Chapter 5 Chapter 5

Determined to achieve a Ph.D., Shirley was 44 years old when she began the doctoral economics program at Duke University. She was older than most of her classmates, a state of affairs that later led her to encourage multiple age groups in her own classrooms.¹

"Working and researching in one university and studying at the other was a very good idea," Shirley recalled. "Although with only one car, Charles would drive me in the morning to my 8 o'clock seminar at Duke, and then he would come back in the afternoon to get me."² Shirley arranged her class schedules so that she could be at Duke in the morning, then work at UNC in the afternoons and evenings, or vice versa.

Between attending classes at Duke and teaching and leading research at UNC, Shirley was very busy indeed—but she managed it all with aplomb.

Charles, meanwhile, had as much work on his desk as Shirley. Now a full professor in the Department of Environmental Sciences Already an associate professor, Shirley began doctoral studies at Duke University in 1965.





Charles and Shirley beside the Oldsmobile Toronado that had been great for getting Shirley to her early classes at Duke

and Engineering, Charles was becoming the nucleus of the department's environmental biology group. He preferred teaching in field laboratories, but field samples had to be quantified in the laboratory.

"Charlie was a mainstay in the academic program for looking at environmental biology issues," recalled Charles' colleague Don Fox.³ "Particularly, I think the students that had the opportunity to go into the field with the various research projects that Charlie was involved in really enjoyed the experience. They learned a great deal from him in judging the quality of water in a natural setting," he added.⁴

The late '60s were busy years for Charles. He had already begun taking on more responsibilities in the department when he began

administering two graduate training grants for the department in 1962. He also had multiple projects under way at any given time: In 1963, he had received a grant from the U.S. Public Health Service to study "Direct Gas Chromatography of Organics in Water," which he finished in 1966. He then moved on to study "Exchange of Phosphorus Species Between Living and Non-Living Systems in Fresh Water Environments," a study funded by a dual grant from the Office of Water Resources Research and the North Carolina Board of Science and Technology.⁵ In August 1965, Charles was asked to join a faculty team traveling to Guatemala City to establish requirements for graduate education in sanitary engineering at



the University of San Carlos' Regional School of Sanitary Engineering. That same year, Charles published a journal article on the "Use of Fish to Detect Insecticides in Water," and he edited a 348-page report on "Man's Environment in the Twenty-first Century," a compilation of papers by department faculty on their predictions for environmental conditions in their fields of study. And in May 1967, Charles and Daniel Okun presented a paper in Washington, D.C., at the International Conference on Water for Peace: Their paper addressed "Water Quality Technology: Present Capabilities and Future Prospects."6

Charles' classes had become a mainstay in the Department of Environmental Sciences and Engineering.

In addition to excelling at teaching and research, Charles' positive work attitude was an invaluable asset to the growing department. With more young faculty members being hired, Charles began mentoring some of the junior professors.⁷

Charles' willingness to contribute to the department was especially valuable to department chair Daniel Okun. In 1965, Okun began planning another sabbatical for 1966 to study public water systems in England. Knowing that Charles had done a good job as acting head during his previous sabbatical in 1960, Okun asked Charles to take on the duty a second time. Charles agreed, cheerfully taking on the administrative duties that came with the role. When Okun returned home a year later, he received glowing reports of the job Charles had done as acting director.

"Everybody said, 'Charlie did a great job," Charles remembered. "So Okun asked me to be the deputy department chair."

Thus Charles became the deputy head of the Department of Environmental Sciences and Engineering in 1967, a job he performed for the next 10 years.

"I started doing a lot more administrative work," Charles said. "Some don't like to make those hard decisions. I never found them difficult."⁸

Shirley's research at UNC, meanwhile, had naturally begun informing her studies in economics at Duke. The fact that Shirley found her own funding for her research through the Center for

Urban and Regional Studies at UNC was a boon for both her and Duke: Shirley was able to use her UNC research projects toward her degree at Duke, and the Duke Department of Economics did not have to fund her research.

From 1967 to 1973, Shirley won several grants from the U.S. Department of the Interior to study subdivision development around lakes (1967-68, 1968-71, 1970-73). Ray Burby was a student of Shirley's at UNC at the time, and he helped Shirley on the lake studies.

"We had to be opportunistic in those days," Burby recalled. "We weren't really interested in reservoir development, but we *were* interested in second home development (around lakes). We got several sizable grants to study that."

At the same time, Shirley was also working on a research grant from the U.S. Department of Health, Education, and Welfare. Begun in 1962, this project was to plant the seed of some of her best research. Examining "Environmental Engineering Policies and Urban Development," Shirley and Stu Chapin began developing computer models of urban growth and expansion and of the spatial arrangement of cities. Because transportation and land use are intimately connected, the pair also won money from the Bureau of Public Roads for the project.



In 1967, Charles became the deputy head of the Department of Environmental Sciences and Engineering.

Space Research

By 1966, Charles' reputation as a researcher who thoughtfully evaluated problems had grown such that the National Academy of Sciences asked him to serve as a member of an ad hoc panel on waste treatment with the Space Science Board.

"It was an obvious problem when they decided to put a man in space: If you put five people in a space capsule, where do they go to the bathroom?" Charles explained. "We evaluated all the ways you can possibly manage a water environment in a sealed capsule containing human wastes."9

Charles and the other five members of the panel spent three years figuring out how to extract and re-use water from waste products in such a closed system. By his third year on the panel, he was asked to be its chairman.¹⁰

Working on this project until 1970, Shirley ultimately decided that computer models were a "dead end," and that she and Chapin needed to understand "more about how cities grow and who makes decisions about how they grow," recalled Burby.

Visiting Edinburgh, Scotland, during their third trip to Britain in 1953. Shirley began exploring New Towns during this trip.



"Shirley got very interested in how developers make decisions," Burby said. "This research was really a prelude to her New Towns study."¹¹

Shirley was already intrigued by the idea of New Towns-also known in the United States as New Communities-which are towns or cities that are carefully planned from their inception (in contrast to towns that typically evolve in an ad hoc fashion).¹² The New Towns movement had begun in England after World War II, where German bombs had destroyed much of the existing infrastructure. During the rebuilding process, the British government began building "overspill" communities outside of London, where bombs had destroyed countless neighborhoods and industries. Rising birth rates in the 1960s prompted a second wave of British New Towns specifically designed to provide better quality housing for existing employment areas.¹³ Shirley had taken note of the New Towns being built outside of London during one of the Weisses' early trips to England, and she was instantly intrigued. She and Charles began touring New Towns whenever they got the chance.¹⁴

As they learned more about planned

communities, Shirley grew more and more interested in the New Communities movement in the United States and in its potential to improve how people live in cities and communities. She began looking into New Communities being built by private companies and investors, such as Reston, Virginia, and Columbia, Maryland.

One of Shirley's mentors at Duke, Joseph Spengler, was an economist who was interested in cross-disciplinary research.

"He was unique in that he was interested both in sociology as a social economist as well as in planning and economics," Shirley recalled.

Spengler recognized Shirley's increased focus on planned urban communities, and he began encouraging her interest in researching New Communities in the United States.¹⁵

As Shirley began exploring new urban landscapes, Charles began branching out to different aquatic ecosystems in his research.

While helping to establish graduate education requirements in 1965 for sanitary engineering at Guatemala's Regional School of Sanitary Engineering at the University of San Carlos, Charles had impressed officials there with the breadth of his research interests. In October 1967, he traveled to the University of San Carlos again to give a paper on the pollution of Central American surface waters. After presenting his paper at a symposium on stream pollution, Guatemalan government officials from the National Geographic Institute asked Charles if he could help them evaluate the water quality of two of the country's

TRANCING CONTRACT OF CONTRACT.

Starting with their first trip to Europe in 1951, Shirley and Charles filled 29 bound travel diaries with their daily experiences. These pages are open to August 18-19, 1967, an excerpt from their second around-the-world trip.

Charles and Shirley took a break from research on the S.S. France in September 1963, returning from a trip to Norway, Sweden, France, Germany, Holland, and Belgium.

major natural resources: the pristine Lake Atitlán and the pollution-impacted Lake Amatitlán. Lake Atitlán is the deepest lake in Central America and fills the caldera of an ancient volcano in the Guatemalan highlands, covering 50 square miles. The smaller Lake Amatitlán fills a much shallower basin near Guatemala City.

"Atitlán was a deep, pure, clean lake beautiful," said Charles. "Amatitlán, the smaller lake, was near Guatemala City and was badly polluted." As a developing country, Guatemala was trying to decide how best to manage the two lakes. Could Charles help?





Charles and Shirley visit Florida for a professional conference, May 1965. "We mounted an expedition using doctoral students; all equipment and supplies had to be brought with us," Charles recalled. "During our first trip in July 1968, we spent 11 days on Lake Atitlán establishing baseline conditions. We then monitored the lakes for two years. I would go to Guatemala for short visits once or twice a year, and in between, the Guatemalan participants on the project sampled the water quality to establish seasonal changes."¹⁶

Charles' studies of the two lakes from 1968 to 1970 examined the water quality of the lakes, potential future uses of the water, and what the impact of development around the lakes would be.¹⁷ In his final report to the National Geographic Institute, Charles argued against using Lake Atitlán to create hydroelectric power, pointing out that to do so would spoil a one-of-a-kind natural resource. The government listened, and Lake Atitlán was protected for several decades—though development along the lake shore in the 1990s eventually raised a new threat to the lake's fragile ecosystem.¹⁸

In the summer of 1968, Charles was invited to present a paper

at a regional seminar of the Pan American Health Organization (PAHO) at the Central University of Ecuador in Quito. Ever the opportunistic travelers, Charles and Shirley combined that trip with a trip to Lake Atitlán in Guatemala for Charles' initial field studies there and then continued on to several South American cities. After 11 days at Lake Atitlán and then six in Quito at the PAHO seminar, the Weisses flew to Cali, Colombia, where they visited Charles' old friend Harold Trapido. Harold, in his job with the International Health Division of the Rockefeller Foundation, provided the Weisses with "a packed threeday visit on mountain roads checking out eco-zones and a recent outbreak of Venezuelan equine encephalitis," remembered Charles.

The research boat on Lake Atitlán setting subsurface floats to describe deep water movements



Shirley and Charles then flew on to Buenos Aires, Argentina, where they awoke after a late-night arrival to see the *Atlantis*, the former Woods Hole Oceanographic Institution research vessel, docked across the river from their hotel room window. They later found out that the *Atlantis*, which carried Charles on his first research cruises, had been sold to the Argentine navy. After Buenos Aires, they traveled on to Sao Paulo, Brazil, where "the architects and builders, with no zoning restrictions, have had a wonderful time expressing themselves," and where the park in front of the municipal theater was filled with cats instead of pigeons. Their next stop was

Around the World, Part II

The Weisses celebrated their 25th wedding anniversary in the summer of 1967, with their second trip around the world.

"We sailed on the S.S. *Mariposa*," Shirley recalled. "That trip started in San Francisco, then picked up additional passengers and cargo in Los Angeles; then we sailed on to Bora Bora; Papeete; Rarotonga; Auckland, New Zealand; and Sydney, where we left the ship. In Australia, we flew to the Barrier Reef, Canberra, Melbourne, Adelaide, and Perth. We continued by air to Singapore, Sri Lanka, and Paris, returning to the United States at New York."¹⁹

It was on this trip that the Weisses' love of Australia began. They would return there many times in the following years, making sure to tour the cities and see what new developments were taking place in the country's urban landscapes. On this trip as on all the others, they took plenty of photographs to include in their class lectures back at UNC.

Brasilia, the capital of Brazil, a city planned and built only a decade before the Weisses' visit.

On the plane ride from Brasilia to Rio de Janeiro, Charles and Shirley struck up a conversation with a woman and her daughter who were seated nearby, and found out that her brother had attended Duke University, while her brother-in-law had gone to the

University of North Carolina at Chapel Hill. Furthermore, she was the wife of a Westinghouse vice president, and when the plane landed, she offered Charles and Shirley a lift to their hotel in her chauffeur-driven car.



The captain of the Mariposa greets Shirley and Charles.

The last two stops on their South American tour were Caracas, Venezuela, where, "in the heavily shaded Plaza Bolivar, instead of squirrels scampering about there are three-toed

sloths slowly inching along the treetops"; and Ciudad Guayana, a planned Venezuelan city founded only seven years before the Weisses' trip, where they toured construction of the Guri Dam and talked with city planners.²⁰

Yet even on vacation, the Weisses made sure to keep up with responsibilities from home.

"It was in Buenos Aires that I read the first draft of Raymond Burby's dissertation," laughed Shirley, remembering. "He sent the paper down, and I read it in Buenos Aires because he had to have it back!"²¹

The Guatemalan lake studies were just one of several items on Charles' research agenda during this

Researchers hard at work in their improvised laboratory, Lake Atitlán



Chapter 5: The Bright Road Ahead



Charles' studies of Lake Atitlán helped preserve the fragile ecosystem for several decades. This exhibit was mounted in the display window in the lobby of Rosenau Hall on the UNC campus.

time. From 1968 to 1972, Charles received seven research grants from federal and state agencies, totaling more than a half-million dollars in research funds. He also arranged three research contracts with Duke Power to study their water impoundments and determine the effects of heated water discharged from power generators on aquatic life.²²

One of the many research projects Charles headed during these years was a \$33,000 water quality surveillance program of New Hope Lake. Renamed Jordan Lake in 1974, controversy had surrounded the lake project from its inception. Though the lake was originally designed for flood control, surrounding municipalities also hoped to use the lake as a drinking water source. But the lake would receive run-off from industries on the Haw River, as well as treated sewage from Durham and Chapel Hill. Would the water be clean enough to treat as a drinking water source?

"Charlie was the one who said, 'Well, let's try and get some information to make sure we make the right decision," recalled Charles' colleague Don Fox.

From 1971 to 1972, Charles and his students performed environmental impact studies and monitored the waters of the lake (which was not completed until 1974). He continued monitoring the lake waters after Jordan Lake was filled, checking for excessive algae and other indicators of water quality. Happily, he found that the lake was indeed clean enough to treat for human consumption.

"Charles was a proponent of testing and finding out what the water quality was and trying to address the issues," remembered Fox. "And Jordan Lake is a water supply that has been very valuable for growth in the Triangle region."²³

Charles' concern with all of his research, according to Fox, was similar to that of many of his colleagues': that the research have a positive impact on the world around him.²⁴

The same was true of Charles' life as a whole—he wanted to help shape his community into a better place. So in 1969, in addition to his teaching, research, and administrative duties, Charles was appointed to the Chapel Hill Planning Board.

Charles receives an award for his work as chairman of the Research Committee at the annual meeting of the Water Pollution Control Federation in San Francisco, October 1971.

As a member of the civic body responsible for envisioning the town's physical growth and development, Charles saw that he could directly impact the urban landscape of his adopted hometown.²⁵ In 1970 Charles became the board's chairman, a post he would hold until 1972 and then again from 1975 to 1976.

By the late '60s, Shirley's work in urban planning was becoming more and more relevant to the nation as a whole. The United States' "urban crisis" had come to a head in the mid-'60s and was to continue into the early '70s. Race riots, suburbanization, urban blight, de-industrialization, rising crime rates, perceived declines in the quality of public education,

financial crises in city governments, and increased racial tensions were contributing to a pervasive sense that cities in America were no longer vital places.²⁶

At UNC, this perception of urban decline was one factor leading the Center for Urban and Regional Studies to launch as an independent research center in 1969.²⁷ And it was into this climate of perceived urban disintegration that Shirley stepped in the late '60s with her research ideas about New Communities.

"People thought that wholly planned large-scale developments would be a way of organizing suburban development, planning large chunks of the urban landscape in a coherent way, and building communities that were cohesive and balanced, economically and racially," explained Shirley's colleague Ray Burby. New Communities were one way people could see to correct some of the errors of cities past. Even the federal government began recognizing the potential Shirley visiting a neighborhood in Buenos Aires



EPA Recognition

In 1970, President Richard Nixon created the U.S. Environmental Protection Agency amid rising concerns about environmental protection and conservation. The EPA began setting standards for air and water pollution in the early '70s, and so became interested in Charles' method of examining fish tissues to determine pesticide levels in water. "In looking for techniques that would allow for judging the impact of chemicals in the water supply, the EPA adopted the technique that Charles had developed 20 years prior!" Don Fox said. Charles' bioassay technique became the standard method for testing for pesticides in water, a part of the risk assessments that the EPA was asking state and local governments to perform.²⁸

of New Communities, offering federal funds for assistance to New Communities in both the Housing and Urban Development Act of 1968 and the Urban Growth and New Community Development Act of 1970.²⁹

But much still was unknown about the benefits of New Communities. Were people living in them really better off than those living in conventional communities?

Encouraged by Joseph Spengler, Shirley submitted a grant proposal to the National Science Foundation in 1968 to study New Community developments in the United States. The NSF funded the first two years of her study through a Public Health Service research grant beginning in 1969. Shirley brought Ray Burby and other research colleagues in on the project,

The New Communities USA research team



RESEARCH TEAM-The Center for Urban and Regional Studies at the University of North Carolina at Chapel Hill has received a grant of \$1,179,400 from the National Science Foundation for a study of new community development in the United States. Prof. Shirley F. Weiss, principal investigator of the project and associate director of the center, is pictured here with the UNC research team as she announced confirmation of the grant from the Division of Social Systems and Human Resources of NSF's Research Applied to Human Needs program. From left, Dr. Thomas G. Donnelly, Dr. Raymond J. Burby III, Mrs. Barbara G. Rodgers, Dr. Robert B. Zehner, Mrs. Weiss, and Dr. Edward J. Kaiser. and they set about conducting initial research into New Communities in the United States.

The next two years passed quickly for Shirley (though not without event: In addition to her doctoral studies and work on the New Communities project, in 1971 she was elected president of the Southern Regional Science Association).³⁰ By then, Shirley's initial research into New Communities was wrapping upbut many questions about New Communities still remained. To continue forward, she and her colleagues decided to apply for "big money" at the NSF-a grant of \$250,000-to fund a large-scale study of American New Communities that would see how well the ideas of New Communities were working in practice.31

The response they got from their grant application was staggering. Not only did the NSF want to fund the study, but it wanted to give Shirley even more money to do a definitive work on New Communities in the United States.

"They told us, 'This is a really great idea. But you are not asking for nearly enough money," remembered Ray Burby. "They said, 'We want you to do the definitive project, and don't view money as an object. Figure out what needs to be done to determine whether these New Towns really work or not.'

"So we asked for \$1.2 million. And they funded the whole thing."32

"We were very fortunate in getting a grant from the National Science Foundation of \$1,179,000," concurred Shirley.

From 1972 to 1975, the NSF funded Shirley's study of "Performance Criteria for New Community Development: Evaluation and Prognosis" under their Research Applied to National Needs, or RANN, program. Examining New Community development in the United States since 1947, the study looked at myriad topics, such as the kinds of people who lived in New Communities, population balance, reasons people moved in and out, planning and governance, recreation and leisure, quality of life, schools, shopping,

transportation, social lives, and health and medical care. In addition to studying numerous privately funded New Communities, the study looked at two federally assisted communities and also examined the experiences of target populations, such as minorities and elderly residents.33

Shirley and her colleagues set to work implementing the study in May 1972.³⁴ Conducting more than 6,000 face-to-face interviews in New Community households across the country, the team was to stay very busy for the next four years.³⁵

Even so, the study was not the only thing on Shirley's mind. Though the New Communities study would continue for another three years, by 1973, Shirley had enough research data to finish writing her dissertation on privately funded New Communities. After



from Duke University in 1973.

nearly seven years as a doctoral student at Duke, she finished her dissertation on "New Town Development in the United States: Experiment in Private Entrepreneurship."³⁶

Shirley defended her dissertation in the spring of 1973 and graduated that June. In August, at 52 years old, with a doctoral degree in hand and a major NSF project under way, she was promoted to a full professor in the UNC Department of City and Regional



Planning.³⁷ Shirley may not have taken the same paths through academia that many of her colleagues took, but she arrived at a place of expertise and excellence just the same.

Charles, meanwhile, had once again stepped up as acting head of the Department of Environmental Sciences and Engineering. When Daniel Okun stepped down as department head in 1973, his replacement could not arrive on campus until 1974. The dean of the School of Public Health asked Charles to step in, and so Charles became the acting department head in July 1973.³⁸

Both of the Weisses were now full professors at UNC, and both had full careers to match. Stepping forward into a new chapter in their lives, the Weisses began the fall semester of 1973 with high hopes for their coming adventures.