these changes and figure out if where they are going is where they want to go. A number of states have commissions on the year 2000—Hawaii's is one of the oldest—and other groups have bloomed with names such as Alternatives for Washington, the Commission on Minnesota's Future, Goals for Dallas, and California Tomorrow. Since the need for decentralization of decision-making and the possible formation of new regional groupings that correspond better to area needs is a strong component of futurist philosophizing, it is conceivable that the real impetus for adjusting institutions to match future conditions will come from the countryside rather than the federal government.

As things look now, futuristic thinking may lead not only to the establishment of foreward-looking components of government agencies, but to a profound restructuring of government itself. Several speakers at the WFS meeting observed that the current structure is no more than an elaboration of a system set up for, and ideally suited for, the agrarian society of the 1800's. Now, as Joe Coates puts it, "We are trying to shoehorn the most complex society that ever existed into obsolete structures." Alvin Toffler, author of *Future Shock*, reflects the views of many in his argument that bureaucracies are becoming obsolete. Hierarchical, homogenized, centralized bureaucracies reflect the shape of an industrial society. Now that we are "postindustrial," the need is for diversity and decentralization, he says.

President Gerald Ford seems to be tuning into these concerns. At his first meeting, in mid-June, with the White House Domestic Council, a proposal was outlined whereby the President would travel around the country conducting a series of "administrative hearings"—a variation on "town meetings" held by Vice President Nelson Rockefeller when he was governor of New York—to educate and solicit the opinions of the citizenry on long-range domestic problems.

Whether holistic visions and solutions are better arrived at through primary emphasis on centralized (from the top down) or network-like (from the bottom up) planning structures is a question for endless debate. Since public participation in decision-making is one value that futurists do not question, the first step will have to be the generation of continuous policy debate among all segments of the populace.

Perfection of communications techniques is therefore crucial to applied futurism. The Committee for the Future, a group that started with the idea of fostering galactic harmony by setting up colonies in outer space, is making its contribution through huge meetings called Syncons, where panoramic unity and enlightenment is sought by having everyone talk about everything simultaneously. The committee is said to be making strides in the use of audiovisual technology to organize and expand communications. Another, more sophisticated approach is "computer conferencing," devised at the Institute for the Future at Menlo Park, California. This enables people to conduct international discussions from the comfort of their home terminals. The method saves travel cost, allows participants to duck in and out of the discussion, to have portions of the talk played back when they want, and to insert opinions anonymously or confer privately with each other. One can readily see its application to Middle East negotiations.

Most people seem to want futuristics to evolve into a distinct discipline. Robert Lamson of the National Science Foundation laments the lack of "quality control" in the field. He points out that futurism has no tradition, its terms are ill-defined, and there is a lot of "sloppy thinking being expressed in sloppy language." They must forge ahead nonetheless. The old ways aren't working very well, for, as an anonymous stock analyst has observed, "The future is no longer what it used to be."

—CONSTANCE HOLDEN

A Conversation with Dixy Lee Ray

In the colorless Nixon years few federal officials cut so distinctive a swath as Dixy Lee Ray, the biologist from Seattle with a mobile home and two famous dogs, Jacques and Ghillie. As a member, and later chairman, of the Atomic Energy Commission, Ray established herself as a public person of substance who spoke her mind and had no compunctions about tangling with congressmen or her colleagues in the Executive Branch. It seemed almost inevitable that a collision would come in her new job as Assistant Secretary of State for Oceans and International Environmental and Scientific Affairs.

Congress, largely at the urging of Senator Claiborne Pell (D–R.I.), had, in October 1973, thrust a new bureau for oceans, the environment, and science on a State Department charitably described as uninterested. The level of Administration enthusiasm was indicated by an 18-month delay in naming an assistant secretary to run the bureau.

Ray, nevertheless, says that when she took the job last January she and the bureau were assured that they would be the "principal voice and forum" of science-related matters in the State Department. "I had nothing in writing," Ray added at a hearing Pell called on 26 June to discuss her resignation 6 days earlier.

Ray said her troubles had begun within a week of her arrival—new funds and staff proved unavailable and Secretary Kissinger's staff tended only to call on the new bureau for concurrence with its views. Moreover, Ray said, she had little taste for the "infighting" necessary to carve out a niche for the new bureau. "People in responsible positions should be able to focus on their jobs" she told Pell.

It was plain too that, since the disbanding of the AEC, she had grown a bit homesick for Seattle and the 65-acre enclave on Fox Island in Puget Sound that she and her four sisters own. The following conversation, edited from a 40-minute tape, took place early on the morning of 26 June amid a busy schedule of appearances on television and Capitol Hill, and packing. "I want to be on the road tomorrow," Ray explained. And she was.—ROBERT GILLETTE [*Transcribed by Scherraine Mack*]

Q: Public resignations in Washington are rare.

RAY: Yes, they are.

Q: Why, basically, did you resign, and why did you decide to go public?

RAY: I quite realize that the normal course is to resign quietly, say nothing, and go home. My purpose, besides having come to the conclusion that I had done all I really could, was to call attention to the problems as they really are.

Maybe I had better put it this way: I believe so deeply in the importance of having good scientific and technical advice in the making of foreign policy—and this has not yet happened in the State Department—that I believe anything I can do to assure that it happens would be of benefit. And I felt the only way I could really draw attention to the problem was to take the course I have.

Q: What were the problems, as you saw them?

RAY: Let me just say that, in general, trying to do something that is not readily acceptable by the top people in the State Department is like trying to nail Jello to the wall. It's a futile exercise.

Now, I don't mean that there aren't kind and capable and intelligent career people in the State Department. There are. But in a broad way their capabilities are not being used, just as the capability of the bureau that I headed was not and is not being used.

There are, in fact, two State Departments. One consists of the Secretary and his small group of advisers, including the Policy Planning group, which surrounds him. Then there is the Foreign Service and all the bureaus and geographic desks, and that kind of thing. The problem is that these two are quite separate.

Dixy Lee Ray

Now the Secretary is an extraordinary man, and highly capable, and I don't want to be considered as making accusations and that kind of thing. But policy doesn't mean anything unless there is a day-to-day administrative organization which will carry out the things that must be done. Because there is no interest in that from the top, the department is not so much mismanaged as unmanaged.

Q: You're quoted in a recent interview as saying people "would be fearful of the future" if they knew that "a little group of whiz kids around Kissinger had automatic answers for everything without consulting the experts."

RAY: I guess that's what I believe. That must have been one of my more frustrated days.

Yes, there is a little group of people, the Policy Planning group, and they are a lot of very nice guys, but they form a tight little buffer around the Secretary and nothing gets through. They have a strong sense of "NIH"—not invented here. If it's not invented here, it's not State [policy].

Q: The pattern was for you to get policy pronunciamentos from the top, without systematic input from your bureau or others in the department?

RAY: That is correct. Let me give you some examples.

I have asked within the State Department how we know for sure what our foreign policy really is, particularly as it may affect science and technology. The response I got was, "Read the Secretary's speeches." That is how the department finds out what our foreign policy is.

So I do. And the Secretary made a speech last Wednesday evening to the Japan Society in New York. Among the things he said in the section dealing with energy, was—and these aren't his exact words, but they're close enough—that the United States is prepared to enter into a large-scale energy R & D program with Japan. That's the first I heard about it.

Q: That was the first mention you had heard?

RAY: Yes sir. No one in the [science] bureau was consulted. We do not know what that means, or whether in fact there *is* a commitment. Are there to be cooperative programs worked out now? What would they be? Gasification of coal? Certainly not, because Japan doesn't have any coal.

And we could go right down the line. Not only is there no program, we can be sure there are no appropriations from Congress. Where are the personnel coming from? Is it going to be done by the private sector or through government laboratories? None of these things have been addressed. But there is the pronouncement. I can give you many, many other examples.

Q: You came to the State Department with considerable experience in energy policy. But your responsibilities at State didn't include energy?

RAY: They certainly included energy R & D, although that was an exercise that took 6 weeks to get resolved on paper.

I decided to go by the rules and within the system. With the assistance of the legal staff, which, by the way, is top-notch, we developed a position paper quoting from the law as to what the bureau's responsibility should be in energy. It hadn't [previously] done much in that area, and the economics bureau had moved into the vacuum. And it became quite clear that Mr. [Thomas] Enders, the assistant secretary for economic and business affairs, did not want to see any change, would not and did not countenance giving up any R & D responsibilities to this new bureau.

So we prepared a document, submitted to the appropriate Undersecretary, and the issue was resolved, pretty much, about 3 weeks ago.

Then we quickly said, all right, we have to have seven new positions to carry this out. But within a week or 10 days I got another memorandum saying we'll only approve two of your positions until we analyze better what the R & D content is in the other energy positions. The two [memos] don't jibe. One says, yes, you have the responsibility and then the other one says, no, we can't give you the resources. Now that was one of the things that I would call one of the last straws.

Q: Then came the Japan Society speech?

RAY: Yes, it's been a number of things along these lines. In my mind it adds up to a kind of lip service, a "down boy" sort of thing. When you really get to the nuts and bolts of being able to perform the functions [of a new bureau] there's no way. We can continue to do the things the science people have always done in State [but nothing more].

Q: Well, the State Department's science bureau has traditionally had a kind of stepchild relationship with inner policy circles. But the consolidation of science and technology with the offices of fisheries, population, and environment—and then your appointment—were held out as harbingers of change, that there would be a new coordination of science and foreign policy. Was that entirely a false hope?

RAY: I hope it's not. It hasn't happened yet, but I hope there are possibilities. It takes time to alter that stepchild relationship. But I think it's important to realize that this is the only bureau in the State Department that has a statutory base.

Under the law, we were to formulate a coherent foreign policy with respect to science and technology; advise the Secretary before enunciation of an overall policy; and coordinate the various international activities of other federal agencies so that they conform to this policy. Now those are very heavy duties and they cannot be discharged with existing personnel.

Q: Do you feel you made any headway at all in the 5 months you were there?

RAY: After taking a little time to look and see what we had, I was shocked to find out that, not only the bureau, but fairly broadly throughout, the State Department is a shoestring operation.

Recognizing that these things take time and that one can't expect miracles, what we've been doing in the 5 months is putting the bureau through a proper budget and personnel and program planning exercise with the help of Johnny Abbadessa, who had

been the controller of the AEC and one of the finest in the federal government.

This I think is the major contribution I made. We laid out what the bureau is supposed to be doing. What are the goals? What are the needs? Over a 4-year period we're talking about an increase from the $583,000 budget now to close to $6 million and a complement of close to 200 people [from 78 at present].

Within the first couple of months we very quickly drew up a bare bones [request] for 29 new positions. I have heard since last week that they [the State Department] probably won't ask for any funds. This puts the bureau in the position of not being able to carry out any of its new responsibilities until the resources are available, and the first budget cycle we can influence is fiscal 1977.

This is one reason that I'm trying to call attention to the fact that this planning has been done. The bureau should be given the opportunity to defend that budget to the Office of Management and Budget and the Congress.

Q: I gather there were also some basic philosophical differences about the role of science in foreign policy. Or was it that Dr. Kissinger just isn't interested in this area?

RAY: There is a great deal of acknowledgment by the Secretary and those around him that science is important. When you stop to think about it, the real problems in the world today, like food, energy, raw materials, the environment, and human population are all interconnected. They're not confined to any one country and they're not going to be solved by any one country. They're not going to be dealt with totally by science or technical knowledge, but they're not going to be solved without good expertise.

Now, when you read the cable traffic in the State Department [you can see that] what other countries want from the United States—particularly developing countries—is knowledge, and some idea of how to make a better life for their citizens.

To put it crassly, they want our science and technology. And I don't think that it's fully appreciated, fully recognized—and this is going to sound a little brutal—[that] the Secretary of State considers scientific capability, management know-how, and so on as bargaining chips in a political game.

Q: That science ought to be a tool of foreign policy?

RAY: That's one way of putting it. It means that you're saying to another country, "If you do what I want in some sort of political situation, or alignment, or whatever, then you'll get access to our science and technology." Now in economics and perhaps other fields you can give a nation most favored treatment. You can provide commodities or military aid, and if you don't like the results you can stop. But you can't do that with science and technology. Once knowledge of how to accomplish something is made available you can't take it away. That is not appreciated. That is not understood. I believe the leadership of the State Department has a hard time thinking of science and technology as other than convenient handmaidens.

Q: Are there particular instances in which science or technological aid have been withheld inappropriately? As a bargaining chip?

RAY: Let's take the Middle East. Back in the 1950's, Eisenhower and a group of people conceived the idea of using nuclear power, if it was appropriate—or some other energy if not—to desalt seawater for a number of countries in the Middle East. The rationale was that these countries will never be able to develop their own economies and, most important, their agriculture, until there is fresh water. Remember that the granary of Rome was an area in Egypt 50 or 100 miles west of Alexandria, and in fact I understand you can still fly over and see the outlines of catch basins for irrigation.

The approach was that if one has an abundance of fresh water this could be an impetus to a more stable social order and to peace in the area. I know that private financing for this idea was achieved and that the State Department said, "No."

Twice since then there have been efforts—the most recent through Senator Howard Baker in 1969—to revive the project from the standpoint that, since diplomacy has not worked, why not try this kind of incentive toward a stable economy? I am no expert on the Middle East. But I have pursued the question, and the answer I get from the State Department is "No," there is no way. The State Department turned it down again in 1972. They say we must not do anything like that until there is political stability. I think we've got our priorities backward.

I was reminded of this recently when Senator Javits and Senator Pell went to Cuba and came back with the suggestion that Premier Castro was interested in the possibility of relaxing the embargo to the point of having it not cover foodstuffs and medicine. You know that was turned down in the State Department. The reason given was that this must not be done until there is political stability. Couldn't that conceivably lead to stability?

It's questions like this where I believe a practical, open discussion of the issues by people who have some knowledge in science and other fields ought to take place—and not just try to use science as a reward or incentive for good behavior.

Q: Let's move for a moment to energy policy. At the AEC, in late 1973, you directed the first systematic plan for energy R & D. How do things stand now from your point of view?

RAY: Well, I think things are not too bad despite the trauma of a major reorganization. It's rather gratifying to realize that the recommendations for a variety of energy R & D programs, so far as the federal role is concerned, are pretty much being followed. There's some shift of emphasis, but that's proper.

What's not been followed up is for government to make it possible for private industry to do its share. Some of the rather innovative things we proposed—like the pioneer synthetic fuels program—really aren't getting serious consideration.

Q: Do you have any quibble with the Administration's basic approach to an energy program—conservation through higher costs and hoping alternative sources will come along?

RAY: I certainly do. I have no quibble with higher energy costs—we've never really appreciated and paid for the value. But I can't agree with an energy conservation policy simply founded on making it cost more. We ought to be conserving on a scale that nobody's even talked about yet, except for a little flurry during the embargo. And time is wasting. I think it's essential for the leadership of this country to set an example and introduce some of the conservation measures we talked about during the embargo, and make them stick.

Q: You would favor oil import quotas?

RAY: When we reflect that in 2 years the cost of petroleum has risen from $5 billion a year to tens of billions a year, yes, I'd say it's time to do something. We are slipping into a greater and greater vulnerability every day, and all we hear from our leadership, both in the Administration and in the Congress, is the price of gasoline. As if the American public were made up of a bunch of idiots who think that the only use of energy is to drive the family automobile. That's part of the problem, but it's only one part, and by no means the most important. Industry is the most important.

Q: From your experience at AEC and then at State, did it seem to you that members of Congress who ought to understand energy issues actually do? What are your impressions of the Congress?

RAY: The trouble is that people in both the House and Senate, as in many other leadership positions, are so taken up with such a

variety of issues that—unless they happen to have specific expertise in the subject—they become dependent upon staff.

Congressmen who have good staffs, who haven't any axes to grind, can take responsible positions, and they do. But some members can become captured by staff who have a crusade going for them.

It's unfortunate that so few scientists run for public office. I think it's a very sad thing. We put no value on a scientist serving the public.

Q: You're thinking about running for office?

RAY: I am considering the possibility. But I can't make a decision until I have a chance to look around, listen to what people have to say about issues in the state [Washington]. I'll try to make up my mind in the next few months.

Q: To close, would you offer any advice for the next Assistant Secretary for Oceans and International Environmental and Scientific Affairs? And for scientists generally who would come to Washington?

RAY: For the next assistant secretary, I would say study the law [establishing the bureau] so that you'll know what your responsibilities are and then approach the position only with a complete understanding—in writing—that you'll get resources commensurate with these responsibilities.

As for scientists in general, I think that public service is essential. We need people knowledgeable in science and technical affairs to become active in government in one way or another, and not just to lobby for science but to become part of the system.

There should be rewards—intangible things, recognition—to [encourage] a person with knowledge of science to involve himself in the issues, for our society today is based on science. If people don't like that, then they'll have to be born in a different time.

APPOINTMENTS

Duane Acker, vice-chancellor for agriculture and natural resources, University of Nebraska, Lincoln, to president, Kansas State University, Manhattan.... **Jefferson D. Farris**, dean, College of Fine and Applied Arts and Sciences, University of Central Arkansas, to president of the university.... **Charles J. Ping**, provost, Central Michigan University, to president, Ohio University.... **William J. Byron**, dean, College of Arts and Sciences, Loyola University, to president, University of Scranton.... **Emmett B. Fields**, executive vice president, University of Houston, to president, State University of New York, Albany.... **William E. Davis**, president, Idaho State University, to president, University of New Mexico.... **Andrew Billingsley**, former vice president, Howard University, to president, Morgan State College.... **Mary M. Zeyen**, executive vice president, Immaculate Heart College, to vice president for academic affairs, California State University, Fullerton.... **Irving Shain**, vice-chancellor, University of Wisconsin, Madison, to vice president for academic affairs, University of Washington.... **Allan H. Clark**, professor of mathematics, Brown University, to dean, School of Science, Purdue University.... **Warren E. Ibele**, professor of mechanical engineering, University of Minnesota, to dean, Graduate School at the university.... **Thomas B. Ducker**, associate professor of surgery, Medical University of South Carolina, to chairman, neurological surgery department, University of Maryland.... **Charles A. White**, professor of information sciences, Illinois State University, to dean, Graduate School at the university.... **Glen L. Martin**, chairman, civil engineering and engineering mechanics, Montana State University, to dean, School of Engineering, San Diego State University.... **John R. Zimmerman**, assistant dean, College of Science, Southern Illinois University, Carbondale, to dean, College of Sciences and Technology, East Texas State University.... **Richard J. McArdle**, chairman, elementary and secondary education department, University of North Florida, to dean, College of Education, Cleveland State University.... **L. Guy Donaruma**, dean, Graduate School, Clarkson Institute of Technology, to dean, School of Mathematics, Science and Engineering, California State University, Fullerton.... **Ara G. Paul**, professor of pharmacognosy, University of Michigan, to dean, College of Pharmacy, at the university.... **Charles L. Howell**, dean of public health and preventive dentistry, Temple University, to dean, College of Dentistry, Ohio State University.... **Jack E. Razor**, associate professor of physical education, University of Illinois, to dean, College of Applied Science and Technology, Illinois State University.... **Helen Codere**, chairman, anthropology department, Brandeis University, to dean, Graduate School of Arts and Sciences at the university.... **James C. Kelley**, acting chairman, geological sciences department, University of Washington, to dean of natural sciences, San Francisco State University.... **Robert F. Perkins**, professor of geology, Louisiana State University, to dean, Graduate School, University of Texas, Arlington.... **Leland J. Bellot**, acting dean, School of Humanities and Social Sciences, California State University, Fullerton, to dean of the school.... **Gerhard Werner**, chairman, pharmacology department, University of Pittsburgh, to dean, School of Medicine at the university.... **William Maxwell, Jr.**, associate dean, School of Education, North Carolina State University, to dean, School of Education, California State University, Fresno.... **Robert Smith**, chairman, family medicine department, University of North Carolina, to director, family medicine department, University of Cincinnati.... **Richard J. Weymouth**, professor of anatomy, Medical College of Virginia, to chairman, anatomy department, University of South Carolina.... **Maarten Schmidt**, executive officer for astronomy, California Institute of Technology, to chairman, physics, mathematics, and astronomy division at the institute.... **Joel Mandelstam**, professor of microbiology, Oxford University, England, to chairman, biology department, Washington University.... **G. Robert Mason**, chairman, surgery department, University of Maryland School of Medicine, to head, neurological surgery division at the medical school.... **John P. Conomy**, former assistant professor of medicine, Case Western Reserve University School of Medicine, to chairman, neurology department, Cleveland Clinic Foundation.... **Albert H. Adelman**, manager, organic and structural chemistry section, chemistry research department Battelle Columbus Laboratories, to manager, chemistry research department at the laboratories.... **M. A. Preston**, professon of physics and applied mathematics, McMaster University, to chairman, applied mathematics department at the university.... **Saul I. Gass**, former vice president, mathtech division, Mathematica, Inc., to chairman, management science and statistics department, University of Maryland.... **Imre Zweibel**, professor of chemical engineering, Worcester Polytechnic Institute, to head, chemical engineering department at the institute.... **Claes G. Rooth**, professor of physical oceanography and atmospheric science, Rosenstiel School of Marine and Atmospheric Science, University of Miami, to chairman, physical oceanography division at the school.