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DR. GILBERT L. COREY

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INTERVIEW

Q: I am sitting with Dr. Gilbert L. Corey in Moscow, Idaho, and we are conducting an interview for the US Foreign Assistance Oral History Program. Dr. Corey and I first met in Washington in the Technical Assistance Bureau during the 1970's when he was the Agency's Senior Officer, Advisor, Consultant and leader, in general, in our irrigation programs and, particularly, in the small farmer irrigation programs. Gilbert L. Corey is known to his friends here and elsewhere as Gil, and we can start like that.

Gil, the program asks that you give us a background on your family, on your education and subjects of major study and interest, travels and early work experience aiming at bringing out those aspects of those experiences, that help explain the evolution of your interest in international development. So I turn it over to you and you'll start in.

Early years and education

COREY: Thank you, that's a big order. I grew up in a large family on a western Colorado farm and I've always said that it was a farm that operated similar to many farms that I was able to see in the dryer parts of the world in lesser developed countries -- very poor soils and we were dealing with salinity and alkalinity all the time. I had a good background and, since I was the ninth child in a family of ten, my parents were a little better off at that time, and were able to send me to college. I always fancied myself as becoming an engineer because I thought surveying would be a good field so I took Civil Engineering and went to Colorado State University. After a couple of years, World War II caught me, and I spent three years in the army before coming back to Colorado State and finishing my degree in Civil Engineering.

At that time, Colorado State initiated a master degree program in irrigation engineering, and since I grew up on a farm and my father had me irrigating with a shovel from the time I was ten years old on, I thought that sounded like a good program, so I took that master's program. There were several foreign students in it. At least five Indian students, some European and three or four from the United States. I finally graduated in that program and, by then, I was very much interested in agriculture as it related to engineering. This was in the 1940's and, as I said, I spent the entire 1940's at either in college or in the army. But Colorado State didn't have, at that time, a degree program in agricultural engineering. I met an Indian there who had graduated from Purdue University and he had a B.S. in Agricultural Engineering. That's the first I had ever heard of it and I thought, "my goodness I've taken the wrong field."

Beginning work in irrigation engineering - 1949

When I started looking for jobs, I remembered that the University of Arkansas and the University of Idaho had programs on experiment stations where they wanted an engineer with an irrigation background and education to do research. At the same time, I wanted to get married and finally decided that I liked to come to Idaho because it was doing research at the Aberdeen Branch Experiment Station. I grew up in a small town and I

would be working out in the fields with farmers. So, my wife and I got married in 1949, and moved to Aberdeen, Idaho, where I worked for five years on an experiment station doing research on irrigation of potatoes and beans and so forth.

We liked that work very much but I felt that I probably shouldn't plan on spending a full career in Aberdeen, Idaho, a small town. So when an opportunity came to work for the Agricultural Research Service in Los Angeles, under a person who had his name in the textbooks and had done excellent work in the field of irrigation engineering, I agreed to change jobs. We went to Los Angeles and I worked with the Agricultural Research Service for a while. I felt so confined in the city of Los Angeles - my office was on the 14th floor of the Post Office Building - that after two or three months I started looking for another job. The University of Idaho called again and said they had a contract with - I can't remember the name of the Agency - ICA, I guess. The Agency for International Development, whatever the name was. In South America they called it "El Servicio."

Beginning international development work - December 1955

The University of Idaho had a contract with ICA to assist the agricultural universities in Ecuador with improving their research programs. The contract called for an irrigation person. In order to get out of Los Angeles and back with the University of Idaho, we took that job and went to Ecuador in December 1955. I spent two years working with the university at Guayaquil. The university contract was serving both the University at Guayaquil and the university at Quito. After two years the University of Idaho terminated the contract because they felt they were not doing a good job in fulfilling the terms of the contract. My experience much later over other parts of the world made me realize that the University of Idaho was very successful in that project, actually, because we did very good work at one of the universities and one out of two is not a bad record for any development project, in my opinion.

Teaching agricultural engineering at University of Idaho - 1957-1970

The University of Idaho had an opening back at the campus, and I came back here to Moscow in a teaching position in the Department of Agricultural Engineering: I was in charge of teaching the irrigation-related courses and the irrigation research program. By then we had one child, in fact our first daughter went to Ecuador with us and attended first grade in Ecuador where she had to speak Spanish because there were no English-speaking schools there. So she came back not very proficient in English. We stayed here in Moscow for the next thirteen years where we had two more daughters, and I became head of the Department of Agricultural Engineering. I should say that after our experience in Ecuador "El Servicio", as it was called down there, the USAID program, wanted to hire me to stay in Ecuador. I was intrigued by that but my wife and daughter didn't think it would be a good thing, so we came back to the United States, but that gave me a taste of the foreign work and I really enjoyed working with people of different cultures. I don't know why this is, but I did.

Back at the University of Idaho, in early 1970, I was head of Department and fairly well frustrated with my job. That was the time when students were protesting every little thing and I felt the faculty were protesting also. I was getting disenchanted with university work, when I received a call from someone at Colorado State University asking me if I knew anybody, any engineer, that might want to go to Pakistan to help out in a project they had obtained, through contract, with the Agency for International Development, and I told them yes, I knew somebody, and it was I.

Assignment in Pakistan - 1970-1974

I was selected by Colorado State University to go to Pakistan as Chief-of-Party on the project. I didn't know much about Pakistan, but I had an opportunity to go over there to look at the project, and decided to agree to go for two years. I took a leave-of-absence from the University of Idaho. The two years became four years, during which I resigned from the University of Idaho.

Managing research and technical assistance in the AID Technical Assistance Bureau - 1974-1981

After four years in Pakistan, the Agency for International Development invited me to join the Technical Assistance Bureau as the Senior Water Management Specialist. During the four years in Pakistan, the Colorado State team had developed a project that proved to be highly successful. My duties at the Technical Assistance Bureau in Washington, D. C., included being in charge managing research and technical assistance programs with US universities. I also provided technical advice to USAID Missions in the field of irrigation. It got to the point where I was doing a lots of traveling assisting with project evaluations and project design. I was traveling to South America, in Asia and in Egypt after the programs started there. I was getting so much travel it began to bother my family. The last year, in TAB, I was probably gone half of the time overseas. I started looking for opportunities to move back overseas and the Agency wanted me to go to India, at one time, and the Philippines at one time, but they never seemed to be able to accomplish the transfer.

On loan to the World Bank in India and then back to Pakistan

One day someone in the World Bank called me and wanted someone's address because they needed a couple of engineers for India. As a result of that, I was able to transfer to the World Bank and went to India for four years "on loan" to the World Bank from USAID. Technically it was called a "transfer" where a person working for the US Government can temporarily transfer to an international agency for a period of time. That was one of my most satisfying experiences in the field of irrigation. India is such a large country with so many different types of irrigation systems and problems. I went there for two years and then was extended for another two years. I was not looking forward to coming back to Washington to my old job, because someone else had filled it. However,

according to the terms of the transfer the Agency had to keep a job open upon a return from a transfer.

In the meantime, the University of Idaho, again received a contract with AID to assist Pakistan with improving some of their research programs in water management and irrigation. They asked me if I would come to the University to head-up this project. I jumped at the chance because this gave me a chance to come back home and to finish my career with the University of Idaho where I had started. It turned out that the USAID Mission in Pakistan didn't want me at Moscow, they wanted me in Pakistan. So we moved from India to Pakistan for another three years. After that I was old enough to retire and did. I have done some consulting in various places since then.

Q: What year did you retire?

COREY: I retired in 1990.

COREY: I gave you more than you wanted.

Associations with Latin Americans and Indians in Colorado

Q: No. Not at all. And I am going to stop the interview now. What is the word, ----- if we can find the politically-correct word to describe the group. When you were growing up in western Colorado did you rub elbows quite a lot with either immigrants or other Americans of Latin descent or Indian descent/extraction.

COREY: Yes, very much so. Because the nearest neighbor to us, at the time that I was in grade school, was a family who considered themselves Indians. I think the community considered them, at that time, and called them Mexicans. They were certainly of Latin extraction. The mother did not speak English, she spoke only Spanish, and there were four boys. At that time, in my family, there were only three of us children at home. My brother and I played daily with our Spanish American friends. We were in their home a lot and their mother was my second mother, even though I could not speak her language and she could not speak mine. She took us in. Her early death was a devastating blow to all of us. Definitely I was associated with people of Latin extraction. Any time my father needed to hire anybody on the farm it would be either somebody from that family or a relative of theirs. And my father was always very considerate of the Latino people and I am sure he taught me and the rest of us children to respect them and not to look at them as any different from ourselves, even though many of them in western Colorado, at that time, were quite poor. But they were really good people; to this day I still think they are some of the best people.

Q: Well, thank you. I think that was bound to have influenced your mental set when you went to Latin American for the first time.

COREY: Yes, it made me also want to take Spanish in high school. I took all the Spanish courses I could. So when I got to South America I was able to converse and I even studied Spanish later on. During my time in USAID I was able to go to Latin American countries and on my own go out and converse with the people. So it became something that was positive for me.

Q: Absolutely, it makes an enormous difference when you have that capacity to speak, at least the lingua franca of the country, even though there are many Indian dialects, I am sure. Well now, you said to me that you took particular pleasure in thinking about - you used the word pride - in thinking about your career, in the things you have been able to stop, and I think it would be wonderful for you to enlarge on that. Then I would like to go back over with you on some of the country by country experiences that we don't cover in that discussion. So, what were you proud to stop, why were you proud to stop it for them?

COREY: I don't know how to approach this, but at least somewhere in this interview I need to talk about my first experience in Pakistan.

Q: Let's just start right there.

Working on contract with CSU on irrigation research in Pakistan

COREY: As I said, Colorado State University had a project with the Technical Assistance Bureau in Washington, DC, to do research that would improve irrigation management on farms worldwide. This was a project that was designed by somebody in Washington and given to at least two universities: Utah State and Colorado State, maybe there were three or four. There was a consortium of western universities. This was a rather vaguely and certainly a broadly-defined research project. Upon arrival in Pakistan I immediately looked at the research objectives. The objective was to improve irrigation management worldwide, and right away, I knew that was too broad for me because I had not been able to do it in Idaho in the five years I had worked on irrigation research there and CSU had only a five year project. In designing this project, Colorado State chose Pakistan for a test country for some reason, I don't remember and also Vietnam was a part of the project. Anyway, I was only interested in the Pakistan part. AID allowed a team of Colorado State people to go to Pakistan who along with Pakistan government officials and the USAID mission designed a program that would be this research project. I had nothing to do with that. I didn't come along until after the design phase. Part of the design called for fielding a team of agricultural professionals in the country. That is where I came along to act as Chief of Party for the program in Pakistan.

When I got there and found out what they had designed and started talking to the local people with whom they supposedly had designed the project, I found that the Pakistan Government really didn't care much for what we were proposing to do. I really didn't either. When I first arrived in Pakistan, I was there on my own, there were no other Colorado State people there. The Mission accepted me, gave me all the help they could give, gave me an office and secretarial help, but my funds were coming from Colorado

State University through the centrally funded project. So it was a quite different from the usual AID Mission project. It was, I believe, a beginning of this type contract work. I was the only AID contractor in Pakistan at that time. In contrast when I was there in the 1980's, there were probably a hundred contractors doing work for the USAID Mission there.

Q: Yes, the point is the change in project implementation from having a large number of highly qualified or the best experts on AID's direct-hire role in contrast to having those experts brought in through university contract and not on AID's direct-hire role. You were in Pakistan, you look at the thing, you and the government thought that was not well designed.

COREY: Well, I had one project working with the Agricultural Engineering Directorate in Pakistan, it's an agency much like the Soil Conservation Service in the United States. It was that type of an agency, and the project that had been designed was for us to lay out some terracing on farms, on that research farm, and try to determine what size terraces farmers should use for irrigation. The University, the principal Agricultural University in Pakistan, was in the same city, which by the way had been helped by Washington State University over a period of ten or so years. When I talked to the Vice-Chancellor of that University he said: "We are not going to be involved in that project, you haven't given us the lead role". So right away I became aware of the politics of working with agencies in this foreign country and I might add on a program that was designed by individuals not well enough informed about local conditions.

I then spent a lot of time... in fact, I had a very good friend in the USAID mission who was assigned me to and he told me: "You go out and look at these farms and see what needs to be done, see where you can do some good with your research program". So I spent considerable time walking farms over. At first I went to a local research station and told them what I wanted to do and they first sent someone with me to walk along the irrigation system covering hundreds of farms. After a few days they didn't have to send anyone with me. The farmers recognized that this foreigner was around looking at things. I realized later, that it took a lot of courage for me to do that but I didn't know any better. I was walking to backyards of farmers and I remember I took my shirt off because the temperature was 110 degrees and that is something I would never do in that society again. But anyway, I learned an awful lot about how the farmers were irrigating. What I was trying to do in my research project made no sense whatsoever to these farmers. I was finding that the irrigation borders that I was testing for size back at the Directorate might be ideal for irrigation efficiency but the farmers couldn't possibly use this technology because their farms were too small and border irrigation was not really the type of surface irrigation they should be using. Since, I was in Pakistan for just two years and I had a job back at the University of Idaho, I decided that I was not going to do what they had assigned me to do. I am going to go out here and develop something that might be more useful to these farmers. I was getting support all the time from the AID Mission, because as any good Mission they were looking for good projects.

The way the irrigation takes place in northern Indian and Pakistan is different from anywhere else that I've been in the world. They have a huge canal system with not enough water in the system to cover all the land that it serves. So it is a rationing system. They have developed a very interesting way of rationing water, of giving water to farmers turn by turn and in an amount according to the size of their farm, which is the way we ration irrigation water in the US when it is in short supply. We would give you your share depending on the size of your farm. The problem they had was that these farmers owned the last two or three miles of the irrigation system. The Irrigation Department just delivered water to groups of farms and let the canal run full all the time. The farmers just passed the water around from one to another. The ditches serving the farmers were in such horrible condition that the last farmer on the ditch was only getting maybe a third as much water as the first one. They assumed he was getting the same amount because they rationed it by time. So I said, if we could just clean this ditch system. So the project then became how to get that done in this society given how they operate? It took me two years to develop a program to make the first ditch. It was such a good experience for me, I was allowed to do this and had to work with the government to get them to do it and I had very little money to spend on the actual field work.

This was the time when there was the war between India and Pakistan over Bangladesh, when Bangladesh was created. The AID Mission in Bangladesh had some money that would be lost and I was told that if I could get some program going they would set aside some million rupees that we could spend on this project. My goal I had decided by then, should be to make one of these farmer owned ditch systems right. How to do it? At home we would put a ditcher on a tractor and go out and clean it. But here we had one hundred and fifty farmers and agencies that had to provide clearances. We decided that we would brick line the channel because bricks were cheap and construction with them was common. I remember that I finally got a Research Station Director interested in the project but only after measuring a lot of water and proving that the last farmer was not getting his share. It was amazing to me that they couldn't see it but they couldn't. He got involved and he saw that he wanted to do it. He asked: "How should be design the cross section"? I said: "Do them anyway you want to, but use standard design procedures for your government". I didn't care what it cost. I knew that, if it was successful, we could later develop the most economic method. It turned out that they made this model system with thirteen inch brick walls.

Q: Dirt?

COREY: No, bricks. That was the specification for irrigation channels from the Irrigation Department. Later it was found that 4-inch walls were sufficient. But getting approval for that simple project was time consuming and frustrating. The engineer in the government of Pakistan that had to approve the program, much later became, and is still is, a good friend of mine; but at that time he said: "We cannot spend that much money on just one ditch". That was bothering him. How would it look to one, in his position, approving something that was going to spend that much money, just on a research project? In the back of my mind, I just wanted to do it to prove to him that if they had this system it

would make a world of difference to the farmers. As it turned out we got approval to do this. I should point out that all the time the Technical Assistance Bureau back in Washington was on my back for not doing research. I was just cleaning a ditch and so forth, but I would tell them, I didn't care. I felt it was going to do some good for these farmers and it was research, something that hadn't been done before. The result was that we got this one ditch system finished and it led to many other problems. It led to problems for those lower farmers. They never had so much water in their life and didn't know what to do with it. So then we had to create a program at the university to teach farmers and extension people what to tell the farmers when they had more water.

Q: The university being in Pakistan.

COREY: Yes, Pakistan Agricultural University. So the program became something I was very much interested in. That is why I stayed another two years, to get this research program going. By then Colorado State University sent three more people to Pakistan, so we became an office with an economist, an agronomist an irrigation engineer. At the end of the period when I left, after the four years, USAID was beginning to see this as a success. We went from that first ditch system to another one. We had to organize the farmers because they had to help build this ditch. That was another big process because they didn't like it. There were a lot of trees growing on the ditches, and being good Muslims they didn't want to cut any tree down. Finally, they got convinced, and after we made one, they just blossomed and USAID decided to make a project to assist the government. The government then created an agency, actually, to build water courses. It is still there getting funds from the World Bank, and from the Japanese Government. USAID projects are finished now, I guess, but there have been millions of dollars put in into this program because there are, I don't know, one hundred thousand of these water courses in Pakistan. So it made a great difference.

I was able to go back there 10 years later on my next project and see the difference and it is something that I'm really proudest of. The reason that it was successful, as much as anything, is perhaps the fact that I was there for two years to really design that project. I had nobody bothering me, nobody pushing deadlines, I had no money actually. But I was working with the people to see what had to be done, how could it be done. I have thought many times since, that projects are often designed by teams going out and, in one month, working with local people, design a project. Usually not enough time is taken to really understand the problems the project proposes to address. If we had the time to place an expert into a place where he could observe the local conditions over several weeks or months projects might end up with better designs. The Pakistan project has been written up several times as a success. Most of the write-ups I don't necessarily agree with because they try to make it too complicated. I have never written one but the process was a simple thing actually, somebody went to a place and had time to see what the major problem was and attacked it, and attacked only the one problem. We didn't try to solve any other problems for the farmer. Solving that, as I said, led to some other problems, but it's the way development takes place, actually. Development is an ongoing program

Q: That's a great story.

COREY: That's when I learned also that you can help somebody only on their terms. Because getting approval, something I assumed would come easily, no problem, they would just love this..... I ran into this at other times too, in my last project, in fact, we did one program that gave farmers the same amount of water that they were getting before but it gave it to them twice as long. So they essentially got twice as much water through a pumping program that we designed. But the farmers were not necessarily happy, they said the water was still a small amount.

Q: So interesting. Well, tell me in terms of other things, what you did was you stopped what had been designed, looked at what was really needed. It was redesigned in terms of the interest of the host country and of all the people and the institution. You mentioned earlier the World Bank. Now, tell us a bit about it.

Supervising World Bank irrigation projects in India - 1981-1985

COREY: Okay, the reason the World Bank needed people in India was that the World Bank provides loans to many countries, but in India at the time, this was in early 80's, the programs in India were very large and there were many in the field of irrigation. So contrary to the way the World Bank generally works, they wanted to put several technical people in India. In the World Bank system of operation, you must go out and supervise a project every six months. There must have been twenty projects in India in irrigation, needing supervision every six months. Traveling from Washington, DC didn't make a lot of sense. There were four or five of us in New Delhi to do this. I was selected because of my experience beforehand in Pakistan and in AID, Washington -- and I had been to India on project design and evaluation for AID -- so I was known to the people in the World Bank in India.

Based on my experience, the first thing my supervisor wanted me to do, when I first went to India, was to review their research program. The World Bank in India had contracted with several consultants to do little pilot research programs around India.

There must have been three or four such programs in India. Some of the engineers in the Indian Government didn't seem to think some of the research programs were relevant. So, I was given a rather tough assignment to do this review because they were pet projects for whomever the contractors were and the contractors were not residents in India. They would come every three or four months to see how things were going and they had agencies in India operating these projects. I was allowed to spend, I don't know, probably three months reviewing these projects, going out in the field, seeing what they were doing and seeing if they made sense.

Well in India, after my experience in Pakistan, I was able to better understand what the farmers' problems with irrigation more readily than, I think, somebody that hadn't had that experience in Pakistan. Certainly I knew the Pakistani irrigation system, which is also

a part, as I said, of the northern India system. What I found and what I wrote in my report was that a lot of the research that was going on did not make sense at all for the Indian system. One researcher was trying to make it possible for a farm, through modern devices, to determine exactly the moisture content of the soil and the evapo-transpiration rates of its crops. He was able to put the exact amount of water needed on those crops based on evaporation, evaporation that he had calculated using standard formulas which relate evaporation to measured weather parameters. Immediately I looked at how does the farmer get his water. Well, he got the water haphazardly, through a system where he had to bribe people to get his share. How could this expand to even five farmers, to say nothing of all the irrigation system? So I reported that the project didn't make any sense. In another case I found that individuals in the World Bank were trying to get the Indians to install the Pakistani irrigation system in India. As I said, the Pakistan system is a system deficient in water, maybe only half enough water for the land it commands. I am not complaining about that system; it is a good system for the condition where there is lot of land and not enough water, but in the many systems of India there is plenty of water to cover the land. And, they were trying to put that system in all of India. In fact, the central Government of India had passed a rule that it should be installed all over India, which was wrong, wrong. I finally got that stopped also .

Another project that was interesting was being conducted on a large irrigation canal system, the Rajasthan Canal (I guess they now call it the Indira Gandhi Canal). The pilot project that was being operated by the Bank and being championed as a great success. The canal that has an erratic supply of water, which means that sometimes the canals are full and sometimes not - maybe half the supply - because the canal system is fed from the Punjab in India and the Punjabis do not necessarily always pass the same amount of water down to the Rajasthanies. So the man who designed the project took one branch of the canal system and he was going to make this one reliable. He was going to take the fluctuations out of this one branch. He gave them less water but they are going to know exactly when they'd get it. They were to get, say, only nine irrigations when everybody else would probably get twelve on the average but we are going to know the dates of irrigation. I was amazed that I could only get one person in the World Bank to agree with me that this wouldn't work either. It will work for the one branch but you cannot spread it because you cannot take the fluctuations out of the canal system for all the system. You just can't do it unless you store water some place. The Indians themselves knew that. I would talk to them, the chief engineer- - yes, he knew that, but this is working, the World Bank is happy -- and so the next thing I know they are going to do it to another branch. They were going to expand it and I went to ask to the engineer (I had nothing to do with this project, other than to go and look at it and tell them what I thought.) Well, they tried it in another branch and it was probably partly successful.

Well, the last thing I heard before I left India, was that the project had failed because the other farmers had gone to the head of that pilot canal with their clubs and other weapons and carried out what they call a "rasta roko" which means they closed the road. They would just sit there and would not let anybody pass. They said: until you change this system we are not going to move from here. So the farmers put a stop to it. Because they

could see that it wasn't fair. It's amazing that you can see these kind of projects going on and is basically because... as the Governor of Oregon once said: "Man is not smart enough." Not enough experience and knowledge about how things work, I guess. So that was another project that.....

It was also interesting for me in India working for the World Bank, and of course, I had friends over in the USAID mission. At that time, the World Bank and USAID were trying to operate more cooperatively and we got some things going. One project that I was involved with in India involved research. Typically what the World Bank would do in an irrigation project was to have a big project that spent a lot of money on lining canals or other construction. For example, maybe a hundred million dollars project with ninety eight million dollars for construction and two million dollars would be to do a little research, pilot studies. AID got in that kind of mode a little bit too. Well, the problem with that is that two million dollars is a lot harder to manage than the ninety eight million dollars for government organizations that are in the business of construction. There is not the problem of making it all ethical and everything like that but these little research projects were just causing havoc with these people because they didn't know how to do it. You have an Irrigation Department doing a research project. Well, I would always tell them: hire the local university and get them to do the part of the research that you can't do. In one of the projects that I was managing for the World Bank I went to the project and said: We are going to have the USAID project people and the World Bank projects people here and we are going to go all over this research and see what you are doing. I was amazed to learn that USAID, in their project, had called for some of the same things that the World Bank had called for. We had two organizations independently doing the same thing with different sources of money. So I suggested cooperation they were very happy to see this because they were under the impression that they had to keep the programs separate. They knew that someone else was working on it but mine is USAID, and yours is World Bank....

Q: They and the Indians?

COREY: Yes, the Indians, they would not go and rock the boat for, I assume they felt they would lose something if it became known that there was duplication. But it was a lot of fun.

Q: Dr. Corey and I were chatting as we turned the tape over and he said he didn't want to be seen as too critical, but I said to him he ought to be as critical as he wishes. So I turn the microphone back to Dr. Corey and his comments. Dr. Corey.

Observations on AID direct-hire versus contracts for technical assistance

COREY: When I was in Ecuador in mid-1950's the Agency for International Development operated much differently than it did later on. At that time the mission in Ecuador had, I don't know the number, but five or six direct-hire people in agriculture. Many of them in later years became good friends and they were operating the agriculture

program for the Bureau. During my last assignment in Pakistan with USAID, as a contractor, we must have had fifty contractors operating the mission program in Pakistan. So it went from direct-hire, at least in agriculture...

Q: And almost no direct-hire technical people?

COREY: No, I would say no. Not almost, I would say no.

Q: None?

COREY: None, that's right.

Q: What's your sense of that? What's the significance in terms of the programs?

COREY: Well, the problem with it and I ran across this in my work in the Technical Assistance Bureau, as I said, I became involved with a lot of mission work because I was willing to go out and help missions. I felt that was my job and often bureaus would ask me to review a report that some contractor had done. I can remember on two occasions, I reviewed these, wrote a report for the Africa Bureau one time, Asia Bureau another time. I was very critical of the contractor. I can always remember my final sentence on one of them was I could had done this in four days here sitting at my desk in Washington. The result of that was nothing. In fact, one member of the Africa Bureau told me: Well we can't do anything about this; if we did we would not be able to hire this contractor again. Of course, that only gave a piece of information on how the system works. It's terrible, I thought. I thought it would be my job to review these things in order that we get better contractors. But the whole thing boils down to the fact that if you don't have people who can recognize when a contractor is doing a good job, how can you do your work through contracts? And I think that this is true of not only the Agency for International Development but is true of more than one organization in the US Government. I can always remember when the Department of Energy was created and in the creation of it there were millions of dollars for research and nobody to monitor the research programs. And I know this was a problem for people in the Department of Energy. So to think that you can do everything by contract..., in fact, I'm sure there are contracts that are made to keep track of contractors. It is like the university's committee on committees. It's not a good way to go I don't think.

Q: For since is that the 1950's and early 60's model of aids functioning with large, thousands of direct-hire, technical people probably produced more relevant results than the system which began in the middle later 60's in reducing our direct-hire staff and increasingly relying on finding contractors, both the universities and the not-for-profit and for-profit contractors to do the work instead of direct-hire personnel. Your sense is that the direct-hire approach produces more relevant results or am I putting words in your mouth.

COREY: Well, yes I believe it would be more relevant, but ideally it would be somewhere in between, I think. To me the people that ought to be in international development should be our best minds in this country. I often think they are not, however, because you are trying to spread your knowledge and technology around the world and because of the cultural differences it is difficult to do. It's okay to do contracting if you know exactly what you want and can't do it yourself, but to do contracting just for the sake of lowering the number of direct-hire you have so you can say that you've cut down the number of people is not conducive to getting the best work. I do think that you can have too many direct-hire. There are a lot of things that can be contracted for but you got to have somebody on your direct-hire staff that can design a good project, get a good contractor and see to it that the contractor toes the line and does the work.

I feel also that ...and of course, politics is involved in the whole thing, and there is no agency in the US Government where politics play a larger part perhaps than USAID because it has no constituency in the population other than contractors.

Q: Sorry, you were talking about or started out by saying you needed a middle ground...

COREY: I think that the universities got involved and I was in Washington at the time when whatever the law was passed (creating the Board for International Food and Agricultural Development - BIFAD) that the universities must be used more. At that time I got a contract book from a friend in contracts and the universities were very much involved even before the Act that created more involvement. I think the universities were used too much and were asked to do things that the universities are not capable of doing. The university is a teaching organization, a research organization, and to think that a person can teach one to do something and still be able to do it and implement a project is quite different. I felt all the time, and you know I came from a university environment, that universities were used many times when they shouldn't have been and, of course, I put some blame on the university for accepting something that it shouldn't have been doing. But what the university would do is hire people who might not even be on their staff to go out and do these jobs.

Q: Must be a hire call?

COREY: Yes. But many of them have done that, of course. But when the agency doesn't have the people who can implement projects and don't implement them themselves, then everybody and mostly everybody in the agency becomes a critic of the work that's done by the contractor so it's hard on the contractors also. My last job in Pakistan was very frustrating, very frustrating, because of the criticism we got on everything we did. We had very little opportunity to really take the initiative to do something we thought ought to be done because of the project officer; all he had to do was criticize what went on. In fact, he was a local-hire which was again wrong in my opinion.

Q: He was a Pakistani national?

COREY: Yes, yes. USAID/Pakistan, that mission was operated by Pakistanis which, if you know Pakistanis, you know that's the wrong thing to happen, but it happened. As far as I was concerned, and all the other contractors felt the same. But that comes from contracting, everything. All you have to do is have a Mission Director and everything else is contracting. One person cannot keep track of all that because a lot of money is being spent and a lot of it being spent very unwisely.

Q: Do you want to make any comparisons in terms of other agencies like the World Bank, or like British Aid or others that you have seen? Did you see some better things done by them?. Something that we seem to be doing better or well? I know you are not saying anything we did was a disaster, that's not your point, not at all.

Observations comparing USAID and other donor development work

COREY: One observation I was able to make, and I'm sure that is nothing new, is that US Foreign Assistance Program puts a lot more of expatriates in the country than others do, and I've a hunch that's appreciated by the local people. Certainly, American aid is as respected as any other. Many times I've seen projects that I thought could be progressing faster, doing a lot better job, but the American projects would hold up to most any other. I've seen many other country projects that were just as disastrous as any I've seen in USAID. The Japanese are very good farmers in their small farms but I've seen them trying to take on projects in large dry land areas which made no sense whatsoever. The World Bank, of course, operates quite differently in the way projects are designed and the way they are managed. They are certainly no more successful than ours. One thing I've learned is that in order to get a decent project going in the irrigation field you have to have some construction because the construction is what the local agency wants. There are all kinds of ways that money can be made from construction in any country and so the tendency was, in my tenure in irrigation, to try to line all the canals and do this kind of construction work. Regardless of what the problem was, the lining of canals would probably solve it. That's certainly not the case. Many times people have proposed lining canals in Pakistan which makes practically no sense whatsoever. Those canals were designed by the old British engineers who were pioneers in sediment alluvial channel flow, flowing sediments through canals systems, and they have operated for a hundred years very well. That's one thing I did notice: that construction is very much a part of most projects.

That reminds me of another project I got involved with in India and it was building a new project in the central part of India on the Deccan Plain. It was going to be a two-million acre project finally. I don't know in what stage it is in now, but they were building the canal system. The tendency in India was, that if you give a farmer enough water anywhere where he is living he will grow rice. The overall design of that system was that there wasn't enough water for everybody to grow rice. It's rather dry on the Deccan Plain, and it was designed to grow other crops than rice. The dam had been built and the canal system was being started. I went through a paper on this subject regarding the way canal systems are designed. They put canal on a high ground and then make branches out to

cover all the land and they put a gate at every branch head so they can operate anyway they want to, never thinking about how they are going to operate the system before they design it. This is a mistake, I think. So what I did in this system -- I would like to go back and see if it's still going on -- was rather than put this huge gate at every node, was to make a weir system where the canal just flowed through the branches and down to farmers much the same as the system in Pakistan. This was the way it was supposed to operate. I got that started; farmers loved it and they couldn't grow rice. They didn't have enough water. I hired a Punjabi retired engineer to go down to southern India, which is something that doesn't happen very often, because the Punjabi will not feel safe. But he taught them how to design these open gates which were probably a tenth of the cost of what they were installing. I was able to do that early on in the project before a lot of money was wasted but I don't know whether it is still going on or not.

Q. Tell me what a "weir" is?

COREY: Well, this was just an opening in a water channel that is made permanent by concrete

Q: Always open and reinforced so it doesn't get plugged up?

COREY: Yes, and that's the way the Pakistan system operates. This system has caused a lot of trouble for people trying to go over and help them - because the advisor wants them to change this system. The Irrigation Department just operates the canal and their job is to keep the canal at full supply, and if it's at full supply all the farmers would be getting their water. And the Irrigation Department employees do not need to be experts in irrigation crops, they don't need to know about irrigating potatoes. But we had programs teaching these Irrigation Department's people how crops grow and all that, but they don't have anything to do with that, they just deliver water to the group of farmers and there is another system below that is operated by the farmers. I have seen many people try to change that system. In fact, to this day, I am sure, somebody is looking into how they can make this system so the farmer can call up the ditch-rider and get water when he wants to. Now, remember I said the system doesn't have enough water. It's like being short of food and letting everybody have all they want. It's impossible. But it's amazing.

Q: Gil, thank you. I am going to suggest we stop at this point and send in this tape and get it transcribed and back to you and also ask the reviewer in Washington to add any questions that come to their mind that they would like you to deal with in addition to this. So you have to interrupt your golf game one of these days and have a second installment. Thanks very much.

That was Dr. Gilbert L. Corey of Moscow, Idaho, speaking about his decades of experience with AID, for AID and about AID, and with universities and with the third world countries.

Irrigation systems in developing countries and international assistance -policy and technical issues

Q: This is the second interview with Dr. Gilbert Corey., one of USAID's outstanding irrigation experts. We're in Moscow, Idaho, on the 18th of July, 1996 at 8:30 in the morning each having a cup of coffee. Gil and I both live in Moscow. Gil has reviewed and corrected the transcript of the first tape. This is the second tape. It's purpose is to consider some of the issues that have occurred to him and to Haven North that ought to be addressed. We will start off now with Dr. Corey. Gil, I know there are some things you've been thinking about regarding irrigation and the whole question of how technical assistance is and is not benefited by US expertise. Will you just take off on that and cover the things that you consider important.

COREY: Okay. First, perhaps we should talk a little bit about why so much foreign aid donor and host country investments in irrigation. I believe it started, when the United Nations had a World Food Conference in 1970 in Geneva. During that conference irrigation was championed as a means of increasing food production in some of the poorer countries that weren't able to provide enough food for themselves. If one looked around the world, and even in the United States, you'd find, at that time, that many irrigation systems were operating inefficiently. Certainly, all of them were operating inefficiently in terms of the amount of water that was used to grow crops. Many were operating ineffectively in that some farmers were getting more than their share of water and some farmers were getting no water at all. So this became a popular way for donor agencies to help countries in agriculture.

Over the years, there's been two types of involvement, at least I like to view them as two types. One is helping with the hardware part of irrigation. This is the building of dams, the canals, the roads, laying out the systems, doing all those things that require construction. The other involvement was concerned with management of the system, in other words, how does it operate, how does it provide water to farmers in an equitable way? And here is where I think that USAID and World Bank have in the past and should in the future cooperate more. Governments like to borrow money from the World Bank, because it is multilateral as opposed to bilateral. The World Bank should be involved more with the hardware part, and USAID could be involved with more the software, the management, because supposedly, we have a lot of expertise in this country on irrigation management. Most all the western part of the United States has irrigation.

One of the problems that arises with this and has arisen in the past is that we have tried too often to put the US system on the foreign system. And this, in my opinion, has been a big problem. Not that the US system isn't perhaps the best way, but we've tried to have these foreign systems arrive at the US system of operation in a five year project. It's a slower process than that. There are big important differences between how the US systems operate and how most of the systems I've seen in lesser developed countries. For example, I don't know of an irrigation system in the United States that isn't owned and operated by the users, the farmers themselves. Some of the first ones were built by private

enterprise and many of them were built by the government. But the process that we've had here is that the government, as soon as the farmers are able to manage it themselves, take over the management of the system and pay back the cost of the system to the government.

In the systems that we're trying to provide assistance to, almost always, the system is built by a government agency, and it is operated by a government agency. Now we can argue that's not a proper way to do it, but that government has decided to do it that way, and there are many good reasons for this. Most places where we provide assistance, the farms are much, much smaller than they are in the United States. In some areas farms might not be any more that one or two hectares. US farmers have more land than that where their house and barns are. So, it's an entirely different system. In the process of trying to convert these to US systems, we got involved in our foreign programs of trying to provide farmers assistance, trying to organize farmers to operate part of the system, etc. In those cases, I think we didn't take enough time to look at the culture we were dealing with and to see how the farmers should be assisted in their organization. I feel that in any irrigation system, I don't care where it is, the farmers organize themselves in some way because they have to share water and they have to get along with each other. So there is an organization there already. But in many cases we've assumed there is no organization and have attempted to help organize them in a way we feel proper.

Another important factor, and I feel perhaps the most important as we look at irrigation systems over the world is the amount of water available for the farms or for the area to be irrigated. This, by the way, has been ignored by most technical experts that go forth with their advice. This was a surprise to me when I went to various places in the world to look at systems to find such a variation in the amount of water available per unit of land. I thought that they would all be designed like they are in the United States and there would be an ideal amount of water. This is not the case. The systems in northern India and Pakistan have perhaps one-fifth the amount of water that our system in Idaho or California would have. In other words, there is not enough water for the land that the area is serving. In Egypt, where the Nile Delta is one of the most productive irrigated areas in the world, the amount of water delivered per unit of land is perhaps three of four times the amount of water that we deliver in the United States. I'm pointing this out because this means different kinds of management.

What the Egyptian Government did in the 1950s because they had so much water was to deliver water to farmers at below ground level. In other words, the delivery ditches were below ground level so the farmers had to find ways to pump the water up to their fields. And of course, that's where they have these animal and human powered devices to lift water several inches to their fields. The government felt, that if you had to lift the water, you weren't going to waste water in your field, and you'd be able to irrigate properly. Foreign assistance programs have raised some of these ditches, and raising them with too much water causes drainage problems. There are those that say, "If you have irrigation anywhere in the world, you will eventually have drainage problems." And that's been

pretty much the history of irrigation everywhere. So many drains have been placed on the delta in Egypt in order to handle the excess of water that goes through the soil.

Q: Explain what you mean by that, Gil.

COREY: One needs to irrigate where there's not enough rainfall to grow a decent crop. If more water is applied than is necessary for plant growth, and most farmers will do that, the water table will eventually rise to the point where plant roots don't have sufficient room to grow. Then the water table has to be controlled. This has been controlled historically by providing tile drains, open drains or interceptor drains. In the case of Egypt, many tile drains have been installed with foreign assistance in the last twenty years. Pakistan and northern India is a good example of a place that can go a long time without this type of drainage because there is insufficient water in the canal system and the farmers are short of water all the time. Historically, it's interesting. When the British built the first systems in the Indus Basin, they provided sufficient water much the same as we would do in the United States. The first thing they found was that the water table was rising and they could see they had a disaster on their hands. So they, according to the research I did, decided they would either provide irrigation water for one season only and let the water table adjust itself. They grow crops year round in Pakistan. Or, they would provide less water than needed the year around. And, of course, the farmer sitting out there in the desert and using the canal system for washing their clothes, bathing themselves, even drinking-water, said, "Oh, give it to us water the year round." So, that's what happened in Pakistan and in the Indus Basin system. People going there twenty years ago thought they would be water-logged by this time, and it's no different now than it was twenty years ago. There are some areas that need drainage, but basically it's operated a long time without this drainage.

Q: Thank you. What would you have suggested if you knew what you know now and could apply it thirty years ago or twenty years ago? What would you have suggested to the USAID finance experts that they do in terms of going about this work?

COREY: If you look at USAID's history in this, it has changed in the proper direction, I believe, in that the USA got out as much as possible of the hardware business. When we go to one of these countries with the idea of providing assistance in irrigation, we find that the country will want to do a lot of construction type work because there's money in construction for a lot of people: for contractors, for builders, for planners and all the various aspects of construction. They like that, and it becomes a big project and generally the donors have big money to spend, so irrigation can become a good way to spend the money. As I said, USAID has gotten away from construction type projects but didn't get out of irrigation. USAID said we ought to provide the software which involves training, teaching farmers, teaching irrigation department people how better to operate the system. But what should have been done more than was done is better research. And by research, I don't mean anything sophisticated. I don't think we needed to come up with a new way to irrigate. We needed to understand irrigation itself better, and that is the problem today. We don't understand it well enough. The US Government was very instrumental in

creating the International Irrigation Management Institute. When you and I were in Washington, that idea was born as an institute to add to the various agricultural research institutes in the world. It finally got funded by a few countries, the US being one of them, and an irrigation research institute now exists.

Q: Where is it?

COREY: It's in Sri Lanka. It's interesting, they didn't want to put it in Pakistan who campaigned hard for it. One Pakistani individual was very influential in getting it started, getting it approved. But, the powers that be in the UN at that time thought that Pakistan was too dangerous a place, so they put it in Sri Lanka where there has been civil war ever since the Institute has been there.

Q: This is part of what's called the international agricultural research system. It's an international institute. These are located all around the world dealing with different crops, but this is dealing with a technology to provide better irrigation.

COREY: Yes, there's one also in Syria, I believe, that deals with dry land agriculture. There's one in India that is dry land agriculture, so all are not necessarily crop oriented. The first one was IRRI on rice in the Philippines. It has done very well and has created many improvements in rice production.

I believe, IIMI, the International Institute for Management of Irrigation, should have considered the entire world as their laboratory and looked at all various aspects of irrigation systems in operation to characterize them according to these aspects. As I said, almost every system has a different amount of water per unit of land. They certainly have different size of farms. There are many aspects that are important in management. Certainly if management has ten farmers for each one hundred acres, it's different than dealing with one farmer for each one hundred acres. There are a lot more problems. I have suggested that the Institute should do this kind of research to characterize irrigation systems according to the given situation, i.e., amount of rainfall, average size of farm, amount of water per unit of land, who operates the system and there may be others. With study, many systems patterns may develop that would give better information regarding the kinds of things that should be done first when considering improvement of any given system. Every case has to be studied and dealt with and improved in its own way. This is really the problem with irrigation in my opinion. I've likened it to a village. If you're going to go help a village, you've got to know the village. Since irrigation is such a complicated process, it's a problem. We do learn as we go, but we spend a lot of money doing it.

I suppose development is always that way, and certainly one can be critical and perhaps we shouldn't be because I've seen many irrigation systems in various countries which have improved a lot over the time I was involved. Part of that has been due to technical assistance of foreign aid, and, of course, a great part of it is also due to the farmers that are managing the system on their farms. They learn and they do pretty well. One thing I

always felt one needed to take with them when looking at a new system or any system actually, is the realization that whoever is operating is doing the best he can given what he knows and what he has to work with. So I think often times we've tried to give people assistance where they didn't need that particular assistance. We've put a lot of concrete in places that probably wasn't necessary, especially the World Bank has done this. The idea that you have an irrigation system then you should line all the channels. That takes a lot of money. A lot of it has not been done well. The linings fail, and then you have to rehabilitate the system. Much money is spent in the world rehabilitating irrigation systems. We've done quite a bit of that in the United States, but not near as much as we see in foreign countries, in these lesser developed countries. We know now how to build a system. One needs to just look at the Central California system which is our latest big system which operates very well, computerized and very modern, but we have a great deal of human input also. Some people feel that if you computerize everything and control the water automatically you can eliminate man or the human input from the management of the system. That is not possible.

Q: Gil, while you're looking at your notes, I don't want to get in the way of what you want to say, but if you could identify one or two places where you think there has been important and positive change on irrigation. I think it would be interesting for the record. You say that some places have improved and changed. Could you point to one or two that would particularly illustrate that?

COREY: Yes, I can. Over time things improve.

Q: Correlations but no causation on what's responsible.

COREY: India's an interesting case I believe. I went to India in 1981 with the idea that here was old irrigation. Irrigation started in the Indus Basin probably 5000 or 8000 years ago, so I assumed there would be old systems needing rehabilitation. India was growing in population so fast that they needed to build new systems and had large rivers crossing the middle of India with no development, building dams, and using the water to irrigate with or to create power. So, India was also involved in making new irrigation systems, so the donor programs, mainly the USAID and World Bank were lending money to construct these systems as well as to improve older systems. India has improved their methods by making lots of mistakes and doing better. The ones they are building now, at least at the time I left in 1985, are improved. They were doing some proper designs of systems and proper building, and they were operating them properly in a way that should provide efficient use of water and good production.

Many of their systems are quite different from their northern systems in Punjab. The Punjab irrigation system is the same system that Pakistan has where water is scarce. That system always has operated very well. Now I argue with a lot of my technical friends who believe that to be a bad system because it has insufficient water, but I've always felt that it's a good system because if a farmer has to be short of water, he will spread water, he won't get maximum production per acre, but he'll get maximum production per unit of

water. In fact, if one, and Cornell University did such a study, checked the crop yield per unit of water in some of our better systems in California he'd find that the system in northern India beats California. And that's really how we probably should be looking at irrigation systems rather than yield per unit of land. So many older systems all over the world, I don't need to say India, have delivered water very inequitably, and the donor agencies scream that it has to be equitable. I feel that we've placed too much emphasis on that. Life itself is not equitable in my opinion, and irrigation agriculture is very much like life. But if you have a system like one in Central America where I found farmers on that system who had a right to water from that system but had never received water and didn't know they had a right to water. Well that's too inequitable. But, there are many systems built by farmers that are designed to be inequitable. The man who got together, the tribal leader, whoever it happened to be, got everybody together and built the system. They gave him all the water he wanted because he was the man that created it. The Karez, or these systems where they dig tunnels into the mountains, they're called Kannats in Iran, are very interesting irrigation systems, but they're generally owned by the tribal leader and he can do as he pleases with them. It's an entire society that's built around this little bit of water that comes out of this tunnel.

Q: Where have things seem to have improved that you see?

COREY: Well, I guess so much has been spent by donor agencies in irrigation management and irrigation system construction that we've learned just from that exercise and countries are using it. There's a lot more training going on in this business--training the engineers, who happen to be the ones who operate and build systems, and training of farmers. It always works better if you get the local people involved because they know the culture. I've been surprised many times when asking farmers why they do certain things the way they do. Farmers have a lot of wisdom. They have more wisdom than anybody in any irrigation system because they're dealing with it, but some times they have superstitions and beliefs such that they won't do some of the things we think of they ought to do. I once asked an Indian farmer why he didn't spray and kill the insects that were eating up his beautiful cotton. He said, "Well, that's not my job. There's a higher being that's going to take care of that if he wants it taken care of." He accepts what he has and fears altering it.

Q: I note that you keep going back to your India experience and your Pakistan experience because they were important and illuminating. You learned a lot. Can you characterize in any way differences between those two countries, working in Pakistan or working in India? Essentially the same? Big differences due to their culture or their political arrangements or whatever?

COREY: They're a lot more alike than they would have you believe. Of course, Pakistan is essentially 90% Muslim but India may have as many Muslims as Pakistan.

Q: It's mostly Hindu.

COREY: Sometimes I felt in donor aided projects that money became the problem. By that I mean, too much money in the project. The objective becomes then to spend the money over the life of the project which generally isn't very long, and everybody is working in construction or whatever it takes to spend this money, when really the problem with the particular system might be more management than anything else. I had a good experience in India. After much discussion with colleagues, our supervisor said, "why don't you try to design a project that will spend less money but will be oriented toward management of the irrigation system or improvement of the management of the system." So, myself and a couple of others designed this project over several months. It took us quite a long time because we had to get the Indian input and World Bank and Washington input. It was designed such that the project could not spend more than a certain amount, I don't know what it finally ended up, but say no more than a hundred dollars an acre on this project and it had to be oriented toward management. The process was that several experts in various fields would go out into the system with the local engineers, local farmers, local politicians, whoever was needed, and study this system for a period of ten days to two weeks and decide what in management could be done to improve/ increase production, increase farmer involvement, or get more production out of the water that was there. I didn't think this project would be approved because of the fact that it didn't involve a lot of money. But, finally the World Bank did approve it, and it was approved after I left India, so I don't have experience in it's implementation, but the idea was that every system, as I said before, has to be looked at as an individual system.

One of the successes that I read about since leaving India was that of this very large system in Andhra Pradesh where the farmers were not growing the crops specified in the project design. It turned out that the government was operating the dam from this very large reservoir for power purposes and were not releasing water early enough in the season so the farmers could grow their rice nurseries. All they did in that system was change the operation of the dam and increased total production tremendously. It was a very large success. It didn't cost hardly anything, but it required people to change their minds on how they wanted to operate the system. In another case, they did nothing more than take the major branches of a canal system and make sure the proper amount of water went down each branch. In other words, they delivered water equitably to canal branches. That's not to say they that did it to individual farmers, but it took a larger unit than the farm, in other words, a branch of a canal. There were eleven branches on that canal and all the farmers I ever saw on the entire system were very pleased with the improvement. And certainly, individual farmers were not getting equitable shares of the water, but every one was getting water more reliably. That's the end of that I guess.

Q: The reliability factor you'd mentioned earlier, it may have not been on the tape because the tape stopped earlier than I thought it would. Would you comment just a moment on the importance of reliability?

COREY: Reliability of water makes a huge difference in agriculture. It's really the only difference between rain-fed agriculture and irrigated agriculture. With rain-fed agriculture farmers have to gamble that the rainfall will come at the proper time. We're living right

here in the best rain-fed area that I've every seen in the world. These farmers don't have to worry too much in the Palouse region of Washington and Idaho because the rainfall is here, there's plenty of it, and it comes at the right time and it always seems to stop in time for harvest. But, in most places there isn't that much rainfall and the farmer operates accordingly. He will grow crops that don't require very much water. In many places in the world, Africa, Asia, he will be growing some kind of grain that will mature maybe on only one good rainfall, and if the irrigation system is not reliable and he doesn't know when he can expect water, he will not change his rain-fed practices because he can't afford to. He'll have to grow crops that can mature and provide something for him on one good irrigation.

The ancient irrigation system of Egypt is worth looking at. In ancient times, that irrigation system resulted from the Nile flooding every spring or whenever it was, flooding the land of the Delta, created the Delta actually. That's beautiful soil. And so there was one soaking irrigation. The farmers would grow their grain on that one irrigation and that was it. And, that was reliable, but they did not grow sugar beets, and they didn't grow potatoes and things like that because they would need more irrigations than one. So reliability is the most important factor in irrigation systems. Just ask any irrigation farmer.

Q: Have you any further notes that you wish to speak to?

COREY: I don't think so. We might say something about the donor agencies insistence on having assurance of a workable repayment program before irrigation projects are approved. As I said, I think in most donor aided projects involving irrigation there's too much money spent because a lot of construction goes on that perhaps shouldn't go on. But, economists always feel that the farmer should pay for this entirely over a period of years. Many times, the farmers do not repay, but in getting projects approved there's a lot of discussion on this. I've always felt that it is up to that particular government that is borrowing money to do this. If they want the farmers to pay for it, they can make them pay, or if they want to put it on the general taxes of all people, that's up to them. To point out how sometimes politics gets involved, I remember we had a project in Haryana in India of lining small water courses. The project I spoke about in Pakistan had spread to India, and it's a big project there. The farmers were happy to repay and they were repaying, but the new Chief Minister came along and he said that farmers shouldn't have to pay. And of course, if the Chief Minister said farmers shouldn't have to pay, then they're not going to pay. That disturbed the World Bank, but I've always felt that we spent too much time worrying about repayment policies that were only marginally our business.

I grew up on a system in the United States where the farmers finally refused to pay, and there had to be a reassessment of the project. That occurred forty years after it was built. The government reassessed it and the farmers now are paying. It was built in 1918-1920, and the farmers are still paying for it to this day. Many things that the farmers have had to do in irrigated agriculture, such as level land, we in the United States have subsidized the farmers. We are still subsidizing it, yet we go overseas in these poor small farms where

we have land leveling programs and we want the farms to pay for it right now. I've always felt that wasn't right either.

Q: This is the opposite of your comment earlier where early technical experts tried to put the US system into a foreign environment where it didn't fit, this is not taking the lessons of the US systems when you go into a foreign environment. A basic point that you made earlier was that too often we would take that which we know works here and transplant it, trying to insure that it works elsewhere without taking proper account of the local situation. Gil, do you think that the technical experts in universities or in irrigation authorities who are called on to engage in technical assistance have changed their basic way of functioning as technical assistants, in other words, has the fraternity learned this lesson or are we still having to learn it each time we get new people?

COREY: We learn slowly, but there's a lot of truth in what you say. We have to learn and relearn because I feel that irrigation is looked at too simply. It's very complicated, and someone that's had a great deal of experience in one system in the United States may feel he knows all the problems that can be associated with irrigation. I felt that way too, and I know how long it took me, in Pakistan, to really see what they were dealing with there. I thought they were doing foolish things. I thought the farmers were doing foolish things and I knew the government was until I really understood. It took me almost two years. Later on, when I moved to India, I would see experts come out and they were going, in one afternoon, to look at this same system and decide how it worked. Of course, I didn't say anything other than "Welcome to it." I am the way I am because I saw so many systems over so many parts of the world. It is too bad that I am not a good writer and don't take the time to put this down some way.

I remember one simple thing I learned in South America, if you put a farmer on steep land, really steep, he'll irrigate efficiently. A simple concept, but everybody should know that, because if he doesn't operate efficiently and carefully manage his water, he'll wash his farm away. Yet I saw another good system in Bolivia where several farmers were out moving the water with shovels, a new type of application of water. They had no furrow system. They had no border system, but they were using good management in moving the water about. They started at the lower end of the field and moved up so that any waste was not really waste but was irrigating dry crops. I thought, "What a very efficient way to apply water, labor intensive but if one has the labor- " until it became lunch time, they all left and went to lunch, the water still running. I was sitting there watching an atrociously inefficient system. I've learned so much by seeing all these places that the only conclusion I could come to is that it's very complicated, and you've got to be careful when you try to help in that kind of system. You'd better know something about it, and my best advice is to study the system carefully before you decide what it is you're going to do to improve it because it may not actually need improving. Doing nothing is sometimes best.

Q: Well, I think that's a great note to end on, Gil. Thank you very much. I want to make clear for the record that Gil is about to go off and play golf. He does that very well. In

fact, he's the senior champion of the Moscow Elks Golf Club, and I simply watch in admiration as he hits the ball from the tee.

COREY: Thank you!

End of interview