

Origins of environmental law and environmental systems science, 1965–1975

1. Suffolk County DDT litigation, 1965–1967

In 1965, Carol A. Yannacone, who had studied biology at Hofstra University, worked as a laboratory technician at Brookhaven National Laboratory, and taught science, witnessed a massive fish kill at Yaphank Lake on Long Island, New York, where she had spent part of her childhood.[1][2] Concerned about the environmental effects of 1,1,1-trichloro-2,2-bis(4-chlorophenyl)ethane (DDT), she insisted that her husband, trial lawyer Victor John Yannacone, Jr., take legal action to stop the Suffolk County mosquito-control authorities from spraying DDT. [1][2] She initiated the lawsuit that created Environmental Law as a new area of legal practice.[47][6]

In April 1966, on behalf of Carol Yannacone as representative plaintiff, Victor Yannacone commenced a class action for declaratory judgment and equitable relief in the New York State Supreme Court to prohibit Suffolk County from causing serious, permanent, and irreparable damage to the environment and natural resources of Suffolk County by continuing to use DDT. [47][4] Yannacone invoked the traditional equitable jurisdiction of the courts to prevent serious, permanent, and irreparable damage to natural resources and the environment.[4][5] The litigation sought judicial protection of the environment itself. [47][4]

During a hearing before Justice D. Ormonde Ritchie in June 1966, Yannacone introduced the expression environmental law to describe this application of established principles of equity to the protection of the natural environment.[47][6] When Justice Ritchie asked him where to look for a legal basis for the action, Yannacone answered, “Environmental law.”[6]

On August 15, 1966, Justice Ritchie granted a preliminary injunction prohibiting Suffolk County’s continued use of DDT.[4]

During November 1966, trial took place before Justice Jack Stanislaw.[4] Yannacone presented scientific witnesses who testified about the persistence of DDT, its movement through the environment, and its effects on the biological relationships that sustain natural systems.[47][4] The evidence presented the environmental consequences of DDT as a problem involving interconnected physical, chemical, and biological processes

rather than injuries to isolated species or individual property interests.[47][4]

In his November 30, 1967, decision, Justice Stanislaw recognized the environmental consequences established by the scientific evidence.[4][5] He observed that DDT, by its chemical stability, had introduced instability into the general ecosystem and concluded that the chemical had caused extraordinary damage to Suffolk County's natural resources.[4][5] His decision distinguished judicial recognition of environmental damage from the exercise of judicial authority to impose a permanent injunction,[4][5] concluding that the decision whether to prohibit further use of DDT was more appropriately addressed by the legislative branch of government.[4][5]

The claim advanced by Carol Yannacone sought equitable protection against injury to the natural environment considered as an interconnected system,[4] and differed from an earlier attempt to halt DDT spraying, *Murphy v. Benson*, which was based on individual property interests.[8] Contemporary scientific reporting identified the Suffolk County proceedings as an important legal development bringing environmental scientific evidence before the courts.[47]

Chemist Charles F. Wurster and ecologist George M. Woodwell prepared a Technical Appendix compiling scientific literature concerning the effects of DDT on organisms other than the insects targeted by mosquito control.[9][10] The appendix was submitted in support of the application for a temporary injunction.[10]

At trial, ornithologist Dennis Puleston presented evidence concerning the natural food webs of Suffolk County.[9][10] Scientists from different disciplines supplied evidence concerning relationships among organisms and their physical environment.[9][10]

2. Wisconsin DDT trial, 1968–1969

The scientific approach Yannacone developed in the Suffolk County DDT litigation was extended during the trial of DDT in Wisconsin. The trial, before the Wisconsin Department of Natural Resources in Madison, opened on December 2, 1968, and concluded on May 21, 1969, following 27 days of testimony from 32 witnesses[11][13][14] and the introduction of 208 exhibits. The completed trial record comprised 4,499 pages.[11][14][15]

The Citizens Natural Resources Association and the Wisconsin Division of the Izaak Walton League of America had petitioned the Department for a declaratory ruling classifying 1,1,1-trichloro-2,2-bis(p-chlorophenyl)ethane (DDT) as a water pollutant.[13][14][12] The petitioners' case was presented by Victor J. Yannacone, jr., as attorney for the Environmental Defense Fund.[11][12] The petitioners' case received support from scientists,[11] conservation organizations,[13] and individual citizens.[16] The trial became an important example of citizen organizations employing the law and scientific evidence to challenge established pesticide practices.[13][17]

The Wisconsin DDT trial examined the persistence, transport, accumulation, and biological effects of DDT throughout the interconnected environmental systems of Wisconsin.[11][12] The proceedings involved testimony by scientists from a number of disciplines, including ecology, chemistry, biochemistry, toxicology, ichthyology, botany, agronomy, and integrated pest management.[11][12]

Among the participating scientists were University of Wisconsin botanist Hugh H. Iltis,[18][19] wildlife ecologist Joseph J. Hickey,[20][21] and plant ecologist Orie L. Loucks.[11][13] Iltis presented the evidence of the complex relationships among plants, animals, and their physical environment.[11][13][18] Hickey documented associations between persistent chlorinated hydrocarbon pesticides and reproductive failure in birds, including eggshell thinning among birds of prey.[20][21] Other scientists testified about the chemical characteristics of DDT,[12] [3] its persistence and movement through the environment,[11] [12] its accumulation in organisms,[11][13] and its biological and toxicological effects.[12][3] The evidence was contested by representatives of agricultural and pesticide interests, whose witnesses defended continued use of DDT.[11][13][12][3]

Rather than focusing solely on the effects of DDT on individual organisms or isolated ecosystems, Yannacone organized the scientific evidence around the relationships among the physical, chemical, and biological elements of the Wisconsin regional environmental system.[11][22] He described this integrated approach as environmental systems science.[22] The Wisconsin proceedings provided an opportunity to present scientific evidence concerning DDT through analysis of the regional

environmental system in which the chemical accumulated and through which it moved.[11][22]

In May 1969, as the Wisconsin proceedings approached their conclusion, Yannacone assembled a team of scientists from the diverse disciplines of ecology, fluid mechanics, engineering, mathematics, statistics, and biological science who worked together to integrate the evidence from the trial into a coherent account of DDT transport and accumulation within the Wisconsin regional environmental system.[11][22] The team developed mathematical models to examine the transport, accumulation, and concentration of DDT within the Wisconsin regional ecosystem.[22] Professor Loucks presented the work in his testimony on the final day of the trial.[11] The work was subsequently published as “Systems Studies of DDT Transport.”[11][22]

The Wisconsin trial was an important stage in the development of environmental systems science because it examined the effects of a persistent chemical contaminant on an entire regional environmental system through the relationships among the elements of the environmental system rather than by isolated observations alone.[11][13][22]

3. Expansion of environmental litigation, 1967–1970

In the following cases, Yannacone extended environmental litigation beyond the original Suffolk County DDT controversy to other pesticides, industrial air pollution, land preservation, nuclear technology, and waterway construction.[9][23][24][25][26]

In October 1967, Yannacone, as attorney for the newly established Environmental Defense Fund (EDF), brought legal action to prevent the Michigan Department of Agriculture from applying dieldrin in Berrien County along the eastern shore of Lake Michigan.[9][10][27] The proposed application threatened the recently established coho salmon fishery.[9][28] During examination of the Director of Agriculture before the Michigan Court of Appeals, Yannacone established that the alleged Japanese beetle infestation was based on the capture of only 72 beetles during three months of trapping.[9][28] Although the court ultimately dissolved its temporary restraining order,[27] the litigation delayed the proposed application until the 1967 spraying season had ended.[29] The delay allowed the Michigan

Department of Conservation to continue its opposition to the agricultural authorities' pesticide program.[29] The disagreement continued during 1968, when dieldrin was nevertheless applied in Berrien County.[29]

In 1968, Yannacone and EDF challenged hydrogen sulfide emissions from the Hoerner Waldorf kraft paper mill in Missoula, Montana.[23] Yannacone had moved Environmental Law and environmental litigation from pesticides to industrial air pollution.[9][23]

Just after the close of the DDT trial in Madison, Yannacone responded to the plea of palynologist Estella Leopold, to prevent second home development that threatened the Florissant fossil beds in Colorado.[24][30][48] A temporary restraining order halted construction while Congress considered federal protection,[48] and Florissant Fossil Beds National Monument was established in 1969.[24]

In 1969, Yannacone joined Richard Lamm[25][31][32] to obtain a temporary injunction which prevented atmospheric flaring of radioactive natural gas from Project Rulison, which involved an underground nuclear explosion intended to stimulate natural gas production in Colorado.[25][49]

In his final case as attorney for EDF, Yannacone challenged the proposed Cross-Florida Barge Canal,[26] alleging further construction would result in serious, permanent, and irreparable damage to the Oklawaha River regional ecosystem of Central Florida. The allegations of the complaint anticipated the elements of an environmental impact statement[26][33][34] soon to be required by the National Environmental Policy Act (NEPA)[35][26][36]

4. Project Eagle, 1970

Building on their scientific collaboration during the Wisconsin DDT proceedings, Yannacone, Loucks, and scientists from several disciplines proposed Project Eagle in February 1970 as a national program for interdisciplinary environmental research. [37][38] The proposal called for a National Trust for the Environment to coordinate scientific work among universities, industry, and government.[38]

Project Eagle proposed a nationwide network of approximately 70 to 100 regional environmental research centers.[38][39] The

proposed centers would bring together specialists from different disciplines to conduct research using mathematical modeling, computer simulation, and systems analysis.[38][39] The proposed research program would examine environmental contamination, resource depletion, and interactions among physical, chemical, biological, and human systems.[38][39]

On February 19, 1970, Yannacone presented Project Eagle at a conference in Washington, D.C., seeking approximately \$210 million for the proposed national research and rehabilitation program.[37][38] The proposal received contemporary coverage in *Newsday*[40] and *BioScience*. [39] Its sponsoring committee included specialists in ecology, medicine, engineering, computer science, psychiatry, agricultural economics, and regional planning.[38][39]

The progression from the Suffolk County DDT litigation through the Wisconsin hearings to the Project Eagle proposal illustrates the increasing use of interdisciplinary scientific evidence in environmental litigation and research.[4][11][22][37][38] The Suffolk County proceedings advanced a claim for equitable protection of the natural environment,[4] the Wisconsin hearings presented an integrated scientific analysis of persistent chemical contamination,[11][22] and Project Eagle proposed institutional arrangements for conducting such research on a national scale.[38]

5. Professional publications through 1975

Yannacone published work addressing scientific evidence in litigation in 1969 and 1970.[41][42][43][44] He and Steven G. Davison published work concerning the National Environmental Policy Act of 1969.[35] In 1972, Yannacone, Bernard S. Cohen, and Steven G. Davison published *Environmental Rights and Remedies*. [45] In 1975, Yannacone edited *Environmental Systems Science*. [36] The volume included a chapter concerning the relationship between environmental law and environmental systems science.[46]

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