

# **DEMOGRAPHIC DESTINIES**

## **Interviews with Presidents of the Population Association of America**

### **Interview with Anne R. Pebley PAA President in 1998**



This series of interviews with Past PAA Presidents was initiated by Anders Lunde  
(PAA Historian, 1973 to 1982)

And continued by Jean van der Tak (PAA Historian, 1982 to 1994)

And then by John R. Weeks (PAA Historian, 1994 to present)

With the collaboration of the following members of the PAA History Committee:  
David Heer (2004 to 2007), Paul Demeny (2004 to 2012), Dennis Hodgson (2004 to  
present), Deborah McFarlane (2004 to 2018), Karen Hardee (2010 to present), Emily  
Merchant (2016 to present), and Win Brown (2018 to present)

## ANNE R. PEBLEY

PAA President in 1998 (No. 61). Interview with Dennis Hodgson, Karen Hardee, and John Weeks at the Sheraton Hotel, New Orleans, Louisiana, April 2013.

**CAREER HIGHLIGHTS:** Anne Pebley received her B.A. (Summa cum laude) in Comparative Communist Studies at Union College, Schenectady, New York, in 1974. She then earned an M.P.S. in International Development at Cornell University in 1978, and her Ph.D. in sociology at Cornell University in 1980. She was at Princeton University from 1979 to 1993, where she was a Senior Research Demographer at the Office of Population Research (OPR), and Professor of Demography and International Affairs in the Woodrow Wilson School. She was Associate Director of OPR from 1986 to 1991 and Acting Director in 1991. In 1993 she moved to southern California to become Director of the Population Research Center at RAND in Santa Monica, from which she launched the Guatemalan Survey of Family Health and the Los Angeles Family and Neighborhood Study (L.A.FANS). In 1999 she accepted her current position as Professor and Fred H. Bixby Chair of the Department of Community Health Sciences at the UCLA Fielding School of Public Health and the Department of Sociology. Since 2008 she has been Director of the California Center for Population Research at UCLA, and she remains a Senior Consultant to RAND.

Dr. Pebley's early research focused on fertility and marriage patterns in the US, and infant, child, and maternal mortality and health care choices in poor countries. She has collaborated with researchers and institutions in Mexico, Central America, Bangladesh, India, and West, Central and East Africa. More recently, her research has centered on neighborhood change and its effects on child and adult welfare in Los Angeles and in the United States more generally. She is the director of the Los Angeles Family and Neighborhood Survey (L.A.FANS), a longitudinal study of neighborhoods, families, and individuals. Public use data from L.A.FANS has generated extensive research by Dr. Pebley and many others. Her other primary area of research is the health of the Mexican and Mexican-American populations on both sides of the international border. For the past decade, she has also been working with Tibetan scholars to improve maternal and child health services in the Tibetan region of China.

**HODGSON:** We're beginning our PAA presidential interview with Anne Pebley, who was our president back in 1998—

**PEBLEY:** The two hundredth anniversary of Thomas Malthus' first publication.

**HODGSON:** There you go. That's correct. The first edition of his essay on population. Our initial set of questions has to do with your formative years—where you grew up and how you got interested in the field of population. So you can think back as early as you like, but definitely let's include your undergraduate years.

**PEBLEY:** Well, it's hard to say how I got interested in population and demography. That's probably true for most of us. I grew up—well, my father was an AT&T executive, and we moved, I calculated, on average every two years. So it's hard to say where I grew up, but mostly on the East Coast. And then I became, as a teenager in high school, very involved in the environmental movement. My heart is still involved in those kinds of efforts. But my professional work hasn't been so much in that area, with one exception.

I went to college at Union College, in Schenectady, New York, which was at that time, or the year before I arrived, a private men's college. I went there for a variety of reasons. It was a great place

to go to school, and reflecting the times, I was a comparative communist studies major, so I studied Chinese and Russian history and political science, and not very much demography. It was the era of big-power politics, and that was my major interest at that point. I hung around with guys who had jackets with the patches on their sleeves, and pipes, beards, and all that. Obviously, I wasn't that kind of person, but that's what I did.

Most of the people from my program went on to Columbia to get an MA degree in international studies and from there to the Foreign Service. I went and worked for a year after college, but decided that what I was interested in really wasn't big-power politics, that that was really important but it wasn't my cup of tea. I was much more interested in poverty issues. So I went to Cornell and I entered a master's program initially, a master's of professional studies, which always makes me sound like a perpetual student, which I suppose I am. For that program they expected people to be Peace Corps grads or Peace Corps alums and I wasn't, but nonetheless they let me in.

After a year I decided graduate school wasn't getting me the kind of education I needed. I had worked at that time with Joe Stycos, and decided that population was really the right place for me to be. But I also was involved with nutrition and agricultural economics, so those were my three fields. I really liked population, so I went on and got a Ph.D., much to my chagrin, because when I entered the program I thought people with Ph.D.s were stuffy folks in academic ivory towers, and I wasn't interested.

**HODGSON:** Can you tell us a little bit about the research you did, in terms of the Ph.D.?

**PEBLEY:** Well, Joe Stycos was very focused on Latin America, and having been a comparative communist studies major in college, I spoke moderately good Chinese and a little bit of Russian. No Spanish whatsoever. I had some French from high school. The opportunities were really in Latin America and the first summer Stycos found me an internship in Guatemala, at the Nutritional Institute of Central America and Panama, working with another former Cornellian whom you may know [since both Dennis Hodgson and Karen Hardee received their doctorates at Cornell], Charlie Teller. So I went to work there, trying pick up some Spanish, and gradually over time learned some Spanish and gradually forgot my Chinese. I worked on, not surprisingly, fertility issues—age at first birth, contraceptive use before first pregnancy, and age of marriage, both in Guatemala, where I was working, and in Costa Rica, where Stycos was working. That was my dissertation.

**HODGSON:** Moving on, you have your Ph.D. and that set of research. Let's move through your various positions, like your first job.

**PEBLEY:** Okay. When I was in the process of finishing up my Ph.D. dissertation, I was looking at jobs, just like everybody else. And suddenly, I found out from somebody that I was going to get a call from Jane Menken of Princeton. And Jane Menken was particularly worried that I was working on a dissertation that was exactly the same as one of her students. As I've subsequently come to conclude, two people could be working the same data, on the same dissertation, and produce totally different things. And that's what was going on, but it introduced me to Jane. And it turned out they had a position available in Princeton for a research associate demographer. So they offered me the position and I took it.

I had planned to go to Princeton for about a year, because my family lived in New Jersey and I thought—you know, I lived in New Jersey most of my life, and I don't really want to have a lot to do with New Jersey, so I thought I'll take this position for a year and then I'll move on. And, of course, I stayed for fourteen years there and became a full professor and associate director of the Pop Center [Office of Population Research, OPR].

And then OPR's population research went through some tough times. Primarily I guess because the field was shifting so much and we weren't shifting quite as fast as we needed to—so I decided after

fourteen years it was probably time to move on. And I looked at a couple of alternatives. I looked at potential job offers at Berkeley, one at North Carolina, and one at RAND. And oddly enough, to the sheer amazement of many of my colleagues, I took the RAND offer. And the reason, of course, is that it is odd to go from a tenured faculty position to this type of position. It's not a strictly academic position. It's a soft-money position.

So I went to RAND for six years. And it worked out very well because I had a big survey to do in Guatemala and I needed to be in Guatemala a lot of the time. Actually, Guatemala's located midway between the East Coast and the West Coast. But the truth is, the flights and the traveling and getting the staff from Los Angeles is much easier. And also, I had the free time. I wasn't teaching, so I had a lot of free time

**HODGSON:** One quick question. Fourteen years at Princeton. Did your research agenda change in those fourteen years?

**PEBLEY:** Absolutely.

**HODGSON:** Although you end up at Guatemala again when you went to RAND.

**PEBLEY:** Because of Guatemala, I think my fundamental interest became economic development and its consequences for fertility but also for child health. I started doing a lot of work on child health issues—child mortality first, and then broadened out to child health. My first set of projects that were really my own, as opposed to projects I shared with other people, had to do with experimental studies that had been done on child nutrition and family planning, such as the study in Guatemala that I originally went to work on. These were mostly public health studies. There was one called Narangwal that was done in the Punjab region of India, and a couple of other similar studies. And I thought, well, we could use these studies—because they were experimental designs—to look at different kinds of outcomes for kids. With these particular inputs, can you improve the health of kids more efficiently than with another set of inputs, or without input? So I worked on that for quite a while.

My initial position at Princeton was really to work with Charlie Westoff and Norm Ryder, on the National Fertility Study. So by the time I arrived, the National Fertility Study—which was extremely innovative, as you know, in the sense of being the first major cross-sectional fertility study in the US that had a sample of all women, as opposed to a more restricted sample—they had just completed another innovation, which was re-interviewing women. They had a longitudinal vision. So I was there partly to work on that with them. That was a remarkable education.

Two more different people you cannot imagine than Charlie Westoff and Norm Ryder, yet they were great buddies and worked very well together over many years. With them I worked on a lot of fertility-related issues, particularly related to starting childbearing in the US, and fertility intentions, and whether fertility intentions predict behavior. And one of the things I found was that for any idea I could think of for a new research project, I would walk into Norm Ryder's office and he'd already done it, but he hadn't published it. It was sitting in a paper in his drawer. So I would walk in and I'd say, well, I'd really like to do this and here is my idea. And out from the drawer would come the paper that was completed and vastly superior to anything that I, as a young person, could do. So that was a little discouraging, because he had clearly done it all, but I had no access to the information about what he had done, because it was all in his drawer, not published.

Charlie Westoff, on the other hand, was a very lively, energetic person. He'd say, oh, don't worry about it. Just do what you want to do. So that's what I did. And then Charlie and I, along with Noreen Goldman and a number of other people—James Trussell and several people at the World Fertility Survey Project in London—got involved in a set of research on contraceptive use, and contraceptive failure, and the unmet need for contraception, which was quite a distance, as you can see, from my research on child mortality. But for me it was not so unrelated: people's fertility motivations

and what they think about having children and their expectations of the survival of their kids seemed pretty related.

**HODGSON:** So that was the Princeton years.

**PEBLEY:** Well, I don't know if that was all of the fourteen Princeton years, but that was a lot of what I did during the early Princeton years. And then I did more work on child health and got involved in a program that the CDC ran. It was really kind of a crazy title. The Centers for Disease Control (CDC) was running a program called Combating Childhood Communicable Diseases (CCCD). This was a program that AID [US Agency for International Development] had funded to try to shortcut the pathway to lower child mortality by immunizing kids in Africa. The idea was, let's take the interventions that are going to be most effective and pursue them first, and then we'll think about building an infrastructure. I was involved in helping to design the evaluation component, along with Doug Ewbank at Penn, and in evaluating what was then the Zaire component, now the Democratic Republic of Congo component, in the mid-1980s, with a graduate student of mine, Anouch Chahnazarian, which was a fantastic experience. Anouch and I spent six weeks in a Catholic mission out in rural Zaire, running this evaluation survey. So, I did various things like that, very much focused on child mortality, leading to the development of this survey in Guatemala, which focused on maternal and child mortality. And I can talk a little bit about that if you like.

**HODGSON:** Sure.

**PEBLEY:** My previous work had been this particular study in Guatemala. Guatemala's an interesting place because maybe more than half of the population are indigenous Mayans and other groups. The other half of the population are known as Ladinos, but many of them have Mayan inheritance too. The two groups think of themselves as very separate. From a social stratification point of view, the Mayan population has been confined to the very poorest ranks of society for quite a long time, and has maintained a real strong traditional medicine usage over time. And one of the issues was the strong feeling at that time—this was the early 1990s—that the Mayan population really wasn't taking advantage of the biomedical health services that were available, and wasn't that interested in them. So we designed a study to take a closer look at that, but also to look at the process of choosing healthcare options, and the consequences for maternal and child health. That was the study that I worked on, primarily with Noreen Goldman, and that we developed right before I went to RAND, and then carried out all of this at RAND, all while Noreen was still in Princeton.

**HODGSON:** You were at RAND. You've got the study you're completing. What takes place in the context of RAND and your research agenda?

**PEBLEY:** Well, one of the things that I always wanted to do—when I started out most of my research was focused on developing countries and poor countries, though I had also been working on the US national fertility study. I think it's a very good idea to be thinking about your own society as well as other societies. So I was quite interested in US society and some of the same issues. My own research interests had really broadened out quite a bit beyond maternal and child mortality and health, to include welfare issues, the well-being of the population. I think I returned to my old interest in poverty issues. RAND was a great place to do that because a lot of people had exactly that kind of interest. Some of the Guatemala survey focused on those kinds of poverty issues. A lot of the analysis we did focused on it. But then, of course, one of the great things about moving sometimes is it makes you think differently. You may not plan it that way but sometimes it just changes how you view the world. Princeton is a great place to live in, a great place to raise young children. I think older children probably get bored out of their mind sometimes.

Los Angeles is a really different place, much more heterogeneous. I love that and that was part of the attraction, that kind of diversity. It made me think a lot more about not just diversity in terms of ethnicity, but in terms of social class and physical structures. I grew up outside of New York City, for the most part. And here was a city that looked nothing like what I thought a city should look like. It's got some tall buildings but that's not primarily what a city like Los Angeles looks like. So I was introduced to whole new urban type areas. It made me start thinking a lot about those issues, and again RAND was a great place to do that.

I started working on topics related to Latino health or Hispanic health. And also on poverty and wellbeing issues. A little bit on education, surprisingly, because it was never my field. I also did some work on family demography, like grandparents involved in taking care of their grandchildren. This all led to the development of the Los Angeles Family and Neighborhood Survey, which I worked on with a number of people at RAND but also a nationwide group, including my colleague Noreen Goldman, to some degree, but my primary co-conspirator has been Narayan Sastry, who was at RAND at that time and who had coincidentally been one of our students at OPR. I can talk more about the survey.

**HODGSON:** Did you have any interaction with grad students or did you miss that?

**PEBLEY:** I had some interaction, for two reasons. RAND has a graduate school, actually, in public policy, and I did teach a couple of classes there. Part of the reason I went to RAND was to have this period of not teaching so I could have a lot of time in Guatemala. It was more of a problem to teach. The other thing is later in my time at RAND, I took a position as an adjunct professor at UCLA. I started teaching a course there which was very similar to a course I had taught at Princeton. So it was very good. Then I also met my husband at RAND. I mean, I had met him a little bit before I came to RAND. He was a RAND graduate student. He's an attorney but he was there to get a public policy degree, but then he decided being an attorney was a better deal for him. He went back to being an attorney, so we don't have people in the house competing for publications, which is good.

So I didn't have much interest in interaction with students. I actually love teaching. It's one of my favorite things. But it really was nice to have a period where I could just concentrate on a lot of hands-on survey research.

**HODGSON:** So from RAND we move to—

**PEBLEY:** UCLA. As I said, I had been doing some teaching at UCLA. UCLA has had an endowed chair in population for many years. I don't remember precisely. It was the 1980s. Judith Blake was my predecessor.

**HODGSON:** It was the Bixby chair.

**PEBLEY:** It was the Bixby chair. Judith had died in 1993 and the chair had been vacant since then. Part of the problem is that in the California system, you can have an endowment for a chair, but you have to have the position as well. And the endowment for the chair doesn't come with a position. So they hadn't been able to get a position for quite a long time. But they were finally able to get one because it was becoming an embarrassment to have this endowment for a chair that wasn't being filled.

They interviewed a lot of people and I decided it was a good time for me to move—I had never seen being at RAND as being a long-term prospect, just because I couldn't imagine being seventy and trying to fund all of my own time out of research grants. That didn't seem like an appealing prospect, particularly, though some of my colleagues at RAND do it and tell me how great it is, but I don't believe them.

UCLA at that time was beginning to attract a number of demographers. There were a couple of people there to begin with. So I applied and they hired me. I was very fortunate in that regard. And at

the same time, partly through RAND, which has had a population center for a long time, we had invited out a number of demographers as visitors such as Rob Mare and Judy Seltzer and Joe Hotz and a number of other people for a year. And they decided that they liked Los Angeles but they weren't willing to take the leap to RAND that I had been willing to take. Eventually, within several years, UCLA was able to recruit them as well. We developed a core, including Cameron Campbell and Don Treiman, and Bill Mason, who were already at UCLA. We developed a core group because we'd all known each other outside.

One of the wonderful things about demography is that we all have this network. We are in a variety of different fields but this network we can use effectively. University administrations don't necessarily know that, so we can be even more effective because we can bring in other people and get stuff done very efficiently. It's not intentionally under the radar, but it is under the radar and it works well.

Suddenly UCLA found they had this cohesive group in economics and sociology and public health. We were all forming a grass-roots organization, lobbying for resources for a population center. And so we started a population center in 1998 and subsequently got our funding from NICHD [National Institute of Child Health and Human Development]. And now we have a population center that has about seventy faculty members across campus. I have been in the field for thirty-five years or so, and compared to most population centers, we have more disciplines, and are vastly more diverse. We have people from medicine, from law, from public health, sociology, economics, psychology, public affairs—a variety of units across campus. We helped to hire a lot of them, again through this network that isn't so apparent on the surface, but not all of them. And it's really blossomed. I wouldn't have guessed we'd be this large and effective, this quickly.

**HODGSON:** Now, diversity in the population center: has that affected your research? Have you broadened out?

**PEBLEY:** It's affected my research in the sense that I had a lot more people of diverse disciplines to talk to. And I work very closely with a colleague in medicine, who also has a Ph.D., Arleen Brown. She's a physician but she has a Ph.D. And she is very involved in the center, so she's sort of on the road to conversion to a demographer. And I've helped a little bit. And she's helped educate me about some of the issues that her community -- biomedical science folks -- talk about. That's helped a lot. I guess I would say the center is more an enabling tool. The seminars are very diverse so it helps me think about a lot of different things. But I also I'm naturally interdisciplinary, always have been. Like a lot of demographers, I don't fit neatly in, say, sociology. I'm not mainly in a sociology department or an economics department or some other department, because I'm also interested in other things that aren't specific to that the discipline. I don't worry about what's within and what's without sociology. I think the center provides a great intellectual community, if that's your orientation.

**HODGSON:** In terms of the current time period, what's your favorite, most intriguing set of interests right now? Is it Los Angeles?

**PEBLEY:** There's a lot more to do in Los Angeles. One of the things I should have known going into L.A.FANS was the huge amounts of time and effort that go into planning and fielding and documenting and making publicly available a survey. Ours is a longitudinal survey, so it just soaks up time and energy. It's really important we do these things. The thing about our field is that we have a long tradition of sharing data, so that you're not just collecting data for yourself, you're collecting data for the community. But I'm in a phase now where I can do a lot of analysis, and we've done quite a bit but there are a lot of new things that I want to do on Los Angeles.

I am interested in both in the US but also interested in what goes on elsewhere. So I have two other things going on. One is a set of projects that look at Mexico and the US, to a degree, the

immigrant population in the US, but also the population immigrating from Mexico and the interchange between the two countries. One of the projects we're just about to start on, with luck, if we get funding for it, is to look at families in Mexico of immigrants who are in the US, and to think about the consequences for immigration. It's not a new topic, but it's something we don't know enough about. One of the consequences for families in Mexico, potentially in Guatemala, and in other countries of migration to the US, is not remittances, but in terms of parent-child interactions, spousal interactions, and also eldercare.

One of the things we're very concerned about is what happens to parents, older parents, when their adult children are in the US, especially given that greatly intensified immigration restrictions. If you're undocumented, going back and forth across the border is never easy, but now is so much harder. So what are the consequences, not only for the immigrant, but for his family, typically, or her family?

And then another piece that I'm working on... we have a long-term collaborative agreement with a university in China. This is the Qinghai University Tibetan Medical College, and its college is staffed by and trains almost exclusively, though not exclusively, Tibetan students in traditional Tibetan medicine. They also do some training in biomedicine. One of the things they decided was that they wanted to incorporate a public health component in what they do, and also to do more rigorous medical research, biomedical research, using randomized controlled trials, and other research on Tibetan medicine and Tibetan medical practices.

One of their faculty members was a graduate student of mine. He came to the U.S. to get a Ph.D. in public health, so he could understand public health, and go back and help construct a program. Right now, we're in an exchange phase. We've been doing it for six or seven years. They have sent students, graduate students, for additional training. And we send faculty and graduate students to do summer training.

The idea is that we will evolve into research collaborators. It's an interesting relationship because we have somewhat different interests. One of the things they want very much is to carry out a survey on socioeconomic status and demography of the population in their region. They're incredibly capable, dedicated folks. They're the best possible collaborators. So we've really been working to try to both increase an institutional infrastructure there and then also to build these research projects.

**HODGSON:** That looks like a really diverse intellectual biography.

**PEBLEY:** There you go.

**HODGSON:** In terms of say, articles, books, what would you say is most influential?

**PEBLEY:** I have published a couple of edited volumes, but not any books per se, because my publishing tradition has typically been in articles. For me, one article is just a piece of a larger puzzle, it's not the earthshaking, groundbreaking thing. It is for other people. For me what's important is putting the pieces together. And often that takes five, six articles.

**HODGSON:** If you had to pick the most influential—

**PEBLEY:** If I had to pick one article, it would be something I haven't mentioned, something that means a lot to me, which is, surprisingly, my presidential address on population and the environment. Partly because of the nature of the presidential address, it couldn't be an in-depth article, but I'm hoping that it spurred people to think a little bit about the environment and environmental issues. And it was really thanks to a lot of your work, Dennis, which was influential in helping to put together that piece. It was about the field of demography and the environment, not so much about population in the environment. Certainly, I hope that we would all step back from our fairly rigid positions, fairly well-defined positions, and think a little bit more about these issues. I wouldn't attribute it to the article

because I think some of this was going on already, but since the article was published we've been forced to pay more attention to environmental issues. There are things going on. I think we've gone about it a little bit differently than I would have imagined, but my hope is that that article caused some people to think and will continue to do so.

Aside from that, I guess I'd say the Los Angeles research is something that matters a lot to me. Each piece of it matters a lot. Ironically, one of the most important findings is that neighborhoods are not as important for some outcomes as people had thought. This is an iconoclastic finding, which is really important. In public health there is a huge literature which essentially assumes that neighborhoods, meaning small residential units that we live in, are the be-all and end-all of contextual effects and of our social life. I think sociologists have known for a long time that that's an incredible simplification and doesn't get you very far. And we've got some good empirical evidence to suggest that neighborhoods can be important for some things, like immediate safety and security. Right after the 1994 earthquake, neighborhoods were very important for a very brief period of time in Los Angeles. They're really important for basic levels of safety, like whether people are shooting up your neighborhood, whether it's unsafe to go out on the streets. Having a basic level of friendly relationships and trust with your neighbors is a good thing. But beyond that, are they really going to have a huge effect on your daily life? And on your psyche? And on your health? And all these things that are attributed to them? For little kids, maybe, if they're growing up in their neighborhoods, in well-to-do LA or middle-class LA. A lot of LA kids do not spend a lot of time in their neighborhoods anyway, so what's the difference? Their moms and their dads are out working. They're in daycare centers. That's been particularly important, defining what is important about neighborhoods, but also thinking about what effects neighborhoods are supposed to have, but apparently don't, and that people should be looking at larger social units.

For example, we're looking at what we call activity spaces, the areas that—you've been talking about this stuff, John—the areas that people travel in their daily lives, and the diversity or lack of diversity in their activity spaces and how that affects behavior and outcomes.

**HODGSON:** You almost had a perfect segue into our next topic.

**PEBLEY:** Well, tell me the next topic and maybe I can help.

**HODGSON:** The next topic is interdisciplinarity. Thirty-five years ago, demography was a quite different thing than it is today.

**PEBLEY:** Yes.

**HODGSON:** We've got your biographical transformation over time. What about your reflections on where the discipline was and where it is now? And where you think it might be headed?

**PEBLEY:** Well, I suspect my reflections on that are not a whole lot different than anybody else's, but I'll tell you one story, which is my first PAA meeting, in Montreal in 1976. My first PAA session, I walked into—and you know, I was a new convert. I really loved demography. This was several months after I started the program. I was all wound-up about everything. The first session I walked into was a session on mortality, and I can remember some of the people—but I won't name them, for obvious reasons—these very dour men dressed in dark suits, probably not black suits, but standing up giving very quiet and very modulated presentations on things like life tables, and causes of death, all things I was really interested in, actually. It was a funny experience, because here I was, twenty-three years old, a young woman, and I thought this stuff was wonderful and lively and interesting. And here were these guys, and they also loved it. And at a PAA meeting this year, I went to an event that was maybe on mortality, or possibly in health – something which grew out of my interest in mortality -- and there

were lots of different people. They're a lot more lively: dressed in much more lively clothes and talking about everything you can imagine, and not focused so much on the technique of measuring mortality, but much more on the social determinants of mortality or economic determinants of mortality. That's an obvious trend that I think we've all seen. Essentially, we had this field that focused on outcomes -- demographic outcomes and demographic measurement -- and didn't pay so much attention to determinants. I mean, some determinants, right? But we've expanded outward now, where the vast majority of what we're doing, you'd have to work hard to press it into the mold of determinants of fertility, mortality, migration, and age structure, right?

My students come to me now and say, okay, what is demography? A lot of them are public health students, and they hear all this language about population health, and they want to know, well, how does that differ from demography? I would say that demography subsumed part of population health, but we've taken in a lot of territory over these thirty-five years since I entered the field. I think that's altogether good. You can imagine, with my interests, I think that it's wonderful, because I can explore an even wider field and get more ideas.

On the other hand, I do worry about a couple of things. One is, I think demographic methods are really neat and very important and, in some cases, even simple methods are not unique to demographic issue. They help you to think about things. They help you think about time and about processes in ways that other kinds of methods don't so much. And I worry that in our diversity we're losing the training in demographic methods for students. We have a lot of economics students in our population centers and students from other disciplines, but it's hard to fit demographic methods training into their program, because it is not rewarded in fields like economics. We can require the sociology and public health students to take demographic methods courses, not these other students. I think it's really a very great way to train your mind.

One of the things I'm thinking about, and I think the PAA should be thinking about, is providing online training in demographic methods. It would certainly be more efficient -- online courses in demographic methods. Why should it just be restricted to universities? It's a useful thing for a lot of people, because the kind of processes we're talking about, of course, can be applied to lots and lots of things we know. So that's one thing I worry about.

The other thing, the other potential danger, is that we absorb so much of the rest the world, there's nothing of our community left. It's the classic sociology of boundaries, for me. What's the definition of membership in the field "demography"? I'm not so worried about that. Other people have been more worried.

**HODGSON:** Any reflections about where you think the future will be, as we get more and more diverse? Many of the problems you perceive are ones where we're sort of losing a core. And you might have some ways of dealing with that, thinking about demography in 2030.

**PEBLEY:** You know, we're really good at twenty years of projection. I mean, we can do longer projections, but then we have a lot of unpredictable factors which make prediction beyond then difficult. It's hard. I think there are two things that could happen. There are probably seventy things that could happen. There are probably seventy other things we're not even thinking about. We face huge societal problems, particularly with regard to the environment, and who the hell knows where we're going to be in 2030, but especially 2050, I have no idea. We don't seem to be able to muster the political will to deal with these problems. I went through the 1970s, like you guys did, where the Club of Rome and other people had all these disaster scenarios, which obviously never came to pass and were based on poor assumptions. I'm always skeptical about these doomsday scenarios, and I don't think we're facing a doomsday scenario, but we have very serious problems that we have to deal with and we're not dealing with them. But for demography, I think there are two ways we can go. One is, we continue to absorb other fields, and dissolve ourselves essentially in these other fields, because I

think humans really do like silos and groupings. I don't think disciplines are going away any time soon. They may change but I don't think they're going away. So we could lose our identity, or we could make stronger efforts to essentially spread our identity. We could either dissipate or we could essentially—I hate to keep using these religious analogies, but we could convert other people, essentially make it clear why the ways we think are important and the kind of tastes and preferences we have for really good data, and being very upfront and honest about the quality of your data, and using thoughtful demographic methods. Doing these things is really important to the quality of research, data sharing, the ethos that we have among demographers.

One way for us to survive and thrive it seems to me, is essentially not to say, oh, we're going to dissipate, fade out over time. Essentially, we have something very important to offer and if we can persuade others that it's important and they should adopt it, not exclusively, but I think that as demography changes its identity, it remains really very important.

**HODGSON:** These are reflections about the planet, in some ways. I think you basically outline your thoughts about the organization itself, the PAA. We've got your experience from your first PAA meeting, then you're PAA President in 1998. We've got today. We've got a pretty good idea of what is happening to the discipline. Organizationally, what can the PAA do to preserve its identity and perpetuate it?

**PEBLEY:** I think the PAA has to be careful, because—and I know you didn't mean it this way—but if it's just about perpetuating ourselves, we shouldn't do it. We shouldn't be spending our time on that. We should be doing things that are important and useful, and taking the ideas that we have and getting out there and making sure that other people understand they're important. I think that I was a bit of a skeptic, as many people were, about the development campaign, although I've been on the development committee since the beginning. But it's worked well, and will help us in disseminating our approach to thinking and research.

Part of the problem is our age-structure. Many of us are baby boomers and older, so the kind of ideas we have about getting ourselves out there and carrying out the kind of things we're talking about are good, but there might be better ideas among our younger colleagues. We have sessions every once in a while to try to gather their ideas, but it's not enough. So I think we need a bigger public presence. We need to provide public education. We're a small association, but a lot of bigger associations do it. Now it's fairly cheap to do it. If you have a really good course and a really good instructor and you think about online teaching, well, you learn that particular set of techniques. You can do a good job. And I think we as an association ought to be out there, not to supplant people who are teaching demographic programs, but we ought to be out there promoting our science and our methods and our research in a way that we're not now. And I think the censuses in the classrooms are a great program. But we should really be thinking a lot more about social media and more about mass media than we are.

**HODGSON:** Can you give specific teaching roles for the association?

**PEBLEY:** There's an issue of copyright and also who would do it and all that, but I know we've done a lot of much harder things. One of the things that the PAA has is a lot of good will among members. I mean, we have arguments and fights, just like anybody else. There's not a lot of major political nonsense that goes on in the PAA, but we've got a lot of really good trust and social capital, which makes it much easier to do things.

**HODGSON:** Have we missed anything you want to tell us?

**PEBLEY:** I don't think so, but thank you guys.

**HARDEE:** Can I ask her one question?

**PEBLEY:** Sure.

**HARDEE:** What was it like being in Guatemala?

**PEBLEY:** The first day I was ever in Guatemala was in 1976 and I was 21 years old. And Joe Stycos had recommended that I stay in the Pan-American Hotel, which I thought was some fancy place. Turned out to be a somewhat fancy place, but not that fancy a place. And I went there and I thought it was the best thing I've ever done, to go there, because it was new and different, and I'd never been anywhere besides Canada. So it was fantastic. On the other hand, I didn't have much money. I had \$730 for the whole summer, for three months in Guatemala. So I had to figure out really quickly where I could stay because this hotel cost vastly too much. So I went traipsing around looking at all different kinds of pensions. I think the good thing is, I had a really open mind, somehow. What happened then was—this is always happening to me. When I'm in another country I don't have the same set of expectations. I don't know what it is. I think if my parents had seen some of the places that I looked at and places I stayed, they would have died. And if I now saw my daughter going and staying at some of those places I probably would die as well. Nonetheless I took up residence in this pension that was really this very old building and settled in, and tried to figure out how things were going. It was very exciting, but somewhat worrisome at the same time. But I thought, okay, I can deal with this.

**HODGSON:** So how was your Spanish?

**PEBLEY:** It was nonexistent. I spent maybe five months working with a tutor. As I told you, I was a French speaker. It's a really different thing to sit with somebody trying to speak Spanish for five months and then actually being immersed. That's the way to learn, to be immersed. Have you been there?

**HARDEE:** I lived in Bolivia for six months.

**PEBLEY:** Okay, cool. In some ways it's very similar, not the mountains so much.

**HARDEE:** And what was the experience like, working with the people there?

**PEBLEY:** The people I started working with were people at the international nutrition center, who were a very international group. They weren't just Guatemalans. In fact, they were from all over Central America, and they were terrific. The project I worked on was an experimental design focusing on improving the nutritional status of kids in Eastern Guatemala, an exclusively Ladino area.

**HODGSON:** That's all the time we have, but we really appreciate your willingness to sit down with us today. Thank you very much.

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# DEMOGRAPHY AND THE ENVIRONMENT\*

ANNE R. PEBLEY

*Demographers' interest in the environment has generally been enmeshed in broader issues of population growth and economic development. Empirical research by demographers on environmental issues other than natural-resource constraints is limited. In this paper, I briefly review past demographic thinking about population and the environment and suggest reasons for the limited scope of demographic research in this area. Next, I describe more recent demographic research on the environment and suggest several newer areas for demographic research. Finally, I consider the future of research on the environment in the field of demography.*

**T**wo hundred years ago in his first *Essay*, Thomas Malthus argued that unrestrained population growth would eventually be limited by fixed natural resources (Malthus 1798). On the 200th anniversary of this *Essay*, the relationships between population growth, human welfare, and the natural environment continue to be widely debated (Livernash and Rodenburg 1998; Lubchenco 1998).

Public and scientific concerns about population and the environment have, of course, varied over time. Agricultural economist Vernon Ruttan identified three waves of social concern about the environment since World War II (Ruttan 1993). These waves, each of which focused on a different set of environmental issues, are shown in Table 1. During the second and third waves, the concerns of the previous waves were recycled. Thus, the list of potential problems has lengthened over time.

The first wave, in the late 1940s and early 1950s, centered on whether natural resources (such as land, water, and energy supplies) could sustain economic growth and food production in the face of population increase. These issues are similar to Malthus' original concerns.

The second wave, in the late 1960s and early 1970s, added another focus: the environment's ability to absorb by-products of modern technology, such as air and water pollutants, asbestos, pesticides, radioactive waste, and household waste (Ruttan 1993). This second wave was spurred in part

by rising incomes in industrialized countries, which, ironically, increased demand, both for the commodities producing these detrimental by-products and for a cleaner environment.

The third wave, in the late 1980s and the 1990s, added yet another focus: changes occurring on a global scale, including acid rain, global warming, and ozone depletion. The second-wave and third-wave issues involve public goods—air, water, and the atmosphere—which have a well-known tendency toward over-exploitation. As the 1997 Kyoto Conference on Global Climate Change (UNFCCC 1998; Warrick 1998) suggests, third-wave problems will be particularly difficult to solve because they involve considerations of equity in the use of public goods among nations (DasGupta, Folke, and Maler 1994; Najam 1996).

Concern about two environmental issues not included in Ruttan's scheme has also increased over the past few decades. The first is wilderness destruction and extinction of plant and animal species (Hilborn 1990; Peters and Lovejoy 1990). Although ecologists and environmental groups are generally concerned with the well-being of both human and nonhuman species, social scientists and policymakers have usually focused on the consequences of environmental change for *human* welfare alone. Plant and nonhuman animal species and natural areas are often valued in the social science and policy communities only to the extent that they are perceived as useful or desirable to humans, now or in the future (Demeny 1991; McNicoll 1995).<sup>1</sup>

A second concern is changes in the ecology of microorganisms, resulting from human actions, such as forest destruction, global climate change, and the misuse of antibiotics and pesticides. Evidence of these changes includes the increasing frequency of drug-resistant bacteria and parasites, and newly emerging diseases (Ewald 1994; Levy 1998; Olshansky et al. 1997; Wilson, Levins, and Spielman 1994). These changes could have dramatic effects on human health (McMichael 1993, 1996). Changes in microorganism ecology often are not considered environmental problems per se, but they may well be part of a fourth wave of environmental concerns in the next decade.

Human activity has radically altered the earth's surface, oceans, and atmosphere, especially over the last 200 years. The nature and degree of these changes has been extensively documented (Turner et al. 1990). The effects of human ac-

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1. Of course, an exclusive focus on human welfare (including preferences for amenities such as wilderness area and biodiversity) may lead to considerably different policy choices about environmental trade-offs than a more general focus on preservation of natural environment (Livernash and Rodenburg 1998).

TABLE 1. THREE WAVES OF CONCERN ABOUT THE ENVIRONMENT

Wave	General Concern	Specific Issues
First Wave: 1940s and 1950s	Limited natural resources	Inadequate food production Exhaustion of nonrenewable resources
Second Wave: 1960s and 1970s	By-products of production and consumption	Pesticide and fertilizer use Waste disposal Noise Air and water pollution Radioactive and chemical contamination
Third Wave: 1980s and 1990s	Global environmental change	Climate change Acid rain Ozone depletion

Source: Ruttan (1993).

tivity are readily visible in satellite images taken from many miles above the earth.<sup>2</sup> Environmental changes have clearly improved human welfare, although the benefits have not always been distributed equally across or within societies. For example, anthropogenic (or human-induced) changes have improved the fertility of agricultural land; provided "built environments," which protect people from the elements, reduce exposure to disease agents, and allow a more comfortable way of life; and enhanced our ability to travel rapidly from one place to another. It is increasingly clear, however, that many of these changes have also brought substantial environmental costs.

According to many observers, population growth has been a (or often *the*) major cause of environmental problems (e.g., Ehrlich and Ehrlich 1990; Kates 1996; Smail 1997). In recent years, this belief has led to strong external pressure on demographers to pay more attention to the environmental consequences of demographic behavior. During the past decade, demographers published several broad theoretical treatments of population-environmental issues (e.g., Aramburu 1994; Cohen 1995a, 1995b; Davis 1991; Demeny 1991; Hogan 1992; McNicoll 1990, 1995; Panayotou 1996; Tabutin and Thiltges 1992). Yet empirical demographic research on environmental issues remains remarkably thin.<sup>3</sup> Until recently this empirical literature has generally focused only on first-wave issues—in other words, on limited natural resources, including land, energy supplies and food production (see Ridker 1972 for an exception). By contrast, little demographic research has been conducted on other types of environmental issues.

2. Satellite images for many parts of the earth are available on many websites, including: <http://www.nasa.gov/>, <http://edcwww.cr.usgs.gov/>, and <http://www.noaa.gov/>.

3. This assessment is based on several literature searches using *Population Index* and a review of several major English-language demography journals since 1965. Others have reached the same conclusion by different methods (Lutz 1994b; Stycos 1996).

In this paper, I consider the history and future of demographic research on environmental issues. First, I briefly review past demographic thinking about population and the environment. Second, I suggest reasons for the limited scope of demographic research on the environment. Third, I describe questions asked and approaches used in more recent demographic research on these issues. Fourth, I suggest several newer areas for demographic research. Finally, I conclude with comments on the future of research on the environment in the field of demography.

### A BRIEF HISTORY

From the time of Malthus, demographers' interest in the environment has been enmeshed in a much larger literature on population growth and economic development in nonindustrial or industrializing countries. For this reason, much of the demographic literature has focused on a specific demographic variable (population growth), a specific environmental concern (natural resources) and a specific set of countries (poor countries in Asia, Latin America, and Africa).

In the field of demography, the first wave of environmental concern contributed to a profound change in thinking about population and economic development. Before World War II, the dominant paradigm held that changes in demographic behavior (e.g., fertility and mortality) were *caused* by economic and social change that accompanied industrialization (Davis 1945; Kirk 1944; Notestein 1945). After the war, population growth rates in poor countries rose to unprecedented high levels as a result of rapid declines in mortality. These declines appeared to be caused by exogenous factors (e.g., the introduction of health technology) rather than endogenous economic and social change. Demographers became concerned that rapid population growth due to exogenous declines in mortality might, in fact, prevent the very economic development that would normally lead to fertility decline (Demeny 1988; Hodgson 1988). Hodgson (1988) argues that these concerns led to the development of a new orthodoxy in demography: that rapid population growth could

retard development and exhaust natural resources, and that fertility control programs were necessary to stem the tide.

Much of the emphasis in the literature on population and economic development during this period was related to the effects of population growth on investments in capital, reflecting economic-development theory of the time. The fixed supply of natural resources as factors of production, however, was also a focus of attention. Coale and Hoover (1958), for example, concluded that constraints on resources (land, mineral resources, water) were unlikely to be a barrier to economic growth in India in the first 25 years of their projections, but that in the second 25-year period (from 1986 to 2011) "resource bottlenecks—particularly in agriculture—could become acute" (p. 330) if rapid population growth continued. Part of the reason was that investment in technology would be lower than if the population grew more slowly (Coale and Hoover 1958:330). Subsequently, many others produced macrosimulation models that examined, at least in part, the effects of population growth on resource depletion, including the highly criticized and sensational study *Limits to Growth* (Meadows et al. 1972) published in 1972, which forecast catastrophic consequences of rapid population growth.

For many demographers, early evidence that population growth could impede development and exhaust resources led *not* to further research on these issues but instead to extensive research on how to reduce fertility in poor countries. Papers on population, development, and resource issues continued to be published in the demographic literature (Bilsborrow 1992; Panayotou 1996; Repetto 1987, 1994; Repetto and Holmes 1983; Ridker 1972) and in the economic-development literature (see Robinson and Srinivasan 1997 for a review). But Kingsley Davis (1991:2) spoke for many demographers, when he said that

...despite the intense public interest in population and resources, the subject receives little direct attention from demographers. The reason is not that they regard it as unimportant, but rather they take its importance for granted....[An important motivation for efforts such as the World Fertility Survey is] an unquestioned belief that high fertility is causing too much population growth in the Third World, straining limited resources.

The assumption that population growth adversely affects economic growth and natural resources came under fire beginning in the late 1970s with the work of Julian Simon (1977, 1981). Simon's view was that moderate population growth is beneficial, not detrimental, because it induces technical innovation. Furthermore, market mechanisms insure substitution away from scarcer to more abundant resources, and thus prevent resource shortages.

Partly in response to this new work, the National Academy of Sciences (NAS) formed a working group on population and economic development. The NAS report (National Academy of Sciences 1986a) was controversial and has been highly influential in demographic thinking about environ-

mental issues (Keyfitz 1992; McNicoll 1995). The report's authors concluded that population growth can have negative effects on some types of environmental outcomes, under particular social, economic and political conditions: Renewable resources, air and water quality, the climate, and species diversity may be harmed by rapid population growth. But the existence and size of these effects depends on the efficacy and efficiency of social institutions that regulate resource use and allocate the costs of externalities (National Academy of Sciences, 1986a).

Since the publication of the NAS report in 1986, there has been a significant increase in demographic attention to environmental issues. This increased attention is primarily due to recent and persuasive scientific evidence about global environmental effects and to greater popular concern about environmental issues. Several international conferences and working groups have also stimulated publications by demographers and other social scientists. Nonetheless, the amount of empirical research remains small.

### WHY ENVIRONMENTAL ISSUES HAVE NOT BEEN MORE CENTRAL

Why have environmental issues—other than natural resources—*not* been a more central focus of demographic research? First, as Kingsley Davis suggested, many demographers have taken for granted that rapid population growth imperils natural resources (and by extension, the environment). Therefore, they have focused their research on the mechanisms by which population growth could be slowed, rather than on interactions between demographic and environmental variables.

Second, other demographers, paradoxically, have come to the opposite conclusion: that the central causes of environmental problems are not demographic and therefore, are not appropriate for demographic research. A central tenet of recent social science thinking about population growth, development, and the environment (McNicoll 1990; National Academy of Sciences 1986a; Panayotou 1996) is that factors such as social institutions, the efficiency of markets, patterns of income distribution, levels of technology, and regulations are at least as important as population growth. Furthermore, any direct effects of demographic change may be muted by feedback effects, such as population growth-induced technological change (Boserup 1965, 1981; Simon 1981), institutional change (McNicoll 1990), and even fertility reduction (Lee 1987, 1997). On the other hand, Keyfitz (1992) argued that the heavy focus on the role of institutions, markets, and feedback effects has led many social scientists to the erroneous conclusion that population change has little or no role in environmental change.

Third, many environmental problems involve expertise outside the realm of demography, including biochemistry, biology, agronomy, or climatology. The use of spatial statistics, remote sensing, and geographic information systems can also be an important tool. An obvious answer to this problem is collaboration, and in recent years, several interdisciplinary studies have been conducted (e.g., Entwisle, Rindfuss, and

Walsh 1996; Gaffin, O'Neill, and Bongaarts 1996; O'Neill, McKellar, and Lutz 1998). Collaboration between natural and social scientists, however, is complicated by major differences in paradigms and assumptions, and often by mutual antagonism (Keyfitz 1992; Pickett 1993). Demographers who have tried to bridge this gap would probably share Preston's (1994:90) frustration with many natural scientists who are "too wedded to the primitive, biological model of human beings, whereby humans are distinguished from ants or seagulls only by their greater capacity for ecological destruction....[ignoring] the vast repertoire of social arrangements that humans have constructed to govern their behavior." On the other hand, demographers (and social scientists, more generally) share some of the blame: By absenting ourselves from scientific and popular debates on population and the environment in recent years, we have allowed simplistic approaches to flourish without the criticism or insight that could be provided by the results of demographic research.

Fourth, longitudinal data for local areas on environmental outcomes can be difficult or impossible to obtain. Most social science approaches to the analysis of the effects of household or individual behavior on the environment require data (preferably at several points in time) on a large number of local areas and households within those areas. For land use, satellite imagery and aerial photography now provide longitudinal data on local areas for most parts of the world. Measurement of changes in air and water pollution, solid-waste disposal, and hazardous waste at the local level is often more difficult, particularly in poor countries. For example, estimates of changes in carbon emissions (or even proxies like fossil-fuel consumption) for local geographic units (e.g., counties or municipalities) are not available for many countries. However, several new methods using remote sensing are currently under development and should provide better quality data in the next few years (H. Kroehl personal communication, February 22, 1998). Furthermore, some demographers are developing methods of collecting environmental data as part of sample surveys. Examples include (1) the Chitwan Valley Family Study in Nepal, in which William Axinn and his colleagues have collected detailed data on flora diversity, flora quality, and land use, and more limited measures of water quality (W. Axinn, personal communication July 2, 1998; Shivakoti et al. 1997); and (2) the second Indonesian Family Life Survey, in which Elizabeth Frankenberg and her colleagues have collected information about the presence of air, water, land, and noise pollution in a community-facility survey, and detailed data on the severity of smoke from recent widespread forest fires (E. Frankenberg, personal communication, July 2, 1998).

Whatever the reason, environmental issues have been peripheral to the main areas of demographic research. To the extent that demographers have analyzed environmental questions, it is generally as a subsidiary issue in analyses of population and economic development. With the third wave of environmental concern in the 1980s and 1990s, however, environmental issues have begun to receive more attention from demographers.

## RECENT RESEARCH QUESTIONS AND APPROACHES

Since the late 1980s, there has been a modest, but significant increase in research by demographers on environmental issues. I do not provide a comprehensive review of recent research here (for thoughtful recent reviews, see O'Neill et al. 1998; Palloni 1994; Preston 1996). Instead, I give an overview of newer research outside the traditional demographic interest in natural resources.<sup>4</sup> This research has focused on three main topics: (1) greenhouse gases and air pollution, (2) land use and deforestation, and (3) environmental hazards and migration.

### Greenhouse Gases and Air Pollution

Virtually all research by demographers on air pollution and greenhouse gas emissions<sup>5</sup> consists of macrodecomposition models of greenhouse gas emissions (Bongaarts 1992; Birdsall 1992; O'Neill et al. 1998; Preston 1996).<sup>6</sup> These researchers have sought to answer the question, how much of an effect on greenhouse gas production has global or regional population growth had in the past, or will it have in the future? They used an accounting identity known as *IPAT*, first proposed by two ecologists (Ehrlich and Holden 1971) to decompose environmental impact into components due to population growth and to other factors. As shown in Eq. (1), *IPAT* states that any given environmental impact—say, carbon emissions—is the product of three (and only three) factors: population, affluence, and technology.

$$I = P (\text{Population}) \times A (\text{Affluence}) \times T (\text{Technology}), \quad (1)$$

where *I* is the environmental impact, say, carbon emissions, *P* is population size, *A* is average per capita affluence generally measured as GNP or GDP per capita, and *T* is a measure of the level of technology in use, such as carbon emissions per unit of income. Researchers have generally used a formulation of the *IPAT* model, which looks at change in emissions as a function of change over time in population, affluence, and technology:

$$r_I = r_P + r_A + r_T, \quad (2)$$

where *r* is the growth rate for each component (*I*, *P*, *A*, and *T*).<sup>7</sup> The impact of each factor on the right side of the equation

4. In particular, I exclude from this discussion studies of the relationship between population growth, natural resources, and food production (e.g., Bongaarts 1996; Dyson 1996; Lutz 1994c).

5. Many of the same gases are implicated in ground-level air pollution and global climate change, though there are some differences. Despite a recent controversy about whether greenhouse gas emissions are hazardous (Stevens 1998), the general consensus among scientists is that the potential threat posed by greenhouse warming is "sufficient to merit prompt responses..." (National Academy of Sciences 1998:1). For evidence on greenhouse gas production on global climate change, see Houghton et al. (1996), Karl, Nichols, and Gregory (1997), and O'Neill et al. (1998).

6. Macrosimulation and decomposition models have also been used by many outside of demography to examine these issues. See, for example, Dietz and Rosa (1997).

7. Eq. (2) is derived from Eq. (1) by taking natural logs of both sides of Eq. (1) and dividing by the length of time over which the change occurs (see O'Neill et al. 1998; Preston 1996).

tion is described in terms of a percentage contribution to the change in the environmental impact (e.g., the percentage contribution of population growth to emissions growth would be  $r_p / r_i$ ).

The IPAT framework has many well-known problems and limitations, which can produce serious biases (Deitz and Rosa 1994; Lutz 1994a; Preston 1996; O'Neill et al. 1998). Perhaps the most important problem is that there are likely to be important interactions between  $P$ ,  $A$ , and  $T$ . For example, higher affluence is likely to be associated with lower pollution per unit of GNP because wealthier societies may invest in technology that minimizes pollution (Preston 1996). Other problems include (1) the upward bias in decompositions at the global level produced by ignoring heterogeneity in each component among regions (e.g., northern countries have the lowest population growth rates but the highest growth rates of carbon production), and (2) the model takes no account of reabsorption or breakdown of gas in the atmosphere (Deitz and Rosa 1994; Lutz 1994a; O'Neill et al. 1998; Preston 1996). Keyfitz (1992) also argued that looking at growth rates in emissions and in  $P$ ,  $A$ , and  $T$  is misleading because it is total emissions, not the growth of emissions per se, that affects the atmospheric concentrations of gases.

The conclusions drawn from IPAT decompositions also depend heavily on the periods examined and the assumptions made. Recently O'Neill et al. (1998) examined global changes over the next 50 years. They concluded that, in the short run, income and technology change will have a greater impact on greenhouse gas emissions than will population growth. In the long run, however, the contribution of population growth will increase.

Although the IPAT framework can be a useful thought experiment and illustration of policy options, like all deterministic models it *assumes* rather than *tests* relations between input and output variables. To make progress in understanding the determinants of pollution, demographers have to move to analyses that test hypotheses using variation across locations and/or over time. Preston (1996) took an important initial step in this direction by using a reformulated IPAT model to examine the relationships among regional *variances* in each IPAT term.

A more direct approach, however, is to estimate a behavioral model designed to test hypotheses. For example, using county-level data, Cramer (1998a) estimated a multivariate model of the determinants of air pollution emissions. Although his model is fairly simple, his analytic strategy could be extended to incorporate more variables and to test more complex hypotheses (see, for example, Lutzenhiser and Hackett 1993). Cramer's finding that population growth is more closely linked with some types of air pollution than others (see also Cramer 1998b) provides both useful information for policymakers and intriguing questions for future research. The study also highlights several common problems for analyses of socioeconomic and demographic determinants of pollution, including (1) the heavy data needs, (2) that pollution levels may be tied more to general market demand for products than to demand from local residents, and

(3) the potential problems created by air and water spill-overs across geographic boundaries.

### Land Use and Deforestation

Population pressure on farmland has long been a concern in the demographic literature. A more recent interest is tropical deforestation. In the past, research on population growth and land use was hindered by lack of adequate data (Bilborrow and DeLargy 1991; Bilborrow and Stupp 1997). As a consequence, most studies have been either simple descriptive analyses using census data or small case studies whose findings are difficult to compare because of differences in methods, variables, and study areas. Palloni's (1994) extensive review and meta-analysis of this literature highlights its limitations. He concluded, based on current evidence, that "while population pressure is an important force leading to deforestation, it rarely acts alone to produce this outcome" (Palloni 1994:160).

Several recent studies by demographers are an important break from past research (Foster, Rosenzweig, and Behrman 1997; Rindfuss, Walsh, and Entwisle 1996; Rosero-Bixby and Palloni 1996; Shivakoti et al. 1997). Their innovations include analyzing of panel data for large samples of local areas (such as, villages, neighborhoods, or land parcels), combining land-use data from satellite images and/or other sources with socioeconomic and demographic survey or census data, and examining the role of other social and economic changes that may cause or mitigate land-use change. For example, Foster et al. (1997) concluded that, in Indian villages, technological change in agriculture "reinforces the destructive effects of population growth on forests" (p. 33). But they also found that rural industrialization appears to preserve forest land.

### Environmental Hazards and Migration

Research on the distribution of environmental hazards and migration has generally focused on industrialized countries (Anderton et al. 1994; Hunter 1998; White and Hunter 1998), although environmental hazards are a serious problem in poor countries as well. These studies, based on local-level data from censuses and other sources, have examined whether hazardous waste sites are more likely to be located in poor and minority communities, and what role environmental hazards play in migration. Some of their results are surprising. For example, Anderton et al. (1994) showed that hazardous-waste sites in the United States are not more likely to be located in poor and/or minority communities (Anderton et al. 1994): They found "no nationally consistent and statistically significant difference between the racial or ethnic composition of tracts which contain commercial TSDFs [hazardous-waste sites] and those which do not" (p. 229). Hunter and White (Hunter 1998; White and Hunter 1998) showed that the presence of environmental hazards lessens the likelihood that migrants will move into a county, but does not affect overall out-migration rates. Certain types of hazards, however, are associated with higher out-migration rates for whites than for minorities.

This overview indicates that several demographers have recently undertaken studies of environmental issues that are outside the traditional demographic interest in natural resources. These studies provide an important base for future population-environment research.

## OTHER DEMOGRAPHIC-ENVIRONMENTAL INTERACTIONS

With some exceptions, recent research has continued to focus on the consequences of population growth, especially growth due to natural increase. But population growth is only one of several demographic processes that may affect, or be affected by, the environment. To illustrate this point, I turn to three examples of other population-environment topics that merit demographers' attention and that are closely related to core demographic interests: (1) environmental effects of spatial distribution, (2) demographic determinants of consumption patterns, and (3) the health and mortality effect of environmental hazards.

### Spatial Distribution

Spatial distribution, which includes migration, refugee movements, and urbanization, is the result of both migration patterns and regional variations in rates of natural increase. As fertility rates decline, however, migration becomes an increasingly important determinant of spatial distribution.

Many aspects of spatial distribution may affect environmental outcomes:<sup>8</sup> settlement in environmentally sensitive areas such as coastal zones, watershed areas, deserts, and wetlands; the pace of change in spatial distribution; and the specific causes of change in spatial distribution—for example, forced versus voluntary migration (Arizpe and Velazquez 1994; Hugo 1996; O'Lear 1997; Roberts 1994). The effects of spatial distribution on the environment can be complex. For example, is population concentration in a few mega-cities better or worse for the environment than dispersion in many smaller cities and towns? The answer may depend on which environmental outcome is considered. To illustrate, I contrast the potential effects of concentration or dispersion on air and water pollution and on the preservation of wilderness areas and species.

In the case of air and water pollution, concentration in urban areas has both costs and advantages. By concentrating household and industrial by-products in a limited geographic region, mega-cities may overwhelm the local environment's natural absorptive capacity. But concentration also reduces the costs of remediation and regulation. For example, in the last several decades, Los Angeles County has experienced both substantial population growth and improving air quality (CARB 1997). The net effects of urban concentration depend on the efficacy of political and social institutions in regulating and remediating pollution, as well as on the pace of urban growth with which these institutions must contend.

8. As Cohen (1998) suggested, environmental changes, such as global warming, may also be the *cause* of significant changes in spatial distribution in the future.

In the case of wilderness areas and species diversity, population concentration in urban areas may have significant advantages on the whole (although clearly not for wilderness and species located in the path of urban growth). Forest-ecology theory suggests that dispersed settlements can be far more harmful than fewer concentrated settlements. For example, scattered settlements strung along roads (shown as shaded areas in Figure 1) can create islands of forest land or jagged borders between forest and cleared land. Islands or jagged borders can be far more destructive to wilderness than a small number of concentrated settlements that leave large, contiguous tracts of land unsettled (McCarthy and Wilson 1967; National Academy of Sciences 1986b; Wilcove, McLellan, and Dobson 1986). Thus, holding constant population size, dispersed settlement patterns may be more harmful to wildlife and wilderness, on the whole, than urban concentration.

Current research on spatial distribution could be readily extended to answer important environmental questions such as, what factors attract potential migrants to, or divert migrants from, sensitive areas such as rain forests and coastal wetlands? How do immigrants decide where to settle in destination countries? What are the environmental consequences of remittances in sending countries? What types of policies can mitigate problems caused by urbanization or dispersed settlement patterns?

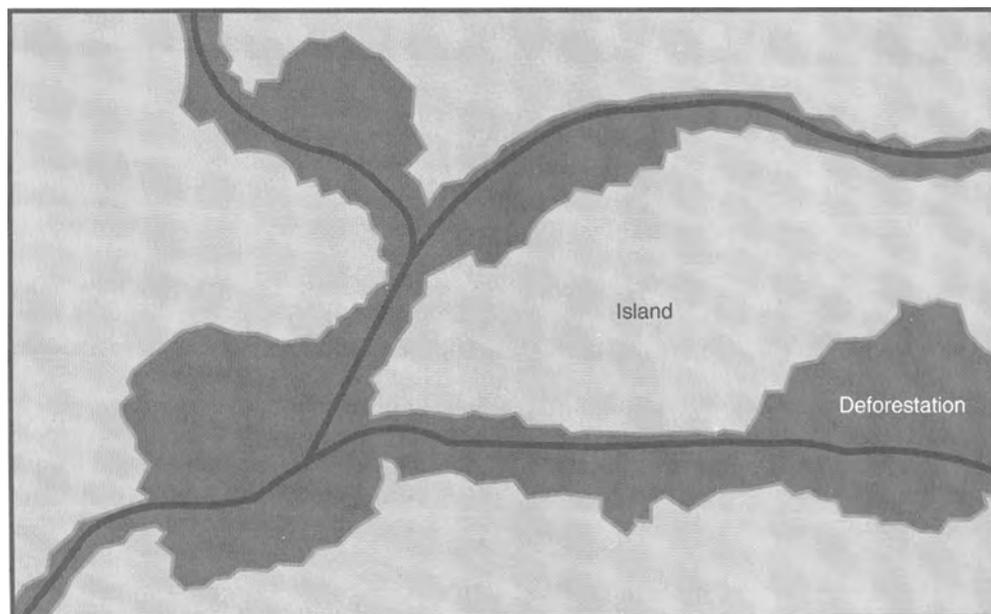
One important caveat in research on the environmental consequences of spatial distribution is that many environmental problems are not directly attributable to the local demographic change (Heilig 1994). Because of the extensive penetration of markets into virtually all areas of the world, local environmental degradation may be caused by demand for local products from other parts of the country or the world. For example, small farmers in eastern Guatemala export fertilizer- and pesticide-intensive peppers to Saudi Arabia. The environmental costs are incurred in rural Guatemala, but the consumption occurs in Saudi Arabia. Similarly, although the demand for paper products in the United States comes from a national market, the pollution costs of manufacture are borne by particular local areas. Future research on population distribution and the environment must consider that demand for local goods and services is often driven not by local population change but by national and international markets.

### Changing Consumption Patterns

Consumption may negatively affect the environment through harmful by-products generated during production or consumption and through disposal of goods once consumption is complete. For example, a car's production requires raw materials and generates waste products. Cars run on fossil fuels, producing carbon. Their operation also generates other waste products, such as used oils, fluids, and tires. And the car must be disposed of when its useful life is over.

Per capita consumption of all goods, and especially higher value-added goods, is likely to increase in the next several decades because of rising living standards, especially in poor countries. Several demographic factors will also af-

FIGURE 1. ISLANDS OF FOREST



fect consumption levels and patterns, including (1) population aging, (2) household-formation patterns, and (3) social inequality. Let me briefly comment on each factor.

Current population projections suggest that most countries in the world will experience population aging over the next 50 years (Heilig 1996; Kinsella and Taeuber 1993). Population aging may affect consumption patterns substantially.<sup>9</sup> Consider, for example, results from the U.S. Consumer Expenditure Survey shown in Figure 2. Expenditures on utilities, transportation, and housing have a distinct age pattern, with lower consumption at younger and older ages and higher consumption in the middle ages. In 1995, the median age of householders was in the 45–54 age group (U.S. Bureau of the Census 1996). As Figure 2 shows, this is the age group in which household expenditures on housing, utilities, and transportation are highest. If the age patterns of consumption shown in Figure 2 persist over time, expenditures are likely to decrease in the future as householders become older. Current age patterns for older adults, however, reflect lower lifetime incomes for older cohorts and cohort consumption patterns developed in leaner economic times. Age patterns of consumption may change substantially in the future as baby-boomers move into their early retirement years. Understanding the implications of aging for consumption and the environment will require research on life-cycle patterns of consumption, which takes cohort effects into account.

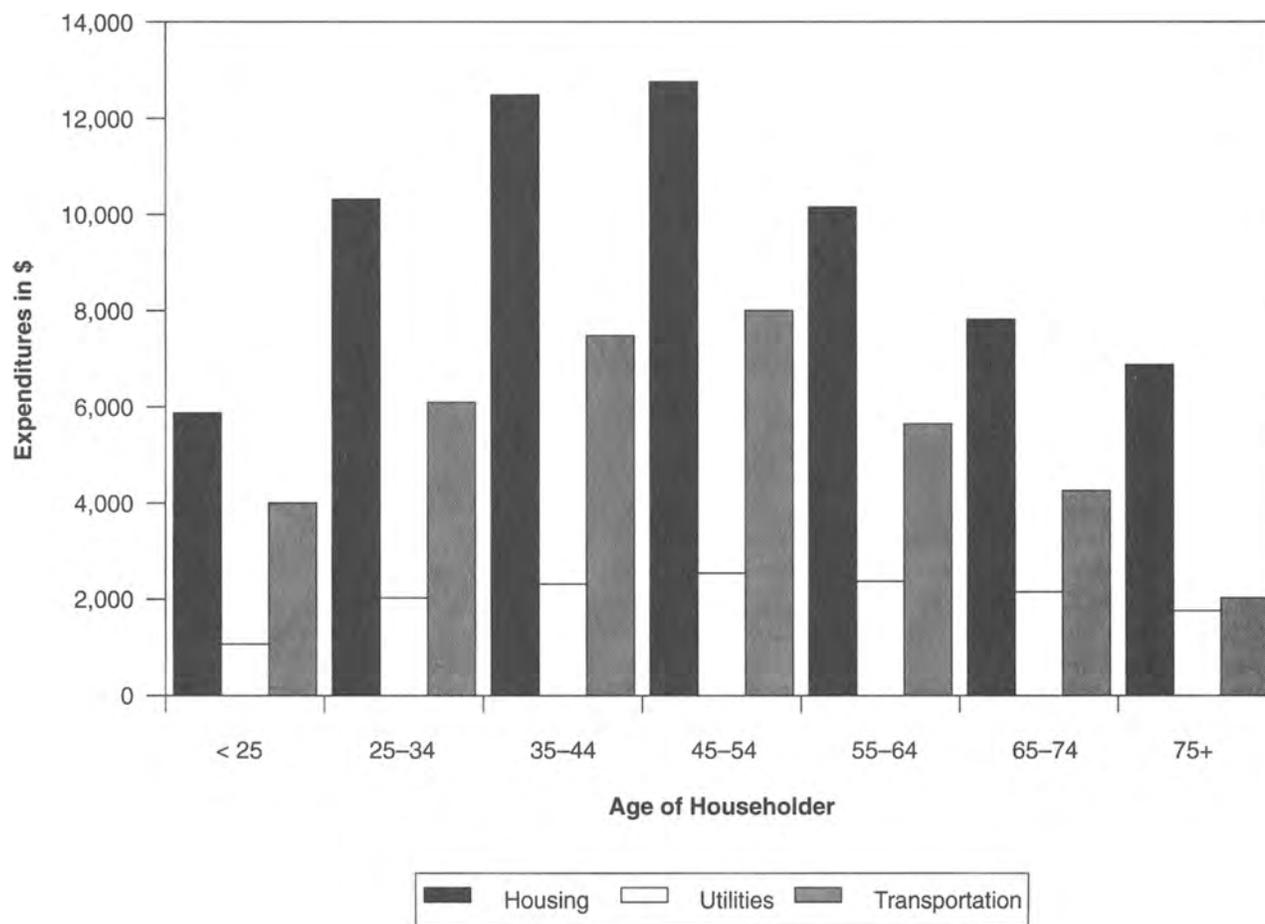
9. There is a growing literature on the effects of aging on savings, standards of living, and consumption patterns. See, for example, Hurd (1997), Lee and Tuljapurkar (1997), and Wise (1997). For other approaches to consumption, see Stern et al. (1997).

Household formation also affects consumption patterns. As Figure 3 shows, average household size has been declining and is projected to decline further. In other words, the number of households is likely to grow faster than the population itself. Because there are substantial fixed energy, waste disposal, and other costs to running a household, the growth in the number of households implies growth in consumption. For example, MacKellar et al. (1995) showed that growth in greenhouse gas production is more closely linked to growth in the number of households than to population growth per se.

Aggregate consumption is also affected by social inequality. The effects can be complex. For example, Table 2 shows that households with the highest income in the western United States used twice as much gasoline as the poorest households (Lutzenhiser and Hackett 1993). But they also used energy more efficiently: Because higher income households are more likely to have newer cars, they got considerably more miles to the gallon. In general, the poor have fewer resources to invest in newer, more efficient technology (for example, newer, more fuel-efficient cars in the United States or high-efficiency wood-burning stoves in rural areas of poor countries). At the extreme, a high degree of social inequality may result in both heavy total consumption by a small and wealthy elite and very inefficient consumption by the majority of the population.

The effects of consumption on the environment is a hot topic in current environmental debates (Myers, Vincent, and Panayotou 1997; Royal Society and U.S. National Academy of Sciences 1997; Stern et al. 1997). Yet much of the discussion is simplistic and lacks a solid empirical base. Demographers could make important contributions by extending current re-

**FIGURE 2. U.S. EXPENDITURES ON HOUSING, UTILITIES, AND TRANSPORTATION FROM THE 1995 CONSUMER EXPENDITURE SURVEY**



Source: U.S. Bureau of Labor Statistics (1998).

search on aging, household formation, and social inequality to examine their effects on consumption and the environment.

### Environmental Change and Health

The previous two topics concerned the effects of demographic variables on environmental outcomes. But environmental change may also have important effects on *demographic* outcomes, including health, mortality, and migration. I illustrate with the example of health and mortality effects.

Environmental factors are likely to play a small but significant role in mortality and morbidity over the next several decades. For example, Murray and Lopez (1996) estimated that air pollution accounts for about 1% of annual deaths worldwide (but see Schwartz 1993 and Shprentz 1996). But environmental factors can be more important in specific locations (such as eastern Europe and coal-dependent industrial towns in China) and for particular social groups (such as the urban poor). As worldwide mortality declines, health

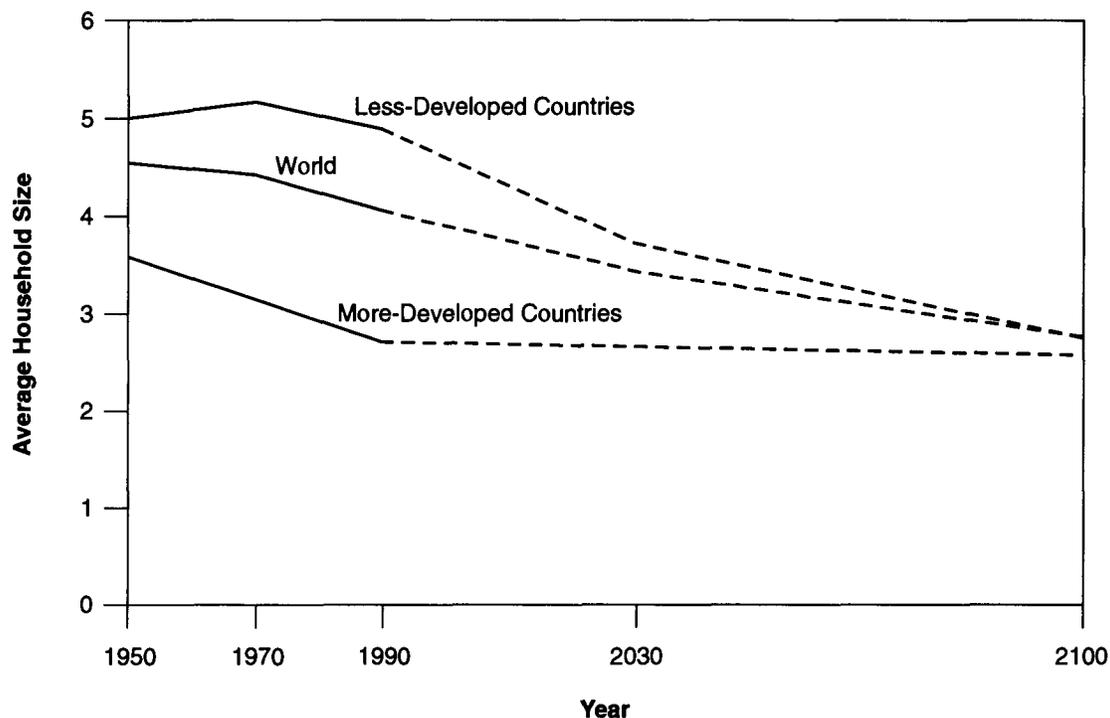
catastrophes may also play a more significant role in period mortality. For example, the recent massive forest fires in Indonesia may have increased morbidity and mortality in Malaysia, Singapore, and Indonesia. As I argued earlier, environmental changes can also indirectly affect human health by altering the ecology of microorganisms that cause disease in humans (Olshansky et al. 1997).

Future demographic research on mortality and health must take environmental factors into account. For example, for studies of trends and differentials, important issues include the effects of environmental change on mortality rates; the role of social and economic factors in environment-health relationships; and the role of policies and individual preventive behavior in reducing environmental health risks.

### WHERE DO WE GO FROM HERE?

Will environmental issues have a more central place in demographic research in the future? My view is that although

FIGURE 3. AVERAGE HOUSEHOLD SIZE, 1950–2030



Source: MacKeller et al. (1995).

they are unlikely to supplant fertility determinants, for example, as a central topic in demography, there are important reasons for demographers to become more involved in research on environmental issues.

Some of the reasons are fairly obvious. Policy debate on the environment will continue and probably increase, with or without the involvement of demographers and other social scientists. Given the importance of environmental problems and the often rudimentary understanding of demographic and social processes in the environmental literature (Ehrlich and Ehrlich 1990; Myers et al. 1997; Royal Society and U.S. National Academy of Sciences 1997; Smail 1997; Stern et al. 1997), demographers can make important contributions to this discussion, and are already doing so to some degree.

Research on environmental issues can also benefit demographic theory and knowledge. For example, demographers have become increasingly interested in the relationship between the social and economic environment and individual behavior. Articles in demographic journals include studies of contextual or ecological variables, such as social ties and social capital, neighborhood or village infrastructure, wages and prices, regulations, and the availability of services (e.g., Brewster 1994; DeGraff, Bilsborrow, and Guilkey, 1997; Entwisle, Rindfuss, and Guilkey 1996a; Lundberg and Plotnick 1995; Pebley, Goldman, and Rodríguez 1996; Sastry 1996). Demographic research on the environment can extend

our current focus on the *socioeconomic* context of human behavior to its *physical* context.

Previous research on population and the environment by demographers suggests several research strategies that are and are not likely to extend current knowledge. Most previous research is based on either macrosimulations or projections, or on case studies. Both have limitations. Macrosimulation and projection models depend heavily on assumptions. They are, therefore, most useful as ways to *summarize* empirical knowledge rather than to *generate* it. Case studies of a single village, region, or country can be a useful starting point, but they generally do not provide a solid basis for comparison or inference, given their wide variation in methods and variable measurement, small sample sizes, and selectivity of research sites.

A few recent studies point the way to a more productive approach. All of these studies test hypotheses based on behavioral models, analyze panel or time series data, link survey or census data with environmental data, and measure variables in a standard and replicable manner. Two other important features for future research are the use of common theoretical frameworks to allow comparison of study results and analysis of institutional and policy variables. If institutional and policy variables are as important as we think, understanding their effects should be a central focus of demographic research on the environment.

**TABLE 2. HOUSEHOLD CONSUMPTION OF GASOLINE BY INCOME GROUP: WESTERN UNITED STATES, 1987**

Annual Income	Average Annual Household Consumption of Gasoline (in Gallons)	Miles per Gallon
< \$12,500	541	16.6
\$12,500–24,999	766	17.9
\$25,000–39,999	1,013	17.3
\$40,000+	1,241	19.1

Source: Lutzenhiser and Hackett (1993).

On the whole, demographers are a pragmatic and skeptical group who like empirical evidence and disdain dramatic rhetoric. This attitude may be partly a legacy of Thomas Malthus and the fact that the dire predictions in his first *Essay* have not been borne out. During the 200 years since this *Essay*, many other observers have argued that humans would exhaust natural resources and face environmental collapse. These predictions were especially common in the 1960s and 1970s, when many of us first decided to become demographers. Remarkably, in the 20–30 years since then, we have witnessed increased living standards and survival rates, a fertility decline in most areas of the world, and some success in reducing environmental damage. That these catastrophic predictions were wrong, however, should not blind us to more mundane, but potentially quite important, interactions between demographic and environmental processes.

As Malthus' later work shows, he also had a firm belief in the importance of empirical evidence as a basis for drawing conclusions, and he was willing to alter his beliefs as the evidence required (Coale 1978). That is a part of Malthus' legacy that I think we all can appreciate.

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