituents. When these expectations are not perceived as met, group members feel a sense of violation regarding who they are and their right as citizens to have a voice in public decision-making.[62] As noted above, for some stakeholders mistrust was kindled by their perceptions that government personnel were not acting even-handedly and were, instead, aligning themselves with farming interests (by giving preferential treatment to certain nutrient management plans and/or acting as advocates of CAFOs), or with community activists' interests (by adopting ordinances that were viewed as violating the pre-emption provisions of the Nutrient Management Act), rather than protecting and responding to the interests and concerns of *all* citizens.

Stakeholders on both sides of the CAFO issue also perceived that even when public officials gave them an opportunity to "tell their story," they were not treated with dignity or respect and their concerns were de-legitimized:

> You know, I subjected myself to that for what? Because when I came back . . . a positive thing I thought I was doing, to show that I wasn't a big corporate executive, that I cared about the community. I am not going to sit down there and say I don't care, to come up and spend practically seven, eight hours at a meeting . . . and this is what you get?[63]

> It is very frustrating when dealing with these systems, when you have people that are complaining of real health problems or perceived changes. They are seeing them and, essentially, they are being called liars because the studies have not been done, so it must be your imagination. But, "Oh, by the way, no, we don't know because we haven't done any work to monitor ourselves."[64]

Perceptions of de-legitimization and disrespect from other stakeholders often pose a threat to people's salient social identity.[65] Social identity refers to that part of an individual's sense of self that comes from his or her affiliation with particular groups (*e.g.*, community member, activist, farmer, farm advocate, environmentalist, citizen, etc.). Generally, social identity provides a source of structure and security that reinforces group members' sense of belonging, their confidence in their

62. *See id.* at 26.
63. *Id.*
64. *Id.* at 13-14.
65. *See* H. Tajfel & J. C. Turner,. *The Social Identity Theory of Intergroup Behavior, in* PSYCHOLOGY OF INTERGROUP RELATIONS 7-24 (S. Worschel & W.G. Austin eds., 1986).

voice,[66] and, we suggest, their confidence that they will be heard in a prescribed venue.[67] Consequently, threats to salient social identities often evoke strong protective responses.[68] Repeatedly, the interviews revealed that stakeholders believed that their identities as citizens in a democracy and as valued members of communities were threatened:

> The crux of the whole thing: Do we live in America or do we live in the Soviet Union where the government says this is how it will be and be damned with who doesn't agree? We should have been given, according to the DEP plans, a public hearing, which never occurred. At least it was never formally said that there was a public hearing. We went up and bitched at our [township] supervisor, but they just sat there and said there is nothing we can do, and that was basically a lie.[69]

> Whatever happens the farmer who is contemplating putting in a CAFO begins to feel like an outsider. He was once a part of a community; all of a sudden because of something he is contemplating he no longer belongs to the community. It may have him giving second thoughts as to what he needs to do farming wise to expand his operation.[70]

> The local farmer depending on the level of citizen activism is also confused because he still sees this as a part of traditional farming and cannot understand why the community he has belonged to all his life is resisting his need to expand his farming operations.[71]

Conflicts over CAFOs can force community members to redefine their identities and can even create animosities among long time allies.[72] In some circumstances, these cleavages are so wrenching that they produce immobilization rather than mobilization. People withdraw from the process completely rather than endure the derision of their neighbors.

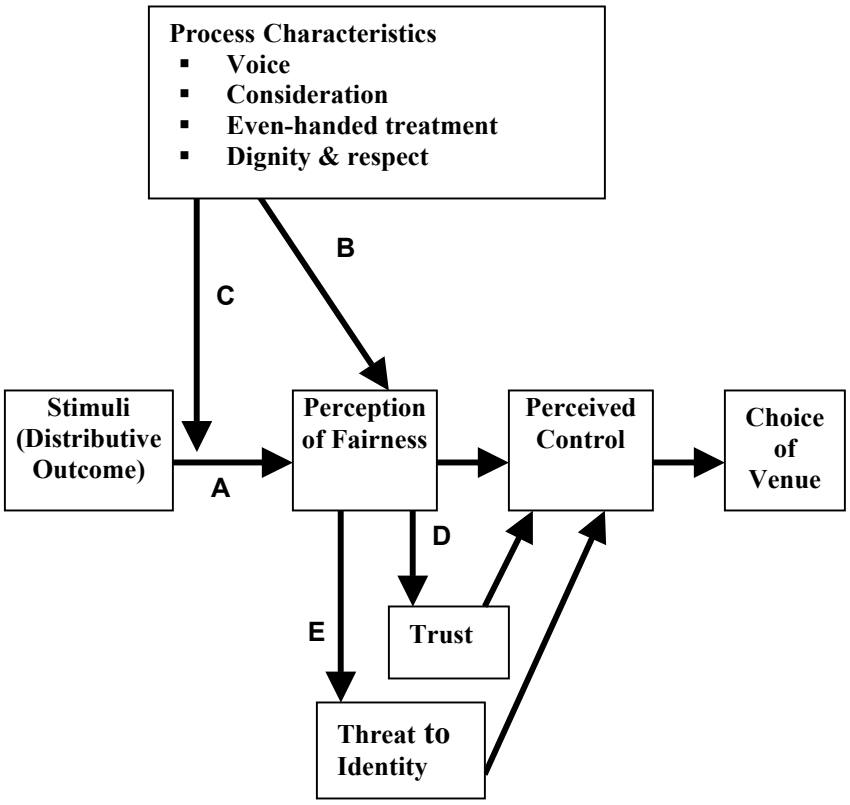
In summary, concerns regarding procedural justice emerged as one of the repeated themes in our interviews. All stakeholder groups expressed disappointment regarding their inability to be heard in decision-making processes, to receive consideration from the authorities,

66. *See id.* at 15-16.
67. *See* GAMSON, *supra* note 3 at 30-32.
68. *See* ROTHMAN, *supra* note 34 at 7-13, BARBARA GRAY & RALPH HANKE, FRAME REPERTOIRES AND COLLABORATIVE AND NON-COLLABORATIVE BEHAVIOR IN INTRACTABLE ENVIRONMENTAL DISPUTES 6 (Ctr. for Research in Conflict and Negotiation, Pa. St. Univ.) (2001).
69. ABDALLA ET AL., PENNSYLVANIA REPORT, *supra* note 4 at 26.
70. *Id.* at 27.
71. *Id.*
72. *See id.* at 15-16.

and to be treated with fairness, dignity, and respect. Environmentalists, agribusiness representatives, local farmers, government officials, and community members consistently objected that governmental decision-making procedures had failed to provide real consideration of their interests, needs, and concerns. The Pennsylvania stakeholders' perceptions that their voices had been ignored helps to explain much of their skepticism regarding the substantive fairness of governmental decision-making regarding CAFOs, their lack of trust in public officials, and their perceptions that their social identities were seriously threatened.

Figure 2

How Process Affects Fairness Judgments, Trust and Threats to Identity



In Figure 2, the model presented in Figure 1 is expanded to show how differences in procedures can affect stakeholders' perceptions of fairness and how fairness, in turn, affects trust and threats to identity. Arrow A indicates whether a decision or action is perceived as distributively fair. Arrow B shows the direct effect of the decision making process or procedures upon fairness perceptions. Arrow C indicates that procedures also ameliorate any perceptions of distributive justice that may have been caused by the initial stimuli.[73] Arrows D and E indicate that fairness perceptions also affect perceptions of trust among the parties and whether stakeholders perceive threats to their identities, as discussed *supra*. All three of these perceptions, as well as the perceptions of risk and uncertainty shown in Figure 1, ultimately affect how much control stakeholders believe they have. The revised model in Figure 2 shows that when stakeholders judge that the *process* of decision-making is unfair, they are likely to: 1) perceive the situation as unfair; 2) perceive that their identity is threatened; and 3) experience distrust of authorities. Consequently, the stakeholders experience less control—either direct or indirect—over a situation in which legal and scientific uncertainties have already left them feeling vulnerable and at risk.

When people feel they have no recourse to ensure that their views will be heard or to effect change, they will either resort to another, more trusted forum for dispute resolution, through conflict mobilization and/or non-traditional forums, or they will withdraw entirely from the process.[74] The breadth and depth of stakeholders' procedural justice concerns in federal, state, and local CAFO-related decision-making in Pennsylvania strongly suggests a need to find alternative dispute resolution and decision-making processes that respond to stakeholders' concerns.

In our interviews, stakeholders' yearning for procedural justice and some form of control were reiterated when we asked them to identify their criteria for the successful resolution of disputes over CAFOs. The stakeholders frequently and strongly expressed preferences for processes that would produce outcomes responding to all stakeholders' interests and inspire both compliance and ongoing collaboration.[75] For example:

> I think that success is when the two parties involved can both live with the arrangement. Where each person comes away feeling like they've gained something from the experience. Maybe they haven't gotten everything they've wanted but they've gained from the experience and their losses have been minimized.[76]

73. This is treated mathematically as a moderating effect.
74. *See* GAMSON, *supra* note 3 at 30-32.
75. *See* ABDALLA ET AL., PENNSYLVANIA REPORT, *supra* note 4 at 33-36.
76. *Id.* at 35.

> That there is a permanent ongoing dialogue between the producers, the Department of Ag[riculture], Department of Environmental Protection. Not just created for initial, but for an ongoing institutionalized arrangement. Each and every one is kept informed of changes and movements in animal agriculture in the Commonwealth.[77]

To a lesser but still significant extent, stakeholders also associated "successful" resolution with respectful procedures that promote real dialogue.[78] One stakeholder observed: "How would you know that disputes have been handled more successfully? Well, if every proposal doesn't threaten to launch World War III that would be some progress."[79] Other expressions of the need for respectful dialogue were less colorful but equally heartfelt:

> I think they would be more willing to bring the parties together and try to find ways to solve issues, if they think that it would be productive . . . . [T]hey say, "These public meetings are non-productive a waste of my time.". . . Nobody's ready to listen, and you are not going to change anybody's mind in that situation. It is such a shame.[80]

> I think you can find remarkable contrast in how issues are resolved based on how elected officials at the municipal and county level deal with the issue . . . . The most successful ones in our experience seem to be those that are able to forge some true collaborated response within the limiting frameworks of our statute . . . . So where you are able to bring the bodies to the table, give them the clear understanding of your limitations and prerogatives, give them clear understanding of their voice or give them a genuine voice to the greatest extent you are permitted by law and the practicalities of the process, we tend to achieve outcomes that are more harmonious in the community than antagonistic. Particularly that's in contrast to the ones where one side feels ignored or feels pushed away from the table. [81]

As the earlier discussion of the procedural justice literature reveals, decision-making and dispute resolution processes that provide a real opportunity for disputants to feel heard and that treat disputants with dignity and respect have the effect of producing outcomes that are more likely to be perceived as substantively just and that inspire greater

77. *Id*. at 36.
78. *See id*. at 35-36.
79. *Id.* at 36.
80. *Id.*
81. *Id.*

compliance and finality. In focusing on the need for civility and real dialogue, the stakeholders invoked the need for real voice accompanied by real consideration and a willingness to be open to fairly assess the concerns and arguments made by all stakeholders. Real dialogue also suggests an acknowledgment of all stakeholders' place in the discussion and their value in the dispute resolution or decision-making process and to society as a whole.

The stakeholders also specifically identified the process characteristics they considered important in resolving CAFO-related disputes.[82] Many of these process characteristics echo procedural justice considerations. For example, many stakeholders expressed a preference for processes that allow:

- The participants and constituents to trust in the honesty of the process;
- The participants and constituents to trust that the outcomes of the process will be truly considered and/or implemented by government agencies;
- Inclusion of all viewpoints;
- Two-way discussion and dialogue; and
- Fair, inclusive outcomes.[83]

To a large extent, procedural justice considerations also were reflected in stakeholders' preferences regarding third parties. If processes required the involvement of third parties, the stakeholders sought individuals who were neutral, impartial, and trusted by all sides.[84] Of course, these characteristics would be important to ensure that all stakeholders felt heard and treated in an even-handed, respectful manner. Stakeholders also wanted third parties to:

- Exercise control over communication;
- Keep the process moving and on track;
- Ask good questions;
- Allow all parties to have a voice; and
- Listen effectively.[85]

Stakeholders' preferences regarding process and third party characteristics, however, also acknowledged the legal and scientific complexity of CAFO-related disputes and the extent to which different stakeholders rely on different and inconsistent information. Many stakeholders wanted to be sure that alternative processes offered access to relevant, accurate information and enabled informed decisions. Of

82. *See id.* at 36-37.
83. *See id.*
84. *See id.* at 37.
85. *See id.*

course, this preference for decision-making based on full information is consistent with the procedural justice literature described *supra*.

In describing their preferences regarding third parties, however, stakeholders identified some characteristics and functions that have the potential to undermine the perceived procedural justice of alternative decision-making and dispute resolution procedures. Particularly, the stakeholders expressed a preference for third parties who were knowledgeable about CAFO-related issues and who would:

- Educate the parties;
- Make and provide judgments about what is relevant and/or truthful; and
- Provide advice to the parties. [86]

Procedures that honor these preferences have the potential to undermine perceptions of procedural justice in several ways. For example, if a third party is knowledgeable about CAFO-related issues and his/her role includes educating the parties or providing advice to the parties, this may necessarily mean that the third party will express views that are consistent with one stakeholder group's perspective and inconsistent with another's. In this case, questions about the legitimacy of the third party will likely be raised.[87] Legitimacy issues arise when the third party and the process s/he facilitates are not perceived to treat all of the stakeholders in an even-handed and fair manner.[88] If a third party's role includes making and providing judgments about the truthfulness of a stakeholder's presentation, the third party may be perceived as failing to demonstrate genuine consideration of that stakeholder's voice. Research suggests that these evaluative interventions may be consistent with perceptions of procedural justice, but only if the third party exercises restraint in the use of evaluation.[89] The third party's evaluative interventions should occur only after a meaningful opportunity for voice and after s/he has clearly demonstrated consideration of what was said. Any evaluation also should be expressed in a respectful, even-handed manner.[90] Use of the third party's knowledge and ability to advise has to be managed very carefully because the need for procedurally just processes is so clear.

86. *See id.*

87. *See* BARBARA GRAY, COLLABORATING: FINDING COMMON GROUND FOR MULTIPARTY PROBLEMS 70-72 (1989).

88. *See id.*

89. *See* Welsh, *supra* note 27 at 846-51 (examining the impact of evaluative interventions in court-connected mediation upon participants' perceptions of procedural justice).

90. *See id.* at 849-50.

IV. A Proposal for Processes that Respond to Stakeholders' Concerns Regarding Procedural Justice and a Sense of Control

Because stakeholders' perceptions of lack of control appear to be so related to their perceptions of lack of procedural justice in current decision-making and dispute resolution process and because these perceptions are exacerbated by stakeholders' perceptions of uncertainty and risk arising out of the legal and scientific complexity of CAFO-related disputes, any proposal for alternative forums must respond directly to these identified problems. Any proposal must also acknowledge that CAFO-related conflicts are triggered by very different stimuli (*e.g.*, a proposal to site a CAFO, a township's consideration of a proposed ordinance, a state agency's response to complaints regarding the operation of a facility) and invoke different decision-making contexts (*e.g.*, local government decision-making regarding a proposed permit, a conservation district's decision-making regarding a proposed nutrient management plan, a state agency's decision-making regarding a CAFO's compliance with environmental requirements).[91] These different contexts can require different emphasis in responding to the need for procedural justice and for education regarding complex legal and scientific questions. Therefore, this Article will not propose just one alternative process to respond to all of the situations in which CAFO-related disputes arise. Rather, the Article will recommend consideration of five different processes and suggest the ways in which implementation of the processes will determine their actual responsiveness to stakeholders' concerns.

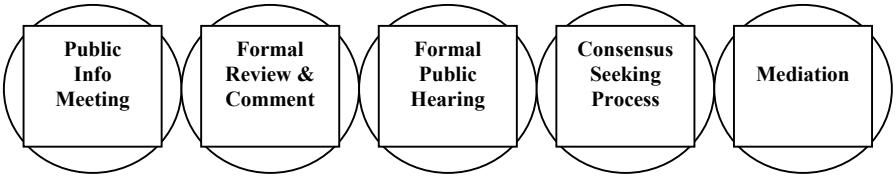
The five recommended processes are: public information meetings, formal review and comment, formal public hearings, consensus-seeking processes, and mediation.[92] As illustrated in Figure 3, the first three processes, also described generally as "community participation" processes, focus upon community education and/or the opportunity for the expression of voice but do not aim directly for resolution. The last two processes, also described generally as "dispute resolution" processes, focus upon providing an opportunity for voice and the achievement of consensus and commitment to a solution. Only the last dispute resolution process, mediation, provides all stakeholders with the opportunity to exercise *direct* control over the decision making process.

91. *See* JOHN BECKER, CHARLES ABDALLA, NANCY WELSH, BARBARA GRAY & CELIA COOK-HUFFMAN, A GUIDEBOOK ON COMMUNITY PARTICIPATION IN ADDRESSING DISPUTES OVER INTENSIVE LIVESTOCK OPERATIONS 53-92 (2000) (describing the application of relevant laws and potential use of community participation and dispute resolution processes in various contexts).

92. *See* ABDALLA ET AL., PENNSYLVANIA REPORT, *supra* note 4 at 38-39.

The first four processes, in contrast, provide increasing degrees of *indirect* control through the expression and consideration of voice. Each of the recommended procedures is described briefly below, with suggestions for implementation to ensure their responsiveness to the need for procedural justice.

Figure 3. Recommended Processes



A. Community Participation Processes

1. Public Information Meetings

This process provides an opportunity for all interested citizens to be educated about a proposed land use (such as a CAFO) or a decision related to a proposed land use that a township board or other agency must make. Information regarding complex issues of law, science, and technology can be raised and discussed. Although anyone can organize a public information meeting, government agencies often hold such meetings to help citizens become informed.[93] The agencies generally determine the identity of the presenters and the issues that will be discussed. The focus in this process is clearly upon education and this may be conceived as one-way communication,[94] from the presenters to the stakeholders sitting in the audience. Structured in this way, public meetings offer stakeholders little opportunity for voice. Indeed, when stakeholders speak, they often are perceived, and may intend to be perceived, as disruptive. Public information meetings have the potential, however, to permit voice. For example, representative stakeholders may be invited to consult with the sponsoring agency to determine the timing

93. *See* PUBLIC ISSUES EDUCATION: INCREASING COMPETENCE IN RESOLVING PUBLIC ISSUES 22-23 (D. D. Dale & A. J. Hahn eds., 1994) (Pub. Educ. Materials Task Force of the Nat'l Pub. Pol'y Educ. Comm. & PLC & PODC subcomm. of the Extension Comm. on Org. & Pol'y, Univ. of Wis.-Extension). *See also* JAMES CREIGHTON, INVOLVING CITIZENS IN COMMUNITY DECISION MAKING: A GUIDEBOOK 30-38 (1992).

94. *See* PUBLIC ISSUES EDUCATION, *supra* note 93 at 23; Creighton, *supra* note 93 at 11, 111-17.

of such meetings, the issues to be discussed, the identity of trusted presenters to speak to these issues, and a means to permit members of the audience to raise questions and provide feedback in a constructive way.[95] The focus of these meetings would remain upon education, but it would be education that demonstrates respect for the views and experience of the people in the audience.

2. Formal Review and Comment

Sometimes a government agency that is making a decision about a CAFO is required to offer the public an opportunity to submit written or telephone comments about the proposed land use.[96] However, no requirement of a formal, in-person meeting exists. This process offers some opportunity for voice in the decision-making process, in the form of letters, e-mail correspondence, and voicemail messages. Thus, the community is ostensibly given an opportunity to influence the decision-making process but, in effect, usually knows little about whether or how their input was considered. Thus, formal review and comment does not generally provide the decision-maker with a procedural means of demonstrating consideration, fairness, and even-handedness or respect for the citizens providing input. While the possibility of acknowledging and responding to all stakeholders' comments in a document that explains the agency's final decision exists, this procedure is cumbersome and rarely used. Consequently, formal review and comment may present the greatest challenge to achieving a process that will be perceived as procedurally just.

3. Formal Public Hearings

Government agencies are required by law to hold formal public hearings at certain points in the process of siting CAFOs.[97] Citizens have the opportunity to present their views to government agencies at these hearings. Although agencies are required to record and take these comments into consideration when they make their decisions, they are not obliged to agree with them.[98] This procedure, like public information meetings, can be structured either to enhance or hinder perceptions of procedural justice. For example, the timing of public hearings is likely to affect stakeholders' trust that their views will be considered in

95. *See id*. at 20-21, 25-29.

96. *See e.g., id.* at 67 (describing formal review and comment period as part of process for approving individual permits under the Clean Water Act).

97. *See e.g., id.* at 56-74.

98. *See* Creighton, *supra* note 93 at 120-21.

determining the final outcome.[99] Hearings that are held relatively early in the decision-making process are likely to be perceived as granting greater consideration.

Changes in format—e.g., traditional,[100] open house,[101] or roundtable[102]—are also likely to affect stakeholders' perceptions of their opportunity for voice, consideration, and treatment that is fair, even-handed, and respectful. The open house and roundtable formats provide an opportunity for real dialogue and even one-on-one education regarding the complex legal and scientific issues involved. The traditional format is less likely to foster real dialogue.[103]

Agencies also can choose whether to use neutral facilitators to manage the communication in public hearings.[104] Again, this can affect the potential for real dialogue. If public hearings are structured to permit stakeholders to have voice and to demonstrate consideration, even-handedness, and dignity, stakeholders are likely to be reassured that they are valued members of the community who will exercise some influence in the decision-making process. Decision-makers must, of course, avoid conducting a proceedings that are, in reality, a mere sham.

B. Dispute Resolution Processes

1. Consensus Seeking Processes

In this procedure, an agency invites representatives of different stakeholder groups or perspectives to join an advisory committee.[105] Members of the committee then search for areas on which they all agree or can reach a "consensus." If the committee reaches a consensus, the agency may make a decision that is consistent with the agreement or use

99. *See id.* at 11, 120-21.

100. Agency representatives generally sit at the front of the room and citizens take turns speaking, sometimes into a microphone. The representatives may or may not respond to the citizens' comments. The proceeding is recorded.

101. This is a more informal format, with agency representatives displaying relevant information at various stations around the room. Citizens visit each station, study the information, and provide comments to the agency representatives. The representatives record the citizens' comments. *See* Creighton, *supra* note 93 at 161-62.

102. This is another informal format, with agency officials or facilitators sitting at tables with eight to ten citizens. The official or facilitator at each table invites the citizens to speak and records their comments on a flipchart. *See* Creighton, *supra* note 93 at 155-56.

103. *See* Michael Elliott, *The Role of Facilitators, Mediators, and Other Consensus Building Practitioners, in* THE CONSENSUS BUILDING HANDBOOK 216-18 (Lawrence Susskind, Sarah McKearnan & Jennifer Thomas-Larmer eds., 1999).

104. *See id.* at 199-239; Creighton, *supra* note 93 at 195-97.

105. *See* Creighton, *supra* note 93 at 117-18, 163-73.

parts of it. However, the agency may be required to consider other information. Therefore, the agency is not required to adopt the precise agreement recommended by the committee.[106] This procedure should only be used, however, when the agency has agreed that it will be significantly influenced by the committee's agreement. Otherwise, the procedure may be considered a sham with the severe negative consequences described earlier.

Consensus seeking processes, when managed appropriately, clearly provide an opportunity for voice, consideration by decision-makers, and treatment that is fair, even-handed, and respectful. They also offer an opportunity for education regarding key issues and real dialogue with other stakeholders, including the representatives of the sponsoring agency.

In some circumstances, particularly when there is distrust of the sponsoring agency or the agency concludes that it cannot behave in a manner that will communicate openness and even-handed treatment of various viewpoints, the agency would be wise to involve a neutral facilitator. The characteristics and role of the facilitator, however, are very important. That person will be required to behave in an effective manner that demonstrates a commitment to even-handed treatment, as well as a commitment to opportunities for voice, consideration, and respect. In Pennsylvania, the interviews with stakeholders suggested that the identity of and trust in the individual playing the role of the third party should be a central process design consideration.[107] Pennsylvania stakeholders' preference for facilitators who are knowledgeable regarding CAFO-related disputes and will be responsible for educating or advising the disputants also may present challenges to process design. Indeed, this preference may suggest the need for a facilitator to find and involve a team of trusted substantive experts, available to conduct an early education session regarding legal or scientific issues and/or to be available throughout the process to respond to stakeholders' questions. Another option might be a facilitator team, with one person responsible for guiding the process and the other(s) responsible for providing even-handed, substantive information.

2. Mediation

In mediation, as in consensus seeking processes, representatives of stakeholder groups and perspectives are invited to participate in

106. *See id.*, at 118; Dwight Golann & Eric Van Loon, *Legal Issues in Consensus Building, in* THE CONSENSUS BUILDING HANDBOOK 505-10 (Lawrence Susskind, Sarah McKearnan & Jennifer Thomas-Larmer eds., 1999).

107. *See* ABDALLA ET AL., PENNSYLVANIA REPORT, *supra* note 4 at 36-37.

discussions and to attempt to reach consensus on an issue. The agency charged with legislative or administrative authority for the issue is also represented in the process. This process is different from consensus seeking processes, however, in one very important way. The stakeholders involved in mediation together decide the resolution of the conflict or make a decision. The decision will be binding. Thus, the responsible agency maintains control over the final decision, but shares that control with the involved stakeholders.

Mediation always involves a third party, the mediator, who helps the parties communicate and negotiate with each other to reach resolution. This procedure, managed appropriately, provides an opportunity for voice, consideration by those at the table, and treatment that is fair, even-handed, and respectful. This process also provides an opportunity for real dialogue. Finally, mediation provides all stakeholders with direct, rather than indirect, control over the situation. As with consensus seeking processes, however, if mediation is meant to respond to concerns regarding procedural fairness, the selection of the appropriate mediator is crucial. This individual or team must manage the process in a manner that allows stakeholders to trust in the process, the mediator(s), and the ultimate outcome.

C. A Continuum of Processes

As should be clear from their description, the five processes recommended here respond to varying degrees to the different needs identified in the interviews with Pennsylvania stakeholders. Public information meetings, in particular, are meant to respond to perceptions of risk and uncertainty by providing stakeholders with easy access to relevant and accurate information regarding the relevant law, science, and technology. To the extent that this procedure permits stakeholders to have an opportunity for voice, the opportunity is designed primarily to provide reassurance regarding stakeholders' social standing. Formal review and comment, public hearings, and consensus seeking processes respond most directly to stakeholders' search for an opportunity to exercise *indirect* control through the opportunity for voice. Public hearings and consensus seeking processes, unlike formal review and comment, additionally have the potential to provide direct reassurance to stakeholders that their voices and identities are valued. Mediation, finally, is the one process that can provide to stakeholders an experience of procedural justice, as well as *direct*, if shared, control over their situation. Depending upon the situation and the needs of the stakeholders, some of these processes can be combined or used in a planned sequence.

V. Conclusion

Making decisions regarding the regulation of CAFOs and other CAFO-related disputes is undeniably difficult. Dispute resolution and decision-making in this context requires consideration of complex and often conflicting legal and scientific information. Some stakeholders' perception of risk is very high. Public officials must weigh one citizen's right to be assured of a safe and aesthetically pleasing environment against another citizen's right to use his property for economic benefit or even survival. Each of these citizens is raising a legitimate set of rights and concerns. If these citizens can be permitted, through mediation, to experience procedural justice *and* exercise *direct* control over the resolution of their dispute, the outcome is most likely to provide some advantage to both, to inspire their compliance, and to permit the maintenance of a relationship.

Even if these citizens cannot be permitted to maintain direct control over the final resolution of their dispute, however, they and their communities (whether a local community, a region, or even a state) will benefit from the use of decision-making processes that respond to the yearning for procedural justice. In evaluating Pennsylvania stakeholders' dissatisfaction with the processes that have been used or are being used to address CAFO-related disputes, the extent to which their dissatisfaction and perceived lack of control is grounded in procedural justice concerns is striking. Citizens, as members of a democracy, need to be able to believe that their voice counts and that public decision-making offers them some level of indirect control over decisions. Thus, if the public authorities responsible for making decisions regarding CAFOs can focus as much on listening to and considering the voice of the people affected by these disputes as they do on the legal analysis and scientific studies that have been done, they may be able to help communities, and the sense of shared control that distinguishes a democracy, weather the consequences of the changing face of agriculture.

NatAgLaw@uark.edu $ (479) 575-7646

An Agricultural Law Research Article

Science, Politics, and Problem Solving: Principles and Practices for the Resolution of Environmental Disputes in the Midst of Advancing Technology, Uncertain or Changing Science, and Volatile Public Perceptions

by

Peter S. Adler, Ph.D.

Originally published in PENN STATE ENVIRONMENTAL LAW REVIEW
10 PENN ST. ENVTL. L. REV. 323 (2002)

www.NationalAgLawCenter.org

Science, Politics, and Problem Solving: Principles and Practices for the Resolution of Environmental Disputes in the Midst of Advancing Technology, Uncertain or Changing Science, and Volatile Public Perceptions

Peter S. Adler, Ph.D.*

Abstract

Environmental conflicts pose powerful questions and complex challenges for civil societies. More than other kinds of disputes, they are contentious, stubborn, and emotional. Many of them are laden with contested scientific information that could determine impacts and outcomes for thousands, sometimes hundreds of thousands of stakeholders, some of whom haven't been born yet. This article reports on recent research regarding the integration of scientific and technical information in mediated and facilitated cases and posits six hypotheses which lay the groundwork for additional research on environmental consensus building

* Peter S. Adler, Ph.D. is a Senior Associate with the Science and Public Policy Program, The Keystone Center. He is also affiliated with The Accord Group, LLC and, in 2001, was a Visiting Fellow at the Policy Consensus Center, Hatfield School of Government, Portland State University. The author is especially indebted to three esteemed colleagues for advice, ideas, and assistance. Dr. Juliana Birkhoff, Senior Associate with Resolve, Inc., helped distill and then articulate many of the mediation strategies referred to in this article and more fully described in *Managing Scientific and Technical Information in Environmental Cases*. Dr. Connie Ozawa, Professor of Urban Studies and Planning at Portland State University, co-shaped the five hypotheses for additional research. Dean Lisa Kloppenberg of the University of Dayton School of Law helped obtain the essential facts cited from the book and film *A Civil Action*. Finally, the author would like to thank Debra Hart-Munchel, a Symposium Articles Editor, and Lauren Carothers, Editor-in-Chief, for editing his piece.

I. The Challenge

At core, environmental disputes reflect America's constant struggle over the "triple bottom line" of sustainability: the health of our environment, the vitality of our commerce, and the endurance of our communities.[1] Consider the following headline:

> "In a major move to protect wildlife in old growth forests, a judge has halted nine federal timber sales in the Pacific Northwest and ordered further reviews that could stop logging in large sections of Washington, Oregon, and California."[2]

Or this:

> "The Environmental Protection Agency said today that it intended to withdraw a new drinking-water regulation approved by the Clinton administration, saying it did not believe that the decision was supported by the best available science. Arsenic, a naturally occurring substance, is a known carcinogen."[3]

And, finally, this:

> The latest product of the mad science of biotechnology is a new critter that industry has dubbed "Enviropig." Though you might call it Frankenpig. **The Boston Globe** reports that big corporate hog producers working with Canadian scientists, have financed development of a genetically-altered porker that produces a more environmentally-friendly manure. Manure is a big barrier to the expansion of massive hog factories because swine excrete excessively. The excretion is especially stinky, and this pig stuff contaminates rivers and our other water supplies, killing fish and causing health problems.[4]

At the start of the 21st Century, citizens and decision-makers are hungry for ways to improve environmental discussions. We need smarter outcomes that are conceptually sound, more explicitly equitable, more durable and efficient, and more transparent and accountable in their trade offs and policy logic. Simultaneously, we need to reduce the transaction costs, both human and financial, that are associated with public interest conflicts over timber, land, water, hunting, pollution, fishing, and energy development.

1. JOHN ELKINGTON, CANNIBALS WITH FORKS: THE TRIPLE BOTTOM LINE OF SUSTAINABILITY (1997).
2. The Spokesman-Review (Spokane, Wash.), Aug. 4, 1999.
3. N. Y. Times, Mar. 21, 2001.
4. The Funny Times, Oct. 2001.

The issues and problems portrayed in *A Civil Action* by Jonathan Harr,[5] and the movie based on this book, illustrate the complexity and dilemmas of these conflicts. Beginning in the mid-1960s, the City of Woburn Massachusetts operated two wells near the Aberjona River which served a number of Woburn homes. In 1979, the wells were closed because of chemical contamination and a suspected cancer cluster. In 1982, thirty-three plaintiffs, half of them were either children who were sick with leukemia or the estates of those who had already died, filed suit against two alleged polluters, W.R. Grace & Co., owners and operators of a machinery plant, and Beatrice Foods, Inc. owners of a tannery and a 15 acre parcel of land adjacent to the tannery.

In federal court, the case was assigned to Judge Walter J. Skinner who, in 1986, tri-furcated the trial. The first phase was to focus on whether plaintiffs could prove that defendants had permitted the accused chemicals to be deposited in the area and, if so, whether those chemicals actually migrated to the wells. Following this "hydrology stage," the second stage of trial, if reached, was to focus on issues of medical causation. The third stage would then address damages.

Considerable legal maneuvering ensued with trial of the first stage lasting 78 days, involving 196 volumes of pretrial depositions, and 25,000 pages of deposition transcripts. Plaintiffs retained 15 expert witnesses and defendants retained 28. Combined, defendants spent more than $10 million on fees and other litigation expenses during this first stage. In response to special interrogatories, the jury concluded that plaintiffs had not proved that Beatrice caused or permitted the accused chemicals to be deposited in the well waters. In contrast, the jury found that plaintiffs did demonstrate that Grace had deposited the accused chemicals and that some of them had reached the wells. It now appeared that the case would proceed to the second stage of trial against Grace.

Just before the second stage was to commence, Judge Skinner granted a motion by Grace for a new trial on the first stage. Counsel for plaintiffs and Grace then entered into negotiations and announced a settlement in which Grace committed to pay $8 million dollars. This amount was divided as follows: $2.6 million repaid costs and litigation expenses; $2.2 million went for attorneys' fees; and each of the 8 families received $375,000 in 1986 and an additional $80,000 five years later. The case against Beatrice and its lawyers continued for three additional years. In the end, a verdict in favor of Beatrice remained intact as did Judge Skinner's finding that plaintiffs had uncovered no evidence that the tannery ever used the primary contaminants alleged to have caused the illnesses in Woburn.

5. JONATHAN HARR, A CIVIL ACTION (1995).

II. Another Way?

The use of strategies based on 'joint gains' problem solving, mediation, facilitation, and consensus building offer promise for cases like the Woburn contamination problem and for many other environmental issues as well. While these approaches are not a panacea, thousands of significant disputes involving public health, public lands, and natural resources have been successfully mediated or facilitated since the early 1970s. This includes 'upstream' cases when rules and policies are being made and 'downstream' issues when parties are involved in enforcement and compliance.[6] Many more cases should be solved in this manner.

Over the last twenty-five years, considerable practical experimentation along with a rich academic, legal, and popular literature has emerged dealing with out-of-court conflict resolution. Within this larger body of efforts, considerable attention has been given to the specialized challenges of reaching consensus when environmental and natural resource issues are at stake. While the fields of alternative dispute resolution (ADR) more generally and environmental conflict resolution (ECR) more specifically are still developing, consensus-building clearly has much to offer to public health, natural resource management, agriculture, urban and regional planning, and energy development.

Like ADR, ECR is not a single procedure. In actual practice, it consists of many different applications and technical processes ranging from traditional pre-trial settlement meetings to facilitated environmental "summits" to special committees and advisory boards, some of which may be conducted under specific legal regimes like the Federal Advisory Committee Act (FACA). Nor is there one single model of mediation or facilitation that prevails among practitioners that is deemed to be appropriate in all environmental cases. Approaches range from highly evaluative to highly facilitative, and from a focus on broadly defined problems with multiple issues to single-issue matters that are more distributive and allocational in nature.[7]

However different from each other they may be in form and practice, all ECR processes share certain common characteristics. They are all attempts at strategic and specific cooperation in the face of real or suspected environmental problems; they all aspire to some form of optimization, meaning, they constitute a search for Pareto-preferential

6. GAIL BINGHAM, RESOLVING ENVIRONMENTAL DISPUTES (1986).

7. Leonard Riskin, *Toward A More Refined Understanding of Mediation: Revisiting, Revising, and Reimagining The Grid*, *at* http://www.law.yale.edu/yls/c_pages /yls_pa/103/Riskin.pdf (last visited Apr. 15, 2002).

outcomes that can maximize mutual gains; and finally, all ECRs are problem-solving exercises that inevitably wrestle with any or all of three types of problems. [8]

"Type I" problems are best described as matters that are "Technical" or "Convergent" in nature. Examples include retrofitting an older water system for conservation, finding the fastest way to Mexico City, setting a broken leg, or eradicating a termite infestation. Such problems tend to be routine and bounded, "fixes" exist, and there is agreement on both the definition of the problem and a range of solutions. Type I problems tend not to require much consideration of values and beliefs and do not usually require high levels of participation and involvement by those who have the problem. The more that people with reasonable intelligence and good will study them, the more likely that solutions will "converge" into a narrow range.

"Type II" problems are "Value" driven or "Divergent" problems. Examples include determining how we will expand a water supply once existing sources have been tapped, deciding "why" we want to go to Mexico City and what we are going to do once we get there, determining how we will effectively educate our children, or deciding how much growth is enough. Type II problems tend to be more emotionally complex, more intellectually opaque, and less bounded than Type I problems. No one "fix" seems exactly right. Though there may be rough agreement on the problem, there is no agreement on solutions. These kinds of problems require greater consideration of opinions, beliefs, and convictions. Resources and technical expertise alone will not solve them because they require high levels of buy-in by those who have the problem. The more that people with integrity, good will, and good working relationships will study them, the more likely that solutions will "diverge" into a greater range.

"Type III" issues are often described as "Wicked" or "Intractable" problems. "Wicked" doesn't mean bad. It means they are diabolically complicated with emotion, politics, and intensity. They preoccupy us, and they take a long time to dissipate or resolve. Examples include the abortion and right-to-life debate, deciding who should have first call on the last of the cheap water that is available, resolving the Israel-Palestine and India-Pakistan conflicts, and finding the balance between resource uses like logging and irrigation in the face of threats to Spotted owls and

8. There is a rich literature on problems and problem solving. The typology of problems presented in this paper has been synthesized from the writings of E. F. SCHUMACHER, A GUIDE FOR THE PERPLEXED, (1978); *see* RONALD HEIFITZ, LEADERSHIP WITHOUT EASY ANSWERS, (1994); *see* EDWARD DEBONO, LATERAL THINKING, (1990); Nancy Roberts, *Wicked Problems and Network Approaches to Resolution, at* http://www.willamette.org/ipmn/test2/issue1/ejchapter1.htm (Sept. 23, 2000).

Columbia River salmon.

In Type III problems, there is usually broad disagreement on what "the problem" actually is, competing solutions that create on-going discord among stakeholders, and a diffusion of power that makes any one party incapable of both defining the problem and posing solutions. Integrity, good will, and good-working relationships are missing, and people are actively trying to defeat each other. Like Type II problems, Type III problems are driven by conflicting values but, unlike Type II challenges, they often have long, nasty, and remembered histories. In these circumstances, proposed solutions are generated by parties who come and go because they have either changed their minds, failed to communicate, or changed the rules by which the problem is being addressed. In these circumstances, no one can guarantee that a proposed solution will actually achieve an intended result, and the fairness of any proposed solution becomes impossible to measure.

In the context of Type I, Type II, and Type III problems, mediators, facilitators, and conveners must grapple with the challenges of managing the substantive, procedural, and relationship barriers that usually attend consensus-seeking. Much of the early literature on mediation focused on improving the mediation process.[9] Management of "substance" was assumed to be a matter for the parties' control, and mediators were often selected precisely because of their skill with process and their ignorance in the material matters in dispute. Perhaps as a result of a quarter century of progressive experimentation, practitioners now seek better traction on substantive matters in the form of new concepts, strategies, and tools for helping parties achieve rigorous outcomes. Managing the scientific and technical aspects of would-be environmental collaborations falls directly into this category.

Finally, it is valuable to understand how scientific information unfolds and braids into environmental decision-making in our prevailing legal and political culture. In general, Americans embrace three approaches to sorting out contested environmental science, and, more recently through the ECR movement, a fourth (Table 1).[10] The "Adversary Science" approach is the bedrock of our democratic institutional framework and the means by which both judicial and

9. For representative examples of "process" and "relationship" oriented mediation models, *see* KARL SLAIKEU, WHEN PUSH COMES TO SHOVE (1996); BARBARA NAGLE LECHMAN, CONFLICT AND RESOLUTION (1997); JEFFREY G. MILLER & THOMAS R. COLOSI, FUNDAMENTALS OF NEGOTIATION: A GUIDE FOR ENVIRONMENTAL PROFESSIONALS (1989); JOHN KENNEDY & SUSAN CARPENTER, MANAGING PUBLIC CONFLICT (1988).

10. Table I, Appendix, is adapted from SCOTT T. MCCREARY, JOHN GAMMAN, & BENNET BOOKS, REFINING AND TESTING JOINT FACT-FINDING FOR ENVIRONMENTAL DISPUTE RESOLUTION: TEN YEARS OF SUCCESS, 3 (Concur, Inc., Working Paper 00-01, May 1, 2000).

scientific "truth-finding" is normally done. This approach involves competing experts who are recruited to bolster each side, opposing counsel who seek to undermine each other, judges and hearing officers who are required to pick a "winner," and various opportunities for forum shopping, escalations, and appeals.

The "Expert Decision Maker" approach utilizes blue ribbon panels, science panels, and other kinds of scientific and technical experts to guide, advise, or actually make decisions. Normally, only the experts participate, and the only information that is salient is "scientific." Local, cultural, and community standards tend to be excluded or relegated to a tertiary status.

The third approach to managing contested, contentious, or uncertain environmental science is through ad hoc, off-line, usually unofficial negotiation. Not unlike other kinds of political bargaining, attorneys, lobbyists, or other advocates meet and, with or without the involvement of public officials, hammer out specific settlements and resolutions in the shadows of formal proceedings. Harr's *A Civil Action* offers repeated examples of this kind of bargaining.[11]

In America, these three models are well perfected and time-tested approaches. Newer on the political and legal scene are collaborative ECR approaches which bring stakeholders, along with their experts and advocates, into face-to-face dialogue and the joint search for an agreement. While strategies, tactics, and steps differ from practitioner to practitioner, most joint gains processes go through at least three broad stages: (1) preliminary work and startup; (2) forum management and information exchange; and (3) problem solving, bargaining, and closure. Each of these phases is a reflection of certain core functions that usually need to be performed if consensus is to be reached (Table 2).[12] Above and beyond building a good process and forging reasonable working relationships, there is, in all of ECR processes, an emphasis on mutually framed questions to help identify expertise needs, the pooling of relevant information, and an explicit search for technical agreement. Though it is usually insufficient by itself, good science is critical to good environmental consensus-building.

III. Managing Scientific & Technical Information

"Science," says physicist Richard Feynman, "is a way of trying not to fool yourself."[13] Stripped to essentials, it is a method of inquiry based

11. JONATHAN HARR, A CIVIL ACTION (1995).

12. Table II, Appendix.

13. This quote, attributed to Richard Feynman, can be found at Bill Arnett, *Bill Arnet's Home Page*, *at* http://www.dkrz.de/mirror/arnett.html (last updated Jan. 22,

on a sole but critical premise: That the degree to which an idea appears to be true has nothing to do with whether it actually is true, and that the way to distinguish facts from conjectures is to test them by experiment and verify them by replication and peer review. In the context of adversarial or expert decision-making, contested models, opposing methods, contradictory facts, and divergent assumptions are routinely put to the test of peer examination and independent analysis. In ECR processes, no such protocols are inherent. The question arises, then: How should alternative or fiercely argued scientific and technical contentions be handled when stakeholders are simultaneously struggling to integrate good science and reach agreements? Are the same approaches used by experts and advocates useful in the new collaborative approaches?

In 1998, I was part of a working group of environmental mediators that conducted a broad inquiry aimed at better understanding the scientific and technical challenges in environmental collaborations. We were interested in capturing and making explicit the best strategies and techniques that can be used when stakeholder groups struggle to find consensual outcomes in science-intensive environmental disputes. The project, conducted and sponsored by the Western Justice Center Foundation, the United States Institute for Environmental Conflict Resolution, and Resolve, Inc., resulted in an 80-page monograph and resource document which is available to the public at different electronic locations.[14]

Thanks to funding support from these three sponsors, our group held regional focus groups with lawyers, scientists, agency representatives, and mediators. These meetings, held in Tucson, San Francisco, Los Angeles, and Washington D.C., resulted in interviews and consultations with more than 100 people, all of whom were experienced in environmental conflicts. In our interviews and focus group sessions, we were interested in four topics:

1. the epistemological assumptions mediators, facilitators, and conveners bring to the issue of science as it braids into and through environmental conflicts;

2. the scientific and technical challenges collaborators, facilitators, and experts have encountered in environmental cases;

3. the strategies that conveners, mediators, and facilitators most often employ to meet those challenges; and

4. the actual tools and techniques that they use to manage those

1997).

14. Peter S. Adler et al., *Managing Scientific and Technical Information in Environmental Cases: Principles and Practices for Mediators and Facilitators* (2000).

situations.

Broadly speaking, we found four different case patterns: (a) conflicts where science was truly at the center of the storm and critical to problem definition and solution-searching; (b) cases where science was an important but not necessarily central issue; (c) disputes where science was a camouflage or red herring to the real issues; and (d) controversies where science was generally irrelevant to the problem and to any proposed solutions. Additionally, we found twenty-three specific science-related challenges (which we termed "Rocks on the Road"), forty practice principles that form a set of bedrock ideas about consensus-building in science-intensive environmental cases, two dozen "implicit" mediative strategies that we sought to make "explicit" in the document; nearly fifty tools and practice tips that we solicited from highly experienced mediators and facilitators; and a variety of useful books and references for people who are interested in this topic.

As we undertook our inquiry, we were struck by the great variety and complexity of science-intensive challenges stakeholders face when they try to forge agreements. The following are two of the twenty-three "Rocks on the Road" we found arrayed in the same format as can be found in the full monograph:

The Access to Data Problem

There is good scientific or technical information available but some or all of the parties have trouble accessing it. They cannot quite articulate what they need to know, how to identify it, or whom to contact.

Example: *Competing recreational users (hikers, horse riders, and bicycle riders) are engaged in a rule-making dispute over management practices in a multi-purpose wilderness area. Although the stakeholders are bright, intelligent people, they are highly positional and unaccustomed to these kinds of conflicts.*

The Irrelevant Information Problem

Scientific and technical information exists and the parties know it exists, but they choose not to examine it. They believe the information is irrelevant to reaching an agreement or there is no practical solution to the problems of conflicting interpretations.

Example: *Government agencies and environmental groups sue*

several industries over the removal of Polychlorinated Biphenyls (PCBs) from river sediments. There are major scientific and factual disagreements over the levels of PCB contamination that actually warrant action. There are also disagreements about the amount of sediment that has been deposited on the river bottom and bank. Plaintiffs and defendants agree to a settlement that results in a cleanup with no admissions of liability.

Other challenges included managing multiple disciplines that are arriving at diametrically opposed policy conclusions, helping groups with missing or incomplete information, dealing with proprietary information in which some of the parties have critical information that could help resolve the matter but the data is confidential, and dealing with uncertainty among the experts where, despite great amounts of advocacy, research, and applied studies, major scientific and technical ambiguity remains.

As a logical follow-up to the identification of these challenges, we were especially interested in the practical strategies that can be used to address these kinds of challenges when conveners, stakeholders, mediators, and facilitators confront them. We collected many different strategies and organized them into a procedural framework that mirrors what happens in actual mediation and facilitation cases. Examples of some of these strategies can be found in Table 3.[15]

Finally, we took all twenty-three of the "Rocks on the Road" that had been identified during our preliminary meetings and interviews and asked experienced mediators from different parts of the country to offer practical advice on what they would do if they were faced with that particular challenge. Here are two examples of approaches suggested by colleagues:

The Access to Data Problem

Competing recreational users (hikers, horse riders, and bicycle riders) are engaged in a rule-making dispute over management practices in a multi-purpose wilderness area. Although the stakeholders are bright, intelligent people, they are highly positioned and unaccustomed to these kinds of conflicts.

Lucy Moore, Lucy Moore Associates, Albuquerque, New Mexico: *Here are some options I might pursue. I could find mentors*

15. Table 3, Appendix.

for my group. I would look for a comparable situation elsewhere, hopefully not far away. I would invite a couple of those participants (from the process to revise the forest management plan, or create open space for a neighboring town, or whatever) to talk to the group. Hopefully, they will have a good outcome that highlights the kind of data that is useful in helping craft a solution. I could find a professor who might come and outline for the group the kind of data they might need, and give them generic ideas about where to find it. I could hold a "Let's Look at the Landscape" session, in which I would bring in experts, scientists, policy people, tribal leaders, and others to educate the group on the ecology, law, institutional authorities, and cultures which make up the proposed wilderness landscape. I would suggest to the group that although they are of course educated, highly intelligent, committed, and motivated, there are facts about the area we will be negotiating that are important for us to understand together. We need a common language and platform from which to work. I would encourage questions to identify additional data needs, and get direction from the presenters about how to get that data. Hopefully, I would end the session with a common understanding of the landscape and a list of questions and sources for answers that will spur the group to learn more. I could arrange a group field trip to the area in question. I have found field trips to be great equalizers when there is a disparity of interests, or when there are some highly trained technical people and some uneducated community members.[16]

The Information is Irrelevant Problem

Government agencies and environmental groups sue several industries over the removal of PCBs from river sediments. There are major scientific and factual disagreements over the levels of PCB contamination that actually warrant action. There are also disagreements about the amount of sediment that has been deposited on the river bottom and bank. Plaintiffs and defendants agree to a settlement that results in a cleanup with no admission.

Bill Humm, Environmental Settlements, Lee, New Hampshire:

I am going to try an approach that succeeded in a similar case I worked on that involved the voluntary cleanup of a municipal aquifer contaminated with hazardous waste. My task was to help a dozen

16. Peter S. Adler et al., *Managing Scientific and Technical Information in Environmental Cases: Principles and Practices for Mediators and Facilitators* 35 (2000).

Potentially Responsible Parties (PRPs) allocate cleanup costs. The usual practice of collecting 'waste-in' data seemed unproductive in this case since records were spotty. Moreover, all parties maintained that they were minor contributors to the problem. There was nonetheless a desire to find a basis for settlement. In a brainstorming session, I helped the parties design their own variant on the old silent auction technique. This process required each PRP to convey via the mediator a confidential bid reflecting a settlement offer. I was also authorized to prepare a report on the PRPs reflecting the total value of the bids, and the amounts of the highest and lowest bids, and certifying that all PRPs had submitted bids. Although the first few rounds of bidding fell short of the amount required for cleanup, the tool nonetheless built confidence among the PRPs that an acceptable allocation was within grasp. I was able to reassure the PRPs that no one was 'low-balling' and that one PRP (perceived by the others as being the major contributor to the problem) was making a bid proportionately larger than the others. Individual PRPs increased their bid in the subsequent round of bidding, based partly on their inference of what others were doing. Meanwhile, I encouraged each of them to focus on the value of avoiding lengthy litigation rather than worrying that one of them might commit fewer dollars than another. With settlement close but still elusive, I convened the CEOs, several of whom no longer felt the need for the confidentiality of the bidding process. They openly acknowledged their bid and challenged the other[s] to increase theirs. Within hours, a settlement of the cost allocation question was achieved. Though the tool was crude, it was effective in this case, perhaps largely because the parties 'invented' it themselves.[17]

Other examples of techniques identified in the monograph are included in Table 4.[18]

IV. Thoughts Towards a Theory of Practice [19]

Although the emerging literature on environmental conflict resolution is increasingly rich with case studies of environmental consensus-building, surprisingly little theory-building has taken place in

17. *Id*.

18. Table 4, Appendix.

19. This theory was developed by the author and Connie Ozawa, Department of Urban Planning, Portland State University in conjunction with the *Collaborative Resource in the Interior West* project sponsored by the Liz Claiborne and Art Ortenberg Foundation.

the specific area of integrating technical and scientific information into ECR. Based on the interviews and focus groups that led to *Managing Scientific and Technical Information in Environmental Cases: Principles and Practices for Mediators*[20] and on a more recent examination of ten cases of environmental consensus-building cases in Montana, Wyoming, and other states in the interior West, Connie Ozawa and I offer the following five propositions as a starting point for additional observation and research.

A. Hypothesis 1: Environmental collaborations are more likely to succeed if the political issues of concern are discussed prior to the examination of technical issues.

Like other aspects of a conflict, the scientific and technical aspects of environmental disputes are embedded in a political context. Inevitably, value choices are at play. These underlying values are the ultimate arbiters of political decision-making, even when a plethora of scientific information is available. Substituting scientific and technical information does not void the making of value choices. Rather, it more fully informs the value choices that need to be made by creating data-driven points of reference.

Environmental disputes are also rarely caused by scientific or technical information *per se.* More often, they tend to be about: (a) perceived or actual competition over interests; (b) different criteria for evaluating ideas or behaviors; (c) differing goals, values, and way of life; (d) misinformation, lack of information, and differing ways of interpreting or assessing data; and/or (e) unequal control, power, and authority to distribute or enjoy resources.

Finally, not every environmental case is actually science-intensive, nor is scientific and technical controversy the primary story in many seemingly science-laden cases. Parties often use scientific and technological issues as a strategic or tactical weapon. Even when parties do not use science as a camouflage for other issues, they typically bring information to the table that bolsters their position or that defeats that of their opponents. Consensus-based environmental decision-making requires a search for jointly usable information, which, in turn, requires a collaborative inquiry.

20. Adler, *supra* pp. 33-64.

B. Hypothesis 2: Environmental collaborations are more likely to succeed when the scientific and technical aspects of a decision are explicitly examined by all the parties involved.

Conflicts over information, data, ideas, and knowledge are an inevitable and integral part of most environmental decisions. This holds true whether the decisions are in the policy formation or rule-making stage or in compliance and enforcement proceedings. Jointly usable information, therefore, requires trust in information and the methods by which it is produced. Trust tends to diminish when parties perceive that the science has been generated from a particular point of view, unilaterally funded by an opponents, or generated with a particular outcome in mind. Conversely, trust often can be built if the questions asked and the methods employed in information gathering are jointly developed.

C. Hypothesis 3: Environmental collaborations are more likely to succeed when the limitations of scientific knowledge and the uncertainties and incompleteness of information and knowledge are implicitly or explicitly acknowledged.

By itself, scientific and technical knowledge is rarely the single resource that will inform and lead to consensual environmental decisions. In most cases, parties bring to the table different kinds of knowledge that may be equally considered or ranked according to perceived importance: traditional knowledge, social and cultural knowledge, legal knowledge, economic knowledge, remembered knowledge, and the place-based wisdom of communities. These represent rich sources of data and information that will usually defeat or significantly delay "scientific" or "technical" solutions if they are not included for consideration. However, all knowledge (including traditional, cultural, local, and remembered-in-nature) is subject to questions about validity, accuracy, authenticity, and reliability. Every type of knowledge has standards of quality that can be examined, debated, or shaped.

Useful scientific and technical knowledge also rarely remains static in the subject matters that come into play in environmental conflict. Knowledge builds off new questions and new information. However sizable our information and knowledge base is, our understanding of environmental, social, and economic realities remains incomplete. We will never know everything we need to know to make perfect decisions, particularly when the decisions concern predictions of future impacts.

In collaborative processes, risks and uncertainties need to be clarified and explicitly acknowledged both in lay terms and in scientific

or technical terms. In general, there are three kinds of uncertainties that tend to arise in environmental cases: (a) uncertainties in which the measurements or observations are insufficient to bound explanation and interpretation; (b) uncertainties that arise because the measurements conflict; and (c) uncertainties over competing or fragmentary theoretical frameworks. All three types may need to be confronted in stakeholder processes.

D. Hypothesis Principle 4: Environmental collaborations are more likely to succeed when participants work together on scientific and technical modeling.

Environmental decision-making processes often require some form of modeling in order to define problems, review impacts, and illustrate choices. The promise of models may seduce policy-makers and disputants into believing that models are infallible. However, all models are inherently uncertain. It is misleading to believe that a number generated by a model is a singular value that predicts a future state with absolute certainty. Participants must understand (and scientists must be assisted to honestly portray) that there is a range of quantities that surround any numerical output from a model. This variance reflects, among other things, the assumptions of the modelers and the complexity of the natural system. A joint recognition of the limitations of the models will enhance its credibility and acceptability among all participants.

Models are also rarely fully predictive; they are best thought of as illustrative. Models serve best when participants understand that models usually can only describe ranges of options and are merely tools, albeit sophisticated tools, to aid in making informed choices. Scientists working for opposing parties may bring different models to the table based on differing assumptions about inputs, interactions between variables, and outputs. The models then are staged to be in opposition to one another, when in reality they simply miss or talk past each other because they are, at their core, incomparable.

This also occurs when scientists of different disciplines model the same natural system from different perspectives. For example, an earth scientist analyzes global climate change through the lens of geologic time. Atmospheric scientists take many detailed measurements of the present-day climate and believe that such measurements are the key to predicting climatic change. Both approaches are valid. However, the results of the two models may yield different conclusions and advocates of each approach may disagree with each other.

E. Hypothesis 5: Environmental collaborations are more likely to succeed if participants, experts, advocates, policy-makers, and third parties are able to confront and overcome the inherent "role" impediments they each bring to the consensus-building challenge and understand the validity of other perspectives.

Public agencies, community groups, and private businesses tend to approach the scientific aspects of their disputes differently. Private businesses usually feel compelled to put out information defensively, offering only that which they believe is required by law, and no more. Community groups and environmental advocacy organizations, which usually have fewer resources to work with, often feel compelled to use their information offensively and in terms that may appear strident and accusing. Government agencies charged with making decisions (particularly those involved in enforcement and compliance) are usually required by law to meet standard burdens of scientific proof.

Similarly, classically trained theoretical scientists are less likely to offer solutions or make practical conclusions than applied scientists are. Conversely, they are more likely to identify further questions that could be explored and answered which may be useful for agreements built on adaptive management practices. Applied scientists are more likely to offer a range of solutions, and professions such as medicine, engineering, and the design professions are more likely to offer specific fixes.

Scientists often believe their work to be value-free and their methods to be observable and replicable truths. However, all science is based on assumptions. These assumptions are affected by culture, perspective, prior experience and other influences. It is especially important in science-intensive disputes for mediators, facilitators, and conveners to help scientists with their roles and possible role conflicts just as they might do with lawyers, accountants, or engineers in other kinds of cases.

Finally, professional mediators, facilitators, and consensus-builders have their own vocabulary and their own modes of thinking and problem solving. Many "third parties" tend to think in terms of agreements, decisions, and solutions, all of which somehow imply failure when there is no tangible result to a process. Managing and sometimes limiting the inherent third-party bias for action is important. In many environmental conflicts, the right action may very well be no action.

V. CODA

Connie Ozawa and I were recently asked by a group of water and air quality scientists to talk about the burden of proof in environmental collaborations. "How much science," they wanted to know, "is really

enough?" They were hungry for an answer that could be grounded in statistical validity, positive correlations, and standard deviations. Our answer, of course, was this: What is appropriate, relevant, and useful in the many environmental cases our society is confronting can never be fully prescribed by the rules of science just as laws and statutes cannot prescribe answers to every factual situation covered by that law. In collaborative processes, "how much science is enough" must be negotiated.

One test of ECR, therefore, is whether the best of what science offers can be successfully enjoined with the best of what the politics and policies of a given environmental conflict offer. Kai Lee calls this approach "civic science" and defines it as "irreducibly public in the way responsibilities are exercised, intrinsically technical, and open to learning from errors and profiting from success."[21] The outcomes of good civic science, he says, should be environmental decisions that are at least as good, if not better, than what would happen otherwise in terms of their conceptual soundness, equity, technical efficiency, and practicability. All of these bring us closer to the illusive "triple bottom line."

21. KAI N. LEE, COMPASS AND GYROSCOPE 161 (1993).

Table 1
FOUR MODELS OF ENVIRONMENTAL DECISION-MAKING

	ADVERSARIAL DECISION-MAKING	EXPERT DECISION-MAKING	OFF-LINE, AD HOC, & IMPROMPTU DECISION-MAKING	COLLABORATIVE DECISION-MAKING
Auspices	Courts, legislatures, and administrative bodies.	Scientific organizations, expert panels, blue ribbon committees.	None	Neutral, credible organizations with strong access to stakeholders.
Convener	Judges, hearing officers, legislative committees, and other deliberative bodies.	Senior scientists or a science organization.	None	Career or appointed public official, usually teamed with a non-partisan facilitator
Participants	Experts aligned with each side and guided by attorneys and lobbyists.	Scientific Experts	Unpredictable. Usually, public officials and lobbyists.	Experts not necessarily aligned with parties, decision-makers, stakeholders
Methods of Introducing Information	Bills, resolutions, budget proposals, depositions, interrogatories, testimony.	Written research reports, discussions, debate.	Private submissions, reports, fact sheets.	Various oral briefings, memos, reports, facilitated dialogue.

Extent of Information Sharing	Information is strategically withheld or provided.	Information is shared. Usually, strong emphasis on peer-reviewed findings or academic research	Unpredictable.	Information is pooled. May be mix of peer reviewed and "gray literature" studies.
Technical Level of Discussions	Technical, though often geared to terms contained in legislation or regulation	Comparable to a scientific conference.	Unpredictable.	Strong effort made to "translate" technical information and make it policy-relevant.

Table 2

CORE MOVES

(Startup Moves. . .)

i. Appraising the conflict for possibilities.

ii. Organizing leadership, sponsorship, and the capacity to convene.

iii. Gaining the participation of all affected stakeholders.

iv. Designing a forum.

(*Management Moves. . .)*

v**.** Establishing protocol and forging working agreements on the issues to be resolved.

vi. Organizing productive and respectful exchanges of relevant information.

vii. Pushing the parties to discern the underlying interests of all stakeholders.

viii. Helping the parties discover, clarify, or create the greatest joint gains possible.

(Closure Moves. . .)

ix. Assisting the parties in making informed choices.

x. Helping ratify, memorialize, and prepare for implementation.

Table 3
STRATEGIES
(Some Examples of AStartup@ Strategies)
1. Do a formal conflict assessment and incorporate scientific and technical issues into your preliminary scoping. Collect information about the technical and scientific aspects of the dispute (along with all other aspects of the conflict) through observation, secondary sources, or interviews with the parties. Raise questions that identify potential information needs, the kinds of data that stakeholders are relying on, and the potential data conflicts that are likely to emerge.
2. Draw a picture or map of the key players, groups, and interests that, if left out of the process, might be affected, might contribute to a solution, or could potentially sabotage a whole process. Identify their technical and scientific sophistication early. Do not presume this has been done by the sponsoring organization.
3. Question parties' assumptions that science-related issues (lack of data, not understanding the data, misinformation, or different interpretations of data) are actually the core of the questions at hand. Often parties will say publicly that science-related issues are at the core of the problem, but then allow privately that they are not central to the problem. A solely scientific focus in environmental conflicts may miss or distort the issues and the process that follows such definition.
(*Some Examples of "Management" Strategies*)
4. Generate multiple descriptions of the technical and scientific problems as opposed to a more inflexible single-problem definition. Grappling with descriptions often will stimulate an understanding of how problems are linked with each other in the minds of both scientists and stakeholders.
5. Don't focus on data and data analysis too early. It is usually more important to understand the legal, political, social, economic, and scientific context to generate a clear set of questions and to position the search for high quality information as a vehicle for informing these other kinds of judgments.
6. Discuss the parties' various perceptions and definitions of 'risk' and 'precaution.' Find out how their ideas apply to the case. Definitions will vary among stakeholders. Discuss the nuances so that the many meanings of both terms are understood.
7. Use data as a discussion point rather than assuming it will inherently lead to an answer.
(Some Examples of "Closure" Strategies)
8. Help parties understand that when they have sufficient agreement on technical issues, they should go ahead and negotiate solutions. Often,

scientists want to keep fighting until they get complete agreement on precise numbers. However, the accuracy that is necessary to develop a solution may not be as extreme as scientists would prefer. For instance, it may not be necessary for all parties to agree on the exact level of pollution in order to recommend a remediation strategy which handles both the high and low estimates of the various parties and achieves regulatory criteria.

9. Promote dynamic, flexible, and adaptive agreements that balance reasonable stability (which is usually needed for business reliability) with flexibility and performance-based adaptability (which are needed for higher levels of environmental assurance).

A contingent agreement for additional rounds of negotiation based on further research and testing.

The capping of future liabilities by private parties through the purchase of an insurance policy or bond to cover unknown exigencies. For example, an insurance policy could be made to cover a capped high and low of the disputed potential cleanup costs for an underground cleanup.

An agreement that will be revisited within a certain period of time.

10. Help the scientists maintain face at the conclusion of an agreement that still poses great uncertainty.

Table 4

EXAMPLES OF TOOLS & TECHNIQUES

Get scientists to try on different "lenses" and look at issues and data sets from different angles of observation.

Monetize and graphically display the ecological and monetary costs of different options.

Bring in participants who have solved similar problems elsewhere.

Ask the 'do no harm' question: "Are there any decisions you might make now, with the information you have now, that might eclipse other critical decisions later or prevent something beneficial from happening in the future?"

Create a separate 'fish bowl' dialogue among the scientific and technical advisers to discuss and analyze the data in front of the parties.

Collect questions for an outside group of experts to consider and then organize a special technical team or review panel to generate ideas.

Develop a game or simulation focusing on multiple perceptions of the problem.

Shift meeting sites so participants understand the place where others come from—-for example, meet at their offices, laboratories, factories, or community halls.

Peer Review: Hire an expert who is trusted by everyone to review the data for the group.

Stage a well-bounded public debate and bring in the leading expert in the country on an issue to discuss the issue in public with the other scientists.