University of California Bancroft Library/Berkeley
Regional Oral History Office

Walter Clay Lowdermilk

SOIL, FOREST, AND WATER CONSERVATION AND RECLAMATION IN CHINA, ISRAEL, AFRICA, AND THE UNITED STATES

In Two Volumes

An Interview Conducted by

Malca Chall

Berkeley
1969

VOLUME I

EDUCATION, RESEARCH, AND WORK IN SOIL CONSERVATION

1888-1947

THIS RECITAL OF MY MANY AND VARIED ACTIVITIES
DURING FIFTY YEARS OF STUDIES IN MANY COUNTRIES
IS DEDICATED TO MY WIFE
INEZ MARKS LOWDERMILK
WHO HAS BEEN MY CONSTANT AND HELPFUL COMPANION

TO OUR EXCEPTIONALLY FINE SON AND DAUGHTER
WILLIAM FRANCIS LOWDERMILK AND WINIFRED LOWDERMILK HESS

TO OUR FIVE BRIGHT AND PROMISING GRANDCHILDREN
SHARON AND KAREN LOWDERMILK
WALTER, ALISON, AND CARL HESS

WALTER CLAY LOWDERMILK

WALTER CLAY LOWDERMILK

PREFACE

The following interview with Dr. Walter Clay Lowdermilk was undertaken by the Regional Oral History Office in January 1967 at the request of Dr. David K. Todd, Professor of Civil Engineering, and Dr. Albert Lepawsky, Professor of Political Science, both of whom served as faculty advisors for the project. Professor Arthur F. Pillsbury, director of the Statewide Water Resources Center, agreed with their appraisal of Dr. Lowdermilk's significance in the area of soil and water conservation and made possible a starting grant from the Water Resources Center. The memoir was planned to cover Dr. Lowdermilk's more than fifty years of conservation and natural resources management, and to chronicle through his career the development of the soil conservation movement in the United States, many countries of Europe, the Middle East, Africa, China, and Japan.

As the project unfolded in its complexity and detail, it became apparent further funds were needed. Dr. Pillsbury made available two supplementary grants over the next fiscal year, which, with the Regional Oral History Office's own budget, covered the major portion of the work. Additional funding was contributed by the UC Berkeley departments of Soil Sciences, Geography, and Forestry. From the University of Wyoming's Western History Research Center came a check to aid in the indexing, from the Western Jewish History Center of the Judah L. Magnes Memorial Museum of Berkeley, funds for photographs. Private citizens, Dr. George Gordon and Professor Samuel Lepkovsky, added their personal donations.

Two years later the two-volume manuscript was completed, and Dr. and Mrs. Lowdermilk turned over their extensive collection of papers to the Bancroft Library for the use of researchers.

Willa Klug Baum
Department Head

31 March 1969
486 The Bancroft Library
Regional Oral History Office
University of California at Berkeley

LIST OF AGRICULTURAL INTERVIEWS

The following interviews in fields related to agriculture and resources management have been completed by the Regional Oral History Office. Where the interview includes a substantial contribution to more than one subject, the name is listed under each subject heading. Interviews are listed in order of completion.

The Regional Oral History Office was established to tape record autobiographical interviews with persons who have contributed significantly to the development of the West. The Office, headed by Willa Baum, is under the administrative supervision of the director of The Bancroft Library.

Agriculture and Land Use

Bancroft, Philip	Politics, Farming, and the Progressive Party in California. 1962
Hutchison, Claude B.	The College of Agriculture, University of California, 1922-1952. 1962
Miller, John A.	Brentwood Plan for Agricultural Labor. 1963
Camp, Wofford B.	Cotton, Irrigation, and the AAA. 1968
Cobb, Cully A.	The Cotton Section of the Agricultural Adjustment Administration, 1933-1937. 1968
Lowdermilk, Walter C.	Soil, Forest and Water Conservation and Reclamation in China, Israel, Africa and the United States. 1968
Swett, Frank	California Agricultural Cooperatives. 1968

Irrigation and Water Resources

Bartlett, Louis	Memoirs. 1957
Downey, Stephen W.	California Water and Power Attorney. 1957
Lambert, Charles F.	Sacramento Valley Irrigation and Land. 1957
Durbrow, William	Irrigation District Leader. 1958
Jones, Herbert	California Government and Public Issues. 1958
Mason, J. Rupert	Single Tax, Irrigation Districts, and Municipal Bankruptcy. 1958
Adams, Frank	Irrigation, Reclamation and Water Administration. 1959
Banks, Harvey	California Water Project, 1955-1961. 1967
Harding, Sidney T.	A Life in Western Water Development. 1967
Leedom, Sam R.	California Water Development, 1930-1955. 1967
Camp, Wofford B.	Cotton, Irrigation, and the AAA. 1968
Lowdermilk, Walter C.	Soil, Forest and Water Conservation and Reclamation in China, Israel, Africa and the United States. 1968
Packard, Walter E.	Land and Power Development in California, Greece, and Latin America. 1968

FOREWORD

SENATOR CARL HAYDEN

In all of my time I have never met a more interesting man to talk with than Walter Clay Lowdermilk. What he had to say was always worthwhile. I first met him in the 1930's when he was Assistant Chief of the Soil Conservation Service in Washington. I then learned that at the age of fifteen he came from South Carolina with his parents and that his father located a homestead near Willcox, in the Sulphur Springs Valley, Cochise County, Arizona.

I remember that he told me he was for three years a student at the University of Arizona, and then went to England as a Rhodes Scholar to obtain a degree in geology. Upon his return, he became a Forest Ranger in the Tonto National Forest in Arizona, where he had an opportunity to observe the damage done by erosion.

I listened with interest when he told me about the service that he rendered during a five year period to the people living in the valley of the Yellow River in China, by demonstrating that flood control was the only way to prevent starvation. With that background of experience, he was most helpful to me in securing the enactment of the Soil Conservation Act of April 27, 1935.

I had read it with interest and at my request there was printed in the Congressional Record of January 27, 1936, the text of an address entitled "Soil Erosion and Its Control in the United States," by Dr. Walter C. Lowdermilk, Associate Chief of the Soil Conservation Service, at the Third International Congress of Soil Sciences in London, August 7, 1935.

It is needless to say that I did not hesitate to call on him to assist me in the passage by the Senate of the Omnibus Flood Control Act of June 22, 1936.

In later years, I enjoyed talking with him about his experiences over a period of ten years in the development of a master water plan for the irrigation of land in the Jordan Valley and the production of hydroelectric power for which the people of Israel were most grateful.

Of the many men of distinction that I have come to know during my fifty-five years of service in the Congress, there is no one of them who has done more to make the world a better place for mankind to live by finding ways for the development of its soil and water resources.

March 28, 1968
United States Senate
Washington, D.C.

INTRODUCTION

Dr. Walter Clay Lowdermilk, now past eighty-one, has been a pathfinder in the development of the theories of erosion: nearly a half century ago he coined the expression, accelerated erosion, as distinguished from the geologic norm of erosion. Since then, his concern for the preservation and proper utilization of the world's land, water, and forests, has prompted him to conduct major studies in erosion, and to travel extensively to apply the results of his research to land use problems in the United States, Europe, Israel and the Middle East, Africa, China, and Japan. He is well known as the founder of the San Dimas Forest Experiment Station, and as the author of the important Jordan Valley Power and Irrigation Project.

This oral history interview became an extensive autobiography of Dr. Lowdermilk, yet in recording his life we were also chronicling the development of the soil conservation movement in the United States and the major areas of the world.

Dr. Lowdermilk was born in Liberty, North Carolina, in 1888, and grew up on farms in Oklahoma and Arizona. He went to Oxford as a Rhodes Scholar, studying forestry there with Sir William Schlich and with forstmeisters in the German forests. Following these years abroad, he returned to this country and worked for the United States Forest Service for a period spanning eighteen years, during which he took time off to serve with the Lumberjack Regiment of the AEF, to teach forestry and study erosion in China, and to work for his Ph.D. in Forestry and Geology in Berkeley.

The next fifteen years he was in Washington, D.C., with the Soil Erosion/Soil Conservation Service where he played a leading role in efforts to control erosion in the United States. As Assistant Chief of the Soil Conservation Service, he helped write the Soil Conservation Act, the first Omnibus Flood Control Act, and administered research programs aimed at developing land use measures suitable to the various geographical sections of the country. This background, during the years following his retirement from SCS, resulted in his appointments as a committee chairman on Truman's Water Resources Policy Commission, as a consultant to the Natural Resources Section of the United Nations Secretariat, and as a consultant on soil and water conservation to the governments of China, Japan, North Africa, West Africa, Yugoslavia, and Israel. His finding water in the desert community of Morongo, California, after his second retirement at the age of seventy, was a most interesting product of his years of study and action in behalf of the management of natural resources. Presently (1969), Dr. Lowdermilk is a consultant to the Save-the-Redwoods League.

These various stages of his career and the thoughts he had about them can be seen by looking at the table of contents. They have obviously

been many, culminating in honors and the sincere expressions of love and respect from countless people in different countries for the man who dedicated his life to bringing people into proper relationships with their land and waters.

One of the aims of this oral history has been to provide material which could be used by students in many different fields: forest conservation in America and abroad; the Roosevelt and Truman presidential periods; American foreign policy, particularly foreign aid; British, French, and Italian colonial policies in Africa and the Middle East; Israel; agricultural practices throughout the world; theories of administration. While this oral history contains so much material for different specialists, out of it emerges the picture of a man who refused to be boxed in physically or intellectually, and whose wide-ranging knowledge often enabled him to understand and help solve problems which baffled experts.

This refusal to be confined, coupled with his broad interests, might possibly be the result of Dr. Lowdermilk's background: his parents were pioneers, and he grew up on farms in the developing wide open spaces of the western United States. "I like the feeling of being a pioneer," he once told me. Another time he said, "It's quite something to get out and read the story that has been engraved in the land . . . all those things we've done to it. And then when you look at it from the point of view of growing foodstuffs for rapidly increasing mankind, it becomes a problem of highest importance. So to be on the front line of this kind of exploration is to me quite an exciting thing . . . I'm still on that trail and will be as long as I live."

From his early youth to the present, Dr. Lowdermilk has always had a drive to know, a drive to achieve, and a love of challenge. These drives have been given purpose and direction by considerable intelligence, creativity, and physical stamina. Such qualities could, of course, produce a hard-driving, machine-like human, but add to them the humility of the scientist, a reverent feeling for nature, a deep concern for the struggles of humble men, a sense of optimism in the face of defeat, and a different kind of man emerges.

Partly a reflection of his western American heritage, partly a reflection of his personal drives, since his days as a Rhodes Scholar in Oxford, he has carried in his notebook Rudyard Kipling's poem, "The Explorer," with its refrain:

"Something hidden. Go and find it. Go and look behind the Ranges--
"Something lost behind the Ranges. Lost and waiting for you.
"Go!"

Both physically and intellectually he has gone "behind the ranges" seeking the key problems besetting man in his continuous struggle to survive on this earth.

Such concern led him to the headwaters of the Yellow River--China's

Sorrow--to find out what caused the silt, for centuries responsible for floods which had beset the Chinese farmers. The significance of the erosion and the incredible gullying that he saw in Northwest China prompted him to spend a lifetime studying erosion scientifically in order to find ways to control it.

Without erosion, he reasoned, people could derive proper benefits from land and water, famine could be prevented, and men thus enabled to live in harmony with nature and with each other. He expressed this idea movingly in his famous Eleventh Commandment, which he dedicated to the pioneer settlers of Israel.

> Thou shalt inherit the holy earth as a faithful steward, conserving its resources and productivity from generation to generation; thou shalt safeguard thy fields from soil erosion, thy living waters from drying up, thy forests from desolation, and protect the hills from overgrazing by the herds, that thy descendants may have abundance forever. If any shall fail in this good stewardship of the land, thy fruitful fields shall become sterile stoney ground or wasting gullies, and thy descendants shall decrease and live in poverty or perish from off the face of the earth.

Despite his many years of hard work attempting to achieve the harmonious relationship between man and the land, this goal seems almost hopelessly out of reach--perhaps even more than it did fifty years. Dr. Lowdermilk is saddened by this, but not despairing. Even though he has witnessed what he believes to have been blunders on the part of the United States government and other nations in dealing with these problems; even though some of his own specific projects and plans have been ignored; even though for years he has seen and understood the problems of the developing countries and has warned that "civilization is running a race with famine and the outcome is in doubt;" even though he is disturbed that so much money goes for weapons rather than plows--he remains quietly optimistic.

For though his great hope is as yet unrealized, progress has occurred and Dr. Lowdermilk has seen many of his own dreams fulfilled. "It is unusual, but how gratifying," he says, "for a man to dream dreams, work hard to make them realities, and live to see them come true."

The Jordan Valley Power and Irrigation Project, his vision of 1939, helped pave the way for the State of Israel. In Israel, Dr. Lowdermilk experienced the joy of working with measurable success to control erosion and to help develop the land to utilize the benefits of the water that is available. And the grateful Israelis honored this special man who came to live and work among them by naming a Department of Agricultural Engineering after him. Here, he claims, he wrote his biography on the land, and it was here that both he and Mrs. Lowdermilk feel they lived the happiest years of their lives together.

No biography of Dr. Lowdermilk can ignore his wife, the very dynamic, intelligent Inez Marks Lowdermilk. She epitomizes the picture of the woman not behind but alongside the man. Her role as devoted wife and helpmate for forty-six years was cogently expressed by two speakers at the testimonial dinner honoring Dr. Lowdermilk in May, 1944. Abel Wolman, of Johns Hopkins University, said:

> The only thing I want to comment on with respect to them [his years] is that I do not know how he managed to pack it into the period in which he has lived, but I suspect that Mrs. Lowdermilk has assisted in the packing. She has covered the ground with him of course, and if I know the kind of wife that I understand she is, his life has been made simple. All he had to do was traverse the deserts, to cover the monsoons, but his baggage and his clothes I am sure were always in good shape and the stimulation which she provided is one of the reasons why he is here looking fresh and active and strong enough even to stand this ordeal.

And Dr. Kan Lee, Commercial Counselor to the Chinese Embassy, said:

> With the permission of the chairman and our honorable guests, may I take this occasion to pay a tribute also to Mrs. Lowdermilk, who, before her marriage, was engaged in pioneering educational work in China. I hope I am not wrong in saying that it was through her that her husband first became interested in the problem of soil conservation. She has helped greatly to popularize the valuable contributions of her husband. Much credit, therefore, must go to Mrs. Lowdermilk as a chief source of inspiration for Dr. Lowdermilk's soil conservation projects.

Mrs. Lowdermilk has the physical stamina equal to that of her husband and has been his companion and secretary on almost all the arduous travels. In addition, an astute observer of people, she has helped him to a deeper insight into people and places, which she often felt he missed while he was trudging through the fields concentrating on rocks, trees, soil, and water.

Never traveling without her portable typewriter, she wrote notes and helped with drafts of reports and articles. Thus Dr. Lowdermilk was enabled to publish prolifically, to tell people throughout the United States, Canada, Israel, and parts of Africa, what he saw and how he felt about it. Occasionally she was an author in her own right: in the early years of their married life in China, she wrote many articles for the Dearborn Independent about China and its people, based upon experiences gained from her years as a missionary in the remote regions of that country. While living in Washington, D.C., many years later, she wrote two radio scripts which told about erosion in China and the United States.

Inez Marks, the daughter of a Methodist minister, went to China as a missionary after college and planned to devote her life to this work. But she could not forget the student she had met in Arizona, and eleven years later, much to the dismay of her parents, she married the young forester and gave up active work in the church. However, she remained a missionary if by this is meant a person strongly devoted to a set of principles who attempts to persuade others to his position. Through her tireless assistance on behalf of conservation, both human and material, refugee relief, and Israel; through her efforts at the typewriter and on the speaker's rostrum; and through her gracious hospitality, she has helped persuade others to the position to which she and Dr. Lowdermilk have devoted their lives.

This is the kind of spirit, coupled with strong self-discipline and an indomitable will, which enabled Mrs. Lowdermilk to enrich this oral history with that major portion labeled Written Questions and Answers. Although in order to help produce it she had to give up many of the activities which she had begun to enjoy since "retirement," she never gave up the gardening, or the teas and receptions for friends in Berkeley and for the many visiting dignitaries from around the world. After the war in the Middle East in June, 1967, she added to her routine a busy round of lectures on Israel.

She has many interesting stories to tell about her life as the wife of a VIP in the capitals and the farm fields of the world; we only taped a few. We get further snatches in some of the reports and letters which she wrote to her family, excerpts of from which we have inserted in the manuscript. These personal accounts will be deposited in the Bancroft Library.

Mrs. Lowdermilk, at seventy-nine, is a tall, rather statuesque woman with brown hair and bright blue eyes. She dresses in the somewhat formal style of most women of her generation. Her voice is strong, and she speaks articulately and to the point. She likes to read aloud, and through this means, she and Dr. Lowdermilk cover a wide range of material together--newspapers, magazines, letters from friends throughout the world, and from their two children, both of whom live away from Berkeley with their families.

Dr. Lowdermilk, somewhat shorter than his wife, belies his eighty-one years. He is robust, with a strong, barely lined face, a sturdy handshake, a shock of white hair (kept trimmed by his wife since she discovered soon after their marriage that he was always too preoccupied to remember the barber), and a neatly trimmed white mustache. His eyes are small, and hidden beneath a massive brow. Their color varies from brown to green depending on the dominant color of the plaid wool shirt he is wearing. But when he laughs or smiles, which is often since he has a finely-honed sense of humor, his eyes disappear.

Unless he is attending a reception or dinner, he dresses informally in his sport shirt and bolo tie. His favorite slide is a mosaic of a thunderbird, crafted by Zuni Indians. When he speaks, he gestures

with his hands to emphasize a point, sometimes thumping gently on the table or desk.

The Lowdermilk home, large and gracious, overlooks a sweeping view of San Francisco Bay. The furnishings, much of them of museum caliber, denote the years of travel abroad, with the entrance hall and living room furnished almost completely with Chinese rugs, tables, screens, vases, framed pieces of rare Chinese hand work, paintings, and carved ivory. A massive chest in the living room comes from Korea. Throughout the house are other oriental rugs, and brass and silver trays and pitchers from the Middle East. There are always flowers in the vases and pitchers, a combination of artificial blooms and whatever is blossoming in their well-kept old fashioned garden which is enjoyed by a variety of birds and several racoons which visit late at night. Throwing out bread for the birds and racoons is as important an obligation as watering.

The study, where we tape recorded, is lined with books showing Dr. Lowdermilk's many fields of interest, plaques and framed scrolls indicating his honors and citations, rocks and small dolls and other bric-a-brac collected from here and there. In addition, the Chinese screens, the Bokhara rugs on the floor, wall and cot, give it a warm and cosy air. The desk is full of papers, an indication of on-going work and study.

The large dining room is Mrs. Lowdermilk's work-hospitality center. Its furnishings are plainly American: a large table, buffet and many chairs. The typewriter, papers and mail are usually on the dining room table, although they may be transferred to a desk on the glassed-in porch. Here the Written Questions and Answers were developed, and here is where we had our many conferences, some over lunch or afternoon refreshments.

This table is often quickly and completely cleared of work and then beautifully set for a festive tea. It is then Mrs. Lowdermilk uses her priceless dishes, handmade on the potter's wheel of the Dowager Empress, and decorated with the yellow color which, until the Manchus were deposed, was permitted only on the Empress' table. (Many years after Mrs. Lowdermilk acquired her dishes, Chiang Kai-shek gave a similar set to Queen Elizabeth of England as a wedding gift.)

Developing this oral history has been a stimulating experience, albeit a long and demanding one, for the Lowdermilks, and for me, the interviewer. Because they desired a thorough document, they were willing to tackle this project with the kind of drive and vitality which, I suspect, they have brought to all their challenging assignments.

Malca Chall, Interviewer

31 March 1969

THE TRIBUNE, Oakland, California
July 1989

Inez M. Lowdermilk dies in Oakland at 99

The Tribune

Inez Marks Lowdermilk, a writer, world traveler, and noted educator and lecturer, died Thursday in Oakland. She was 99.

As a girl, Mrs. Lowdermilk, a native of Oregon, wanted to do something worthwhile with her life. So in 1916 — after graduating with honors from the University of Southern California — the Methodist Church sent her on a five-year mission to China's remote Szechuan Province, where she opened 15 girls' schools.

Upon her return, she married Walter Lowdermilk, who became an internationally known environmentalist and helped establish the U.S. Soil Conservation Service. Together, they began a life of travel and work around the world.

With their neighbor, author Pearl Buck, they barely escaped with their lives in the 1927 "Nanking Incident" in China, in which revolutionary soldiers swept in to destroy foreigners.

Many years later, they visited the Holy Land, where as devout Christians, they became staunch supporters of Israel.

Mrs. Lowdermilk was later instrumental in starting the Berkeley Chapter of Hadassah and the California Christian Committee for Israel.

Inez Marks Lowdermilk
Barely escaped in China

She would also become a popular lecturer, a legendary hostess and a radio personality, broadcasting to American farmers on the National Farm and Home Hour.

In an interview at her Berkeley home with The Tribune in 1982, Mrs. Lowdermilk, then 92, reflected on her life, saying: " . . . I'm driven. I say to myself, 'If you're needed for something, do it. If you feel tired, do it anyway.' "

Mrs. Lowdermilk is survived by a daughter, Winifred Hess, of Gaithersburg, Md.; a son, William Lowdermilk, of Silver Springs, Md.; five grandchildren and four great-grandchildren.

Funeral arrangements are pending.

San Francisco Sunday Examiner and Chronicle
July 30, 1989

Humanitarian Inez Marks Lowdermilk dies

By Eric Brazil
OF THE EXAMINER STAFF

Inez Marks Lowdermilk, author, educator and humanitarian, whose life of commitment and adventure had wide-ranging international impact, is dead at age 99.

Mrs. Lowdermilk died Thursday in an Oakland retirement home.

A native of Oregon, reared in Southern California, energetic and idealistic, young Inez Marks departed on an epic journey to China after her 1916 USC graduation.

She traveled far up the Yangtse River in China, then overland into Szechuan, 1,000 miles beyond the nearest railhead, as a Methodist educational missionary.

"I was appalled to find girls who could not read or write, for there were no schools to attend, except in cities," she recalled in a newspaper interview a decade ago. "All the girls hobbled painfully on small stumps of crippled, bound feet."

By 1924, Mrs. Lowdermilk had opened 15 schools with more than 600 female students, trained 26 teachers and traveled thousands of miles afoot and in sedan chair through the Chinese hinterlands. She became an influential force in the campaign that abolished the custom of foot binding.

In 1922, she married Dr. Ralph Clay Lowdermilk, then the head of an American-sponsored famine prevention program at Nanking Union University. In Nanking she was a neighbor and fast friend of Nobel Prize-winning American author Pearl Buck.

Dr. Lowdermilk, who died in 1974, achieved world acclaim as an authority on soil conservation and reclamation.

Mrs. Lowdermilk, a tall woman usually described in newspaper articles as "stately," was an active participant in her husband's globe-trotting work and a prolific journalist.

1977 FILE PHOTO

Mrs. Lowdermilk *helped bring about much change in Israel.*

A 1939 visit to Palestine changed their lives.

Not only had the land been wrecked by centuries of erosion, but the Jewish people were ravaged by the Holocaust and wracked by the violent birth pangs of Israel.

"Mother went back to America to tell the tragedy of Jewish suffering," said her daughter, Mrs. Winifred Hess of Gaithersburg, Md. Mrs. Lowdermilk raised funds for rescuing European Jewish children and bringing them to Israel. She founded the Berkeley-based Christian Committee for Israel.

In 1942, she and her husband co-authored "Palestine: Land of Promise." The book's thesis was that Israel could support millions more Jews by effectively utilizing its natural resources. It became a document that influenced the United Nations vote establishing the Jewish state.

In all, the Lowdermilks worked in Israel for six years during the 1950s. Dr. Lowdermilk's work had such far-reaching effects on Israel that he is regarded as the father of its water plan and modern agriculture.

Dr. Moses Cyrus Weller, a Jewish National Fund representative, once quipped: "Israel is a land flowing with Lowdermilk and honey." Israel's Institute of Technology at Haifa was renamed the Lowdermilk School of Agricultural Engineering.

At age 88, Mrs. Lowdermilk was writing her biography, "All in a Lifetime," which was privately published in 1985. "At my age, I guess one is expected to be sitting in a rocking chair. But I can't. Every day is crammed full of activities. Why, I'm even busier than when I was 86 or 87," she told an interviewer.

Israel and China remained abiding interests throughout her life. She visited Israel in 1976 to dedicate a new forest in memory of her husband. And she was still boarding visiting women students from China at her Berkeley home while in her 90s.

"Her energy amazed me, and it amazed everybody else," said Mrs. Hess.

In addition to her daughter, Mrs. Lowdermilk is survived by her son William Lowdermilk of Silver Springs., Md., five grandchildren and four great-grandchildren.

No funeral service will be held. Contributions may be made to the Lowdermilk Scholarship Fund, Haifa Technion University, Haifa, Israel, in her name.

Arrangements were made by McNary-Morgan-Engel & Jackson of Oakland.

LOWDERMILK, Inez Marks — In Oakland, July 27, 1989, wife of the late Walter Clay Lowdermilk; mother of Winifred Hess of Gaithersburg, Md. and William Lowdermilk of Silver Springs, M.D., also survived by five grandchildren and four great grandchildren, a well known writer, educator and lecturer, a native of Oregon, aged 99 years. No services held. Contributions may be made to the Lowdermilk Scholarship Fund, c/o American Technion Society, 870 Market St., #968, SF 94102, in her name. Arrangements by McNARY-MORGAN-ENGEL & JACKSON

INTERVIEW HISTORY

Research and Planning

This oral history comprises two sections, the Written Questions and Answers, and the Taped Questions and Answers. The written portion is a unique addition to the oral memoir, but its presence indicates the flexibility of oral history in gathering historical material.

It was Dr. and Mrs. Lowdermilk's feeling that he had covered too much territory, both physically and intellectually, for a complete accounting of his life's work by the usual taping method. After considerable discussion, and some trial and error, the Lowdermilks and the interviewer devised a special working arrangement which would permit their story to be told as completely as possible.

Dr. Lowdermilk's life was divided chronologically into periods based on his particular activities during his eighty-one years. After reading his publications and other relevant material, and conferring with the Lowdermilks, the interviewer gave them a detailed outline of questions relating to each period a week or more in advance of each writing-interview stage.

The Lowdermilks then painstakingly searched their memories, read their letters, diaries, published and unpublished reports and articles, reviewed the facts and emotions of the period, and came up with answers and comments. Mrs. Lowdermilk typed these in dialogue form in order to retain the character of the taped interview. She composed questions to cover items suggested in the outline, or to bring out some other important information which they wanted to discuss. Needless to say, this allows the interviewer to seem exceptionally erudite.

Following submission of this written material, if the interviewer thought that the subject required more detail or greater depth, she prepared additional questions and then taped an interview with Dr. Lowdermilk. One taping usually completed the subject, but the complexities of fifteen years with the Soil Conservation Service and six years in Israel required many taping sessions for each of these periods.

Time and Setting of the Interview

Altogether there were twenty-two taping sessions between March, 1967, and April, 1968. Most were held once a week, but occasionally a month or two would elapse between recorded interviews. When taping, Dr. Lowdermilk and the interviewer worked alone in his study; the two interviews with Mrs. Lowdermilk took place, however, in the dining room when the three of us were having lunch.

Editing

The interviewer edited the transcript and the written questions and answers at the same time. Most overlapping and duplication were cut from the transcript. Some material was rearranged in order to develop a topic as clearly as possible. Such editing has done away with some of the conversational tone, but because this interview is so long and so detailed, we decided that setting forth the facts and providing for ease of research was of primary importance.

Beginning in February, 1968, the edited manuscript, one or two chapters at a time--both written and taped--was given to the Lowdermilks for their final editing. Mrs. Lowdermilk reviewed it all first, noting changes she thought important, then read it aloud to Dr. Lowdermilk. At this point they discussed further editing, cut duplication that had remained, and further tightened the style. Here too they inserted information which had occurred to them while they revlewed the manuscript, or answered questions which the interviewer had thought of in the interim between research, taping, and editing. By May 1, in record time, they had completed the editing.

Format

The interviewer has been responsible for the arrangement of the chapters, the titles and the sub-headings, in both the written and taped sections, providing many of each in order to help chart a way through this lengthy and fact-filled document. The thirty-three single pages from reports and letters which are inserted, wherever relevant, in the document have not been listed separately. They refer the researcher to the scope of additional source material which the Lowdermilks have given to the Bancroft Library.

The index is intended to supplement the table of contents. Subject matter clearly defined in the sub-headings has not been indexed. The researcher will need to use both the index and table of contents to find the information he seeks.

INTERVIEW SCHEDULE

	Date	Subject
1.	March 13, 1967	Family background
2.	March 14	Schooling in Missouri, Arizona and Oxford
3.	March 20	Forest Service: Tonto National Forest Tenth Engineers, AEF
4.	March 22	Forest Service: Missoula, Montana
5.	March 27	China: first trip Mrs. Lowdermilk talks about the Nanking Incident
6.	March 30	China: second trip Mrs. Lowdermilk talks about experiences in Washington, D. C. and Israel
7.	April 27	Soil Conservation Service
8.	May 4	Soil Conservation Service (cont'd.)
9.	May 31	Survey of Europe and the Middle East
10.	June 15	Survey of Europe and the Middle East (cont'd.)
11.	July 12	Survey of Europe and the Middle East (cont'd.)
12.	July 19	Soil Conservation Service (cont'd.)
13.	July 26	FAO Technical Committee on Forestry and Forest Products
14.	September 26	French North Africa
15.	October 3	British Colonial Africa
16.	October 13	United Nations Secretariat Truman's Water Resources Policy Commission
17.	October 24	Israel: the Jewish farmer The Eleventh Commandment
18.	October 31	Israel: Soil Conservation Service
19.	November 7	Israel: Department of Agricultural Engineering

Walter Clay Lowdermilk

BRIEF BIOGRAPHY

1888	Born July 1, Liberty, North Carolina.
1912-15	Rhodes Scholar, Oxford: Forestry and Geology.
1914	Belgium Relief Commission.
1915-17	United States Forest Service, Tonto National Forest, Arizona.
1917-20	World War I, Tenth Engineers, A.E.F.
1920-22	United States Forest Service, Missoula, Montana.
1922	Marriage to Inez Marks, August 15.
1922-27	Professor of Forestry, Union University of Nanking, China.
1927-29	Ph.D., University of California, Berkeley: Forestry and Geology.
1929-33	Founded San Dimas Hydrological Experiment Station and other Forest Experiment Stations.
1933-47	Assistant Chief, Soil Erosion Service and Soil Conservation Service, Washington, D.C.
1938-39	Surveyed erosion in Europe and Middle East for Department of Agriculture.
1942	Wrote Palestine, Land of Promise.
1942-44	China: Consultant to Executive Yuan on erosion control and agricultural production.
1945	Paricutin, Mexico: Group leader for National Research Council on study of erosion in volcanic ash.
1948	Algeria, Morocco, Tunisia: Consultant to French Colonial government on problems of soil erosion and methods of conserving farm, pasture lands and forests.
1949	British West Africa: Consultant to British Colonial office and British and American missionary societies in eleven countries, to appraise local problems related to conservation of land and water.
1950	United States: Chairman, Basic Data Committee, Truman Water Resources Policy Commission.
1951	Japan: Advisor to Allied Powers on erosion and flood control.
1951-53	Israel: Consultant (FAO) on development of soil and water program.
1954	United Nations, New York: Assigned to develop a coordinated water program for the U.N.

1955-57	Israel: Consultant (FAO) on development of a Department of Agricultural Engineering at Technion-Israel Institute of Technology.
1957	Yugoslavia: Consultant (FAO) on integration of land and water policies for the Cetina River Valley.
1958-62	Morongo Valley, California: Directed search for water for residents of the area where Lowdermilks had a retirement home.
1962-	Berkeley, California: Consultant to Save-the-Redwoods League; Research Associate, Geography Department, UCB.

TABLE OF CONTENTS

Volume I

EDUCATION, RESEARCH, AND WORK IN SOIL CONSERVATION, 1888-1947

TABLE OF CONTENTS

Volume II

CONSULTANT ABROAD AND AT HOME, 1938-1968

I CHILDHOOD AND EDUCATION, 1888-1915

[Written questions and answers]

Chall: Will you tell me about yourself and your family?

WCL: I was born in Liberty, North Carolina, July 1, 1888. We do not know when our foreparents came to America, but legend has it that three brothers came over from Holland, settled in New York and were later driven out by the British. At that time, my forebears migrated southward along the Atlantic Piedmont. We know that one of them settled in Pennsylvania where numerous Lowdermilks live today. Another family settled in North Carolina and were my immediate forefathers. Another group went west and we find some of them in Arizona.

Chall: What did these pioneers in your family do?

WCL: The Lowdermilks were farmers, lumbermen and engineers. They were Protestant in religion and conservative in politics, probably Republicans. They always managed to have a farm, regardless of other undertakings.

Chall: Would you tell me something of your parents?

WCL: My mother and father were very opposite in temperament. My mother was of English descent, from Lawrences and Covingtons. They were English scholars and preachers. My mother was the daughter of a minister and a school teacher. She gave us a sound religious training. We children all went to Sunday School and church. My mother tried to instill in us the desire for an education. I was the oldest and the only one to go on to college, but all my sisters had Normal School training. My one brother was very capable and became a bank cashier. It was not easy for girls to get an education in those days when finances were limited.

My father was a Lowdermilk and a Van Cannon from early Holland stock. He was a mechanical genius and developed machinery for sawmills. He also was a great hunter and early taught me how to hunt and handle a gun safely and to be a good shot. He loved the great out-of-doors and was not so interested in formal education but was a self-taught man of much ability.

Largely due to our mother, we developed splendid family loyalty. But my mother often despaired of the individualistic traits in each of her children. We were all strong-willed, which many would call stubborn. She used to say, "Just look

WCL: at the set of their chins and you know why each child is so determined and difficult."

My father was a loyal Democrat--good or bad, right or wrong--while I was always for whomsoever I thought to be the best man. I remember many terrific discussions over politics, even until long after I was married. When we visited my parents at the time of the elections for Herbert Hoover and Al Smith, we almost had a family quarrel.

Early Education and Work

Chall: Dr. Lowdermilk, will you describe your early school days?

WCL: My schooling began in a little red school house with one room and one teacher for all classes and grades. I had little trouble learning the prescribed studies and quickly did my lessons and then had nothing to do. I evidently was an annoyance to my teachers for I would draw comic strips and pass them around to the other students. This distracted teachers as well as the children. As a result, my teachers, to keep me occupied, appointed me to go and listen and help some other class with their reading or spelling. Sometimes the teacher had me make drawings on the blackboard, to be copied by the class. Sketching was natural for me.

Chall: Where did you go when you graduated from the little red school house?

WCL: When ready for high school, I liked the idea of the preparatory school of Park College, in Parkville, Missouri. We had a neighbor whose daughter was the fiancee of a senior at Park College. He arranged for me to go to Park and be his roommate during his senior year. In those days I was a physical culture enthusiast and an admirer of Bernard McFadden. I placed great emphasis on discipline and self-control.

Chall: What was there about Park College that especially appealed to you?

WCL: It was necessary for me to work my way through school. I liked the arrangements for self-help at Park. Students were divided into "families," according to the number of hours a day they worked for their keep and tuition. I belonged to a "family" called Number Four, where students worked four hours a day.

WCL: I was mechanically inclined. While in this preparatory school for Park College, I was given the job of running the electric plant on evenings from about six to midnight. During my spare time at the plant, I was able to study. Among other things, I memorized ten chapters of Proverbs and won a prize of a ten dollar gold piece, for highest grade in Old Testament Bible. This prize was most welcome to me then.

There was something about the close-knit association and friendships of Park people that has persisted on through life. I have met Park friends all over the world.

Park College was founded by the McAfees as a Presbyterian college with a strong missionary spirit. Many students after graduation went as missionaries to other countries. Since then Park has become interdenominational, but continues former policies.

During a summer vacation when I was sixteen years old, I worked in an ice plant on the night shift as an oiler. One night the fireman and I discovered that the big boiler was forming a dangerous blister. Instantly I ordered the fireman to draw the fire. I rushed to turn on the water pump into the boiler so as to bring down the steam pressure in the boiler, and I held down the governor of the big Corliss engine to race it in order to lessen steam pressure. Apparently this quick action saved the plant from a disastrous explosion. For this, the owners offered to send me to college with all expenses paid to study refrigeration engineering. The only thing they asked was that I would return and work for them (Rumley-Dawley Co.) at a good salary for five years. But I was not yet ready to be thus circumscribed, for I did not yet know what I wanted to do for my life work.

Chall: When did you first think about trying for a Rhodes Scholarship?

WCL: Even before going to Park College, I had a dream of winning a Rhodes Scholarship, which I had heard about through a friend. I wanted to make all efforts in that direction. In those days applicants had to pass "responsions" (entrance examinations to Oxford). The examination required among other things, proficiency in Latin and in Greek. The other subjects of mathematics and biology were easy for me so I gave special emphasis to Greek and Latin to be strong in these subjects.

Then the rule was that every three years, only two student candidates from each state were awarded a Rhodes Scholarship. I applied as a candidate from the state of Arizona where my parents were living.

Student Activity, University of Arizona

Chall: Where did you go to college?

WCL: After Park, I transferred to the University of Arizona at Tucson, for my last three years at college. I had to work my way entirely. I was unusually fortunate however, for I found more tutoring to do than I could manage. The fee was one dollar an hour, equivalent to several dollars now. I remember we could get a good steak dinner for twenty-five cents, and everything else was in proportion. During the summers I organized a little academy for tutoring, where I taught both in classes and individually. In those days I played a good game of tennis with excellent players on the University courts.

It was while in college at Tucson that I was elected president of the student body. There were about two thousand students at that time. Every one remembered my surprise and embarrassment when asked to make a speech after my election. I stood on the platform and started out, "As I look over your faces . . . " Then I could not think of what more to say, so I repeated it and still could not go on. Suddenly it struck me to say, "As I look over your faces, I see your hair." The applause and laughter were tremendous, but it convinced me that it was important to learn to speak in public.

Chall: Did you have any other activities while in the University?

WCL: Well, I started the first newspaper ever to be published at the University of Arizona. I named it, "The Arizona Life." Later it was renamed, "The Arizona Wild Cat." I remember an editorial I wrote on the sinking of the Titanic in 1912 which was widely acclaimed.

Chall: What was your major subject at the University?

WCL: I specialized in chemistry.

Life at Oxford as a Rhodes Scholar, 1912-1915

Chall: Did you continue in chemistry at Oxford?

WCL: No, because when I was awarded the Rhodes Scholarship, I learned that with certain subjects, studies on the continent were

WCL: included for vacation periods. I decided to specialize in forestry in the School of Rural Economy in Oxford, so that during the long summers I could work under the Forstmeisters in Germany, where forestry was practiced with great refinements. I also decided to prepare to take a degree in geology as well, for my credits would make this possible.

Chall: You were invited to enter Wadham College in Oxford. What was it like?

WCL: It is one of the most beautiful but not the largest of the college buildings of Oxford. Its picturesque cut stone buildings were three hundred years old and covered with ivy. These buildings had been designed by Sir Christopher Wren, the famous architect of that time The main hall had a hammer beamed ceiling and many lovely old paintings on the walls. In the grand dining room we ate in state each evening, wearing our scholars' gowns and using the battered but solid silverware and pure silver drinking mugs that had been used for hundreds of years.

But I could not rave over the food. The British never seasoned their vegetables and cooked potatoes and cabbage without salt. I never wanted to see Brussels sprouts again after leaving Oxford.

Chall: Were the rules very strict in Oxford? We think of such an old school as being very conservative.

WCL: Yes, there were many regulations. One had to be in by midnight or crawl over the back wall and sneak in through a window. Just once I found the great front gate locked. I roused the gateman who let me in, but reported me to the Warden who called me up on the carpet. Next day I was given a stern warning never to let it happen again, and I did not!

Regardless of all the dignity of Oxford, boys will be pranksters wherever they are. I remember one Guy Fox Day, which is similar to our April Fool's Day. I went out to see why the crowd had gathered around the tall Martyr's Monument Spire, a hundred or more feet in height, and were all looking upward. There on the pinnacle, inverted and hanging at a jaunty angle, was the humble utility vessel always found in a cabinet beside the bed before the days of plumbing. The University sought volunteers to make the dangerous climb, but no one volunteered, and the expert climber of the night before did not come forth to reveal his identity. Finally, the University authorities had to shoot the poor thing to pieces to get it down. Otherwise, it might have remained indefinitely.

Chall: Dr. Lowdermilk, will you tell me something about the routine

Chall: in your life in Oxford.

WCL: Each morning at six, the scout pulled out a flat bathtub from under my bed with a great clatter which awakened me. Then he poured in about an inch of water over the bottom and put in a sponge which I was to use for a cold bath and rubdown. He took my order for breakfast, and by the time I was dressed, my breakfast was served in my room in front of the fireplace.

Every student had two rooms, a "bedder" and a "sitter." There was only local heat in a small coal-burning fireplace. There was no running hot or cold water; this was carried to each room by the scout or servant in a big pitcher.

For breakfast or lunch we could invite to our rooms other students from our college, or the other colleges, to eat with us. Many were the lively discussions: on politics in England, America and on the continent, on studies and discoveries, on athletics, and one's progress in studies. Most Oxford men went to church on Sunday, largely as a duty, but there were few discussions on religion. Whenever a student wanted no company and wished to be alone, he "sported his oak," or shut his heavy oak door and locked it from the inside.

Chall: What about athletics in Oxford?

WCL: I found athletics in Oxford and Arizona very different. In Tucson, we played tennis, football, basketball, or took track, to compete with others to win. But in Oxford, athletics were for exercise primarily. A student would watch others in these various games and find a group which displayed more of his own skill or lack of it, and he would join that group and play just for exercise. During vacation I played tennis, but during the winter I rowed in the crew for Wadham College, and because ours was the winning crew one year, we each were allowed to keep our oars.

Chall: Oxford at that time was strictly a man's institution. Did you have any contact with girls?

WCL: Oh, we had plenty of opportunities to entertain girls, but it was strictly on the chaperone basis. She was omnipresent. One of the happy memories was of inviting girls to visit us and go "punting" on the tree-shaded Cherwell River, which was just over our back wall. Sometimes we punted quite a distance to a garden restaurant along the banks of the Cherwell where we went ashore to eat strawberries and thick cream.

At commencements, the colleges would have an all-night dance and small groups of friends had their special booth where the chaperone sat. After each dance we returned to the

WCL: chaperone's booth to chat and to change dancing partners. Then the final gala part was a breakfast together. But it was all very dignified and formal.

I made some close friends among the British students and was invited to their homes; I still correspond with some. It was customary in Oxford each semester for every undergraduate student to make a formal tea-time call on his Don, or Tutor. This gave a social contact between professors and students.

Chall: Was the educational system at Oxford much different from what it was in the United States?

WCL: Decidedly so. Throughout the three-year course of study, there are no tests or examinations, except where lectures and laboratory experiments are given. The Tutor directs his students in assimilating a vast amount of knowledge about which one must have a usable knowledge in his field of study.

Then at the close of the three years, there is a week-long examination on any questions that come under one's studies. Cramming for exams is disastrous, as a fellow Rhodes Scholar learned, for he cracked up mentally before the week was over. It was the habit of most of us to take off several days for rest, relaxation, exercise and fun. Then we were ready for the long grind of examinations. The questions asked were to draw out one's knowledge of facts and subjects. The student was graded, not on the number of questions he answered, but on his mastery of the subjects on which he wrote.

Chall: This sounds as if Oxford was quite a hard grind. Were the lecture and study sessions year-round?

WCL: Thank goodness, no. In Oxford the class work lasted only six months and the remainder was spent in three long vacations. This gave us time for the more serious reading designated by our Tutor, as well as time for recreation. I spent four summers or vacations on the continent. In Germany I studied forestry under the German Forstmeisters who were expert in the care and maintenance of forests. I lived in German homes so as to have a mastery of the German language.

Work With Belgium Relief Commission, 1914

Chall: Where were you when World War I broke out, in Oxford or Germany?

WCL: At that time, two British students and I were making a tour to see various kinds of forest management in Germany. We were caught at Freudenstadt. The British students were immediately called back to England, while I stayed in Germany for another month. How times have changed. At that time, I had no passport but I was able to get a temporary one from the American Consul at Stuttgart and returned to Oxford. Almost immediately the United States Ambassador, Brandt Whitlock, made a call for Rhodes Scholars who spoke German and French to volunteer to work with Herbert Hoover on his program to feed the starving Belgians.

Chall: So this was how you happened to work with Herbert Hoover on the Commission for Relief in Belgium. Was this interesting?

WCL: Yes indeed, it was a wonderful opportunity to do something useful and to have this personal contact with a future President of the United States. Do you know the background for this relief work?

Chall: No, not fully.

WCL: Well, the Germans were conquerors. They wanted the Belgians to become laborers, for there was much to be done. The courageous Belgians steadfastly refused. This angered the Germans who said to the Belgians, "If you won't work, you don't eat," so food supplies were cut off and the Belgians were starving! Hoover was sent over to see what could be done. He pointed out to the German military command that this planned starvation of the Belgian people would give Germany a black eye among nations of the world. He urged Germany to allow us to feed the Belgians.

Finally an agreement was made whereby Germany would not torpedo the American food ships. England demanded the assurance that no food thus given by America would reach German stomachs, and Germany insisted that the distribution would be such as to prevent spying among those overseeing distribution.

Chall: Then you were one of those called in to help distribute foodstuffs to the Belgian people?

WCL: Yes. When Ambassador Whitlock appealed for Rhodes Scholars who could speak both French and German fluently, there were fifteen of us who fulfilled the qualifications and we were sent over at once.

Most of the foodstuffs were unloaded at Rotterdam, Holland. The Germans had taken over all the Belgian railroads and highways, but had not wanted to bother with the big, slow-moving canal barges. The Commission for Relief in Belgium took over the canal systems.

WCL: I was one of those assigned to Belgium at the docks to oversee the unloading and distribution of vast amounts of foodstuffs. It was touching to see the joy among Belgian housewives who could have bread made of white flour, after the coarse black bread they had been eating. They said, "Today we have cake," meaning white bread was such a treat.

Chall: Did the Belgian people seem grateful for this American help?

WCL: My, yes! It was very touching to see the joy of housewives at distribution points. We did have one rather unusual experience however. Generous Iowa farmers wanted to share with the heroic Belgians their special corn crop. They chartered a big cargo boat and filled it full to overflowing with shelled corn--it seemed to me there were mountains of golden yellow corn. But the Belgians had never eaten corn. They only used it for animal food. It seemed repulsive to them; they would not eat it. Hoover brought over groups of domestic science teachers to demonstrate how to prepare good corn bread for table use. Finally, Hoover had the corn ground to a very fine flour and mixed it with wheat flour, and bread was made from this. The people did not know they were at last eating the corn. Many shiploads of corn were prepared in this way and consumed. All were happy with the outcome.

Chall: Hoover was highly respected for his relief work. Did you accord him this respect too?

WCL: Yes, Hoover was a marvelous administrator and organizer. He demanded that all of us keep accurate records of all transactions. We all called him "the Chief," and whatever our Chief wanted done was carried out all down along the line, from the highest to the most lowly job. There was marvelous esprit de corps in our staff. It is remarkable that those who worked with Hoover during the aid to the starving people of Europe have met annually in reunions. Whenever possible, we attended the big banquet in New York where "the Chief" presided.

All of our names are engraved in stone in the great Hoover Memorial Tower at Stanford University. When we were married, the Commission gave us a lovely sterling silver bowl from Tiffany's in New York.

I was invited by Herbert Hoover to continue with him indefinitely and I considered it, but I decided to return to Oxford and get my degree in my chosen field of work and then see what opened up.

I would like to give a few figures as to what this American Relief Association (A.R.A.), under Hoover's personal direction, did to help the peoples of Europe between 1914 and 1924. During

The Commission for Relief in Belgium

March Tenth
1 9 1 7

Dear Mr. Lowdermilk:-

As the membership of the Commission has grown it has become increasingly difficult to keep in touch with the individual men who have sacrificed so much for our work. With a view to commemorating your connection with the C.R.B. and in order that you may have a definite though small recognition of your services, we have cast a service medal in Brussels, and I have arranged with this office to send yours under separate cover. In presenting this to you, I take the opportunity of expressing my heartfelt gratitude for your assistance.

I know that you value, as I do, the opportunity that has been given to all of us to serve a worthy people and, furthermore, we can always be proud that we have furthered the interests of our own country abroad by increasing the respect for our flag. I look upon the C.R.B. as the most exclusive organization in the world, and its success and the prominent place it will have in history is due in a large measure to your loyalty and the wholehearted support accorded me throughout.

Yours faithfully,

Herbert Hoover

Chairman.

Mr. Walter C. Lowdermilk,
Wilcox,
Arizona.

WCL: this period, Hoover spent five and one-quarter billion dollars and delivered to Europe more than thirty-three million tons of commodities, mostly American foodstuffs. Great amounts of clothing and medical supplies were distributed. Exceedingly accurate records were kept. If it had not been for Hoover and his leadership in feeding the starving, it is estimated that ten million people in occupied regions of Belgium and northern France might have perished. During the Armistice period, peoples of central and eastern Europe would have died by the millions in the greatest famine the world had seen in the past 350 years. There are millions alive and able-bodied today who owe their lives entirely to this child-feeding work from 1919 to 1923, and international famine relief.

Also, millions of Russians owe their lives to the American Relief Administration in the terrible famine of 1921-1922. It is to their shame that they gave no credit to the United States and made snide remarks against Hoover. They did not want their people to know of this outside help, for they were in the throes of impressing the people with the glories of the Russian revolution. But their attitude does not in any manner minimize the splendid relief work of Herbert Hoover and the great numbers of devoted people who worked with him.

Graduating From Oxford

Chall: So you returned to Oxford to get your degrees?

WCL: Yes, I completed the requirements for two degrees: one in forestry and one in geology, covering the three years of studies.

The subject of the thesis in forestry was "A Working Plan for the Forest of Salmunster, Germany." This I wrote in German. No thesis was required for the degree in geology. But the University of Oxford conferred on me a "First I" in Geology Honors Examinations.

Chall: What do you mean by a "First I"?

WCL: Well, this was conferred in a "striking way." The Vice-Chancellor of the University hit me over the head with the catalogue of the University of Oxford and said something in Latin which I forget. This ceremony took place before an assembly of the University of Oxford.

As recognition of this First, I was permitted to make a choice of books. Accordingly I chose a magnificent four-volume set of an Encyclopedia of Forest Science and Practice. Since

WCL: this was, at that time, the highest authority, I considered it a fitting reward for my studies in the School of Forestry.

I wrote my thesis in German for I had applied myself diligently in learning German. Knowledge of this language opened up a wide field of theory and practice in the international science of forestry.

Chall: Will you summarize what the Rhodes Scholarship meant to you?

WCL: After more than half a century, it is hard for me to encompass what this all meant to me. I feel that the Rhodes Scholarship is the greatest academic prize in modern times. It marked my transition from a local country boy in a western atmosphere to a student of the international scene in a society whose outlook, history and interest were far wider than those in which I had been brought up. I developed a point of view that is based upon the recognition that the modern world is not confined to one people, one language, or to one political faith, but touches on all. I found myself in an academic system where the methods of instruction and study were widely different from those in which I had been trained. To me, this meant a widening of my own vision and acceptance of a challenge to determine by comparison what are the good and what are the bad points in our society.

It meant much to me, through the Rhodes Scholarship, to become a member of a small, but select and congenial, loosely-knit group of able men of superior quality. Friendships have been stimulating and enduring. In Oxford I met my own select countrymen from every state in the Union, which improved my insight into the essential unity in diversity of the United States.

Oxford teaches freedom--social, political and intellectual. Every member of the University is expected to be himself, and to develop along the path he has chosen for himself. We respect each other and are respected by our fellows, regardless of one's chosen field. Respect for learning permeates the whole atmosphere.

With an Oxford training, one feels he has a foundation fashioned at one of the world's greatest centers of learning. This gives one the right, and imposes on him the duty, to make an open-minded examination of his own mind and the discovery of what it can do.

Chall: Did it mean much to you that you received a "First" in scholarship?

WCL: Well, this is a distinction highly esteemed by the student body.

But I hope this summary of what Oxford has meant to me does not exemplify the trenchant words of Max Beerbohm, who said, "When I was growing up, I was an amiable, studious and well-mannered youth. It was only Oxford that made me insufferable."

CHILDHOOD AND EDUCATION, 1888-1915

[Taped questions and answers]

Parents and the Westward Migration

Chall: You have provided quite a bit of interesting information in your written questions and answers, but I do have a few more questions. Where did your parents meet?

WCL: In the Piedmont, in Randolph County, North Carolina. My mother's father was a minister of the Christian Church.

Chall: Were they fundamentalist in their beliefs about religion? Did they follow the Bible as closely as did the Bible Belt settlers?

WCL: They were quite a liberal type, more liberal than the ultra-fundamentalists. I was named after Uncle Walter Lawrence, one of my mother's brothers.

Chall: And where did the Clay come from, by the way?

WCL: That came from my father's side. In those days Henry Clay had made quite a name for himself, and my father was named Henry Clay Lowdermilk. He had his own timber business, and was a genial pioneering type of person. My father and mother migrated from North Carolina very early. I grew up in the West.

Chall: Where?

WCL: In Oklahoma and Arizona. I don't remember our life in the Carolina's, because I was just a mere child at that time. I can't recall the year. But the timber business apparently went on the rocks. That may have been the stimulus on my father to "go West." There were some members of an earlier branch of the family who had preceded us in Arkansas. They were miners and business people.

Chall: Were these your father's relatives who were miners?

WCL: Yes. I remember we stopped over with them for a couple of years. My father got a farm and later sold it, and moved further to the West and finally homesteaded in Arizona.

We didn't jump from the East to the West, but it was more, let's say, a migration from place to place to California, very

WCL: much as the family with the "long Rifle."

Chall: Can you trace it?

WCL: Let's see. Our first stop was in Arkansas. My father took up one of those hillbilly farms. That's where I learned to plant corn. And I'll never forget how beautifully my mother would roast sweet potatoes in an oven. I don't think they grow them as rich as then. When we'd roast them, a sweet syrup would ooze out of those sweet potatoes.

Chall: What did your father grow on this hillbilly farm?

WCL: Corn, potatoes, and fruit trees in orchards. Of course there was a pasture and my father ran hogs in the woods.

Chall: Was this a subsistence kind of farm?

WCL: More or less. His idea was that we were going farther west; this was just a stopover. He took part also, when I was just a small child, in that famous race for land in Oklahoma.

Chall: How old were you when you moved to Sulphur Springs Valley in Arizona?

WCL: I was about fifteen years old.

Chall: That's where your father homesteaded, in Arizona?

WCL: Yes, with a 160-acre homestead in Wilcox, Sulphur Springs Valley.

Chall: What did you raise in Sulphur Springs Valley?

WCL: Cattle and vegetables. My father was also a stationary engineer, and was in demand. As things were developing, he had plenty of work. There was a premium on men with mechanical know-how.

Chall: How had he become a stationary engineer? Is this something that he had learned?

WCL: Yes, from childhood. He was very inventive. He was quite a mechanical genius in many ways, and he was always working on some better way of doing things mechanically--quite original. And he was a crack shot.

Chall: Oh?

WCL: I used to go out hunting with him. He taught me how to handle a gun, even though the gun was longer than I was.

WCL: He wouldn't let me go out with other boys, but only with him or alone. He taught me how to carry a gun, how to be careful with it. And he was a very good instructor in marksmanship. So I too became quite a marksman. Much later I was Chairman of the Montana State Rifle Association, when I was a Forest Service Research officer.

Chall: When you were living in Sulphur Springs Valley, farming the land and hunting, I assume it was wild open country then?

WCL: Yes, open after Geronimo, the Apache, had been killed.

Chall: Can you tell me a little more about your mother?

WCL: My mother was a marvelous person, a very saintly person. She had been a schoolteacher, and a good one.

Chall: Did she teach the children at all?

WCL: In those days, and even when we were on the farm out in Arizona, she would hold us children to a program each Friday evening. Each one would prepare something, either a poem to memorize, or some story to tell--things of that sort that were distinctly with educational content, as spelling bees.

Chall: She was the daughter of a minister--did she give you your religious training?

WCL: Yes, I would say so. Father was not . . . he was a free and easy sort of person, not emotional at all but a practical person. He had a very wide circle of friends, and he was always leading parties to go hunting, because in those days people depended a great deal upon game for a meat supply.

Chall: So your mother took care of the spiritual side of the children. Did she read the Bible to you?

WCL: Oh yes, and taught us to memorize special passages.

Chall: Where did you come by your feeling for nature?

WCL: My father appreciated nature for its beauty as well as for its practical use. When hunting, he would climb a hill to get the view, or explore the streams. He was always wanting more land, but it had to have water on it and forests. I appreciate my father more and more. Later in my travels as a forester, soil conservationist and hydrologist, I found opportunity to appreciate natural phenomena as my father did.

Chall: And what attribute in your character did you think your mother instilled in you?

WCL: My mother was quite an intelligent person and a student, critically searching for reasons.

Chall: Where do you think you might have got the feeling for hard work and disciplined effort?

WCL: We had the spirit to make the best of opportunities available to us; and we were willing to work hard for it--and we had a lot of fun in doing it. The spirit of accepting a challenge and doing what was necessary prevailed.

Brothers and Sisters

Chall: How many brothers and sisters did you have?

WCL: One brother and three sisters--five of us. I was the oldest. My brother went into the banking business but died of a heart attack at the age of fifty-four, before his time. My sisters were all married and are still living. They are all beautiful, highly respected and useful members of their communities, and are married to prominent men.

Chall: Where do they live?

WCL: Ruth Beaton lives in Portland, Oregon; Flora Rivers in Santa Maria, California; and Esther Gung'l in Tucson, Arizona.

Chall: Did they come by any of these traits that you have, scholarship, scientific interest, that sort of thing?

WCL: Yes, very much so. My oldest sister, Flora, is one of my "heroines." She married a young man who was in the auto business in the early days. Then he had an auto accident which didn't kill him, but injured him so that he lived about six months before he finally died from his injuries. This used up all the resources of the family, so my sister, with four little children, took over the responsibility to educate her four youngsters and trained herself as a secretary. Some of her friends suggested that she run for election as County Clerk. She was elected time after time until years later she retired. Now she's worth about $250,000. She holds quite a lot of stock in Standard Oil as well as real estate. For she was thrifty, and so she trained her children.

As I have said, all my sisters are quite exceptional women,

WCL: but I have singled out Flora as a heroine of mine because she succeeded against very great odds. They had a hard struggle, but every one of her children has done well. There's one of them, Dorothy, who lives near the Claremont Hotel in one of the lovely residences there. Her husband is a successful lawyer in San Francisco. My sister's oldest boy is president of the Bank of America in Atwater, California. And her other daughter, who unfortunately died early in 1968, lived in San Marino at Pasadena. Her husband is a wealthy man. Every one of her children has done well.

Chall: Well, then she must have acquired some of the same traits of character that your wife said you acquired from your family. Self-discipline seems to have been one of them and a desire to train yourself carefully. From whom did the theory of self-discipline come?

WCL: I think it was from my mother.

Early Education

Chall: What do you remember of special interest about some subjects you learned in school?

WCL: I remember that one of my teachers taught me the diagraming of sentences. To me, this is one of the clearest and best ways of teaching the relationships of phrases and words in the structure of sentences.

Chall: That's because you have a scientific bent. How early do you think you were taught to diagram?

WCL: Quite early, and I always liked to diagram sentences. If you could diagram your thoughts, then you could think and present ideas more clearly.

Chall: Did you go directly from Park Academy to college?

WCL: I had two years at Park Academy to graduate. Then I took a year off to teach school. I taught school in Anadarko, Oklahoma. And then I went back to Park as a freshman in college. After I finished the freshman year, I took the examination for the Rhodes Scholarship, at the University in Lawrence, Kansas.

Chall: I see.

WCL: I passed and was notified to appear before the Rhodes committee in Arizona, because, as you recall, I had chosen to be a candidate from the state of Arizona rather than from Missouri, where I was in college, for I had this choice. I decided I had better transfer to the University of Arizona, which I did.

Chall: Did this cause you difficulties?

WCL: Yes. My passing the examination made me a candidate from Arizona, but to my surprise, there were already three others in Arizona who were candidates. A friend in Oxford had telegraphed through the committee in Arizona that three applicants had passed. So they were congratulating themselves that all had passed. And then surprisingly when the official mail came, here was this man Lowdermilk who had also passed and was a candidate, whom nobody at the University of Arizona knew of at all. So I wasn't received with very much warmth. But after a time I won the loyalty and support of the student body. In a year's time the student body had elected me president. I made my letter in college athletics. Among other things, I had the record for the hammer throw. In time my turn came to be designated as Rhodes Scholar from Arizona. I made the long trip to Oxford in September 1912. This was the beginning of a new world for me.

Chall: You have written quite completely about life at Oxford, but I want you to tell me something more about your work and study in the German forests.

Training in the German Forests, 1912-1915

WCL: At Oxford, as you know, we were "up" only six months out of the year. The other six months we were on vacation, supposedly. But it was in the vacation that we were expected to do our most serious reading or study, as indicated under the guidance of a program laid out for us by our tutors.

I had elected to read in the School of Forestry. I spent four summers on these "vacations" on the Continent. It was when I did my practical work in the German forests, according to the course of study as set up in Oxford, under Sir William Schlich. In our thesis for the degree, we carried out studies to gather information for a working plan for a definite area of forest land in a German forest. We had to survey and to

WCL: map it, to make a survey of soils and vegetation and forest stands. We had to establish the growth rates, timber volume by stands, and those facts that were necessary to preparation of a working plan that was supposed to be practical and to be founded on sound scientific knowledge. After we had carried out our studies for management of a definite forest tract and had finished our thesis on this work, we were then sent to visit forests of different kinds and under different types of management, to give us a broader view of the subject of forest management responsive to different sites and physiographic conditions. This final study tour took us students to forest regions in Germany and in parts of France.

This program was interrupted by the outbreak of World War I. I was then in Germany along with two British students. We were in the little town of Freudenstadt in the Black Forest when the newsboys rushed out on the streets carrying newspapers and calling out, "Extra! Extra!" in German. This newspaper announced the declaration of war by Germany against France. This was the beginning of the First World War. British students found it necessary to leave immediately for England. But I didn't see why I should have to leave so quickly, because the United States was not yet involved. I used the time to good advantage by translating some German works on forest silvicultural systems of management which Engler had worked out in the Schwartz Wald. And in afternoons, I would take my exercise walking into the forests where Engler had worked out his theories in practice.

Chall: Was Engler an old-time forester?

WCL: Oh yes. He was one of the top authorities in German forestry. He had worked out a special system of silvicultural treatment that I wanted to bring to the United States. To this end, I translated his work, "Femel Schlag Betrief," from the German.

Chall: You felt his contribution was unique, that we didn't have it in this country, or we weren't concerned with it at the time?

WCL: We were not concerned; or we had a lot of ideas, but they never had been put to the test in the United States.

Chall: I see.

WCL: Because it takes time in forestry for many of these measures to come to fruition.

Chall: The Germans were leaders in forest management at that time?

WCL: Yes. German forstmeisters were trained in making very close observations of natural conditions and in knowing how to

WCL: modify those conditions, as an objective of management for a region.

Sir William Schlich, of course, was in charge of our schooling, and arranged plans for the four of us--a Scotsman, an Englishman, a South African and myself--who were mature students and were out to learn all we could. We were workers too. Sir William liked our progress, so he had us assigned to go to Germany to work with forstmeisters who had been outstandingly successful in their forest management. Among the best German forstmeisters was Herr Hebel of Salmunster Hessen Nassau. His work was so interesting and important, and taught me so much, that I want to go into it in detail.

Chall: That's a fine idea.

Herr Forstmeister Hebel, Specialist in Growing Oak For Furniture

[Written by Dr. Lowdermilk for insertion here]

WCL: Herr Forstmeister Hebel, of the State Forest of Salmunster, had become widely known for his ability and success in growing oak timber especially suited for the manufacture of high-quality furniture. The lumber for this purpose must have narrow, uniform annual growth rings. As a wood technologist will tell us, the annual growth ring of hardwood species, especially of oak, is made up of two layers: one is the narrower and softer spring growth and the other is the summer growth, wider and harder. So if spring growth makes up most of an annual growth ring, then the lumber is softer, more easily worked and does not readily crack on drying. But if the summer growth makes up most of the annual growth, then the lumber is characterized by alternating hard and soft layers of growth rings; the lumber is harder to work. The sharp difference between soft spring wood and hard summer wood makes lumber easy to split and it is more difficult to make accurate joints.

The silviculturist like Forstmeister Hebel, as distinct from the Agriculturist, sets up his objective of growing uniformly narrow annual rings that give us less pronounced hard summer wood. He must control the sunlight that falls on his forest stand. He does this by getting a close and uniform spacing of young trees. This uniform restocking is the first essential. Oak seedlings will be planted to fill in gaps if they occurred.

Thereafter the silviculturist must carry out a program of systematic thinnings of young trees to maintain the uniformity of the stand. He will encourage competition among the trees,

WCL: especially in the period of more rapid growth so that the ratio between tree crowns and tree roots shall be uniform, to keep the stems of the trees of the stand shaded by a closed canopy of tree crowns. Sunlight on tree stems encourages dormant buds to grow into branches. But the silviculturist must manage his stand so that the stems are kept in the shade, thus discouraging the growth of dormant buds. Then the trees of the stand compete with each other for the sunlight above. They grow tall and straight. Here the silviculturist controls this competition by maintaining the trees of the stand at a given density, so as to keep the annual rings as uniform as possible by judicious thinning and by introducing an understory of a species of trees that endures shade, such as beech trees. This understory shades the lower part of tree stems and prevents the formation of branches from latent buds. Tree stems are kept in dense shade to discourage development of branches.

This is important, for a branch that develops on the stem means that as the tree grows in diameter, a knot is formed that renders the lumber much less valuable than lumber without knots, or clear lumber, as it is known in the lumber trade. In Europe, such shade-producing understories are commonly produced by natural seeding or planting of beech trees.

The spread and density of tree crowns become very important in encouraging stimulation, distribution and uniform spacing of young trees of the stand. Judicious thinning is necessary then, to remove diseased and malformed trees and to keep proper lighting for growth and straightness of the tree stems.

To maintain the trends of several factors integrated in a developing forest, the silviculturist needs some indicator such as an instrument photometer, and better yet, the close observation of plant indicators.

In Germany, especially in Hessen Nassau, this need is supplied by huckleberries that form a soil cover. The huckleberry growth gives rise to a forest soil mulch that protects from soil erosion during heavy rains. Moreover, the terminal ends of huckleberry branches are very sensitive to light. Herr Forstmeister Hebel taught us to observe very closely the behavior of terminal branches of this huckleberry ground cover. If the terminal leaves were dying back, this would indicate to the silviculturist that light intensity getting through the forest crown was diminishing. But, on the other hand, if terminal leaves of huckleberry plants were growing, adding new leaves, then the intensity of light through the crown canopy was increasing.

These indications would show the aggregate trends of light necessary for photosynthesis and would suggest to the

WCL: silviculturist whether to increase or decrease thinnings within the stand.

So successful had Herr Hebel been in growing narrow-ringed and soft-textured and clear lumber, free of knots and of high quality, that he had been awarded citations for his achievements.

The tendency has developed that clear lumber is giving way to pulp and chip production from which compress boards are being manufactured. This trend turns timber production into more of a technology than a plant science.

Chall: I didn't know that these things had been worked out so scientifically as they had in Germany. You got good training.

WCL: Oh yes. We were taught to diagnose a whole situation, analyze factors of the problems, and then either bring them together to integrate them so that you would modify the measures, or adjust them to other measures.

Chall: Yes, you always came out with some kind of a principle based on a total evaluation of the situation.

Americans Learn Forest Management in Germany

WCL: That's right. I did my thesis in German and Sir William Schlich signed it. We were his favorite students, and we didn't want to fail him because we admired him so much.

People in the United States were beginning to get interested in scientific forestry, among them Gifford Pinchot, Henry Solon Graves and Fernow. A group of prominent Americans went over to see Sir William Schlich. Sir William became the principal contact between interested Americans and German scientists in the new forestry. It came to be popular for American scientists and educators to visit Germany and to see first-hand how the science of forestry was developing. Many Americans got their grasp of what forests really were about. And that stimulated a big movement among our pioneer foresters here in the United States. Now I don't know if we need to go into our attitude toward the forest resources of the country, except to say that the general opinion was that they were inexhaustible.

Chall: That seems to have been the theory at that time.

WCL: And the wasteful use of the timber by cutting. Of course, much of the farm land was covered with forests, and so the tree was an enemy to the farmer who was pioneering in the breaking of new land. So the attitude toward the forest was hostile rather than friendly.

The British Foresters

One other thing I wanted to say is that the Britishers, in the training of young foresters for British Colonies, selected qualified and sound young men, good students. Their esprit de corps was splendid. I enjoyed working with the Britishers because most of the men who were my classmates were being trained in forestry for some colonial post, in central South Africa, India or Cyprus.

At one time, Cyprus was denuded of trees, and the land had been grazed to the roots. British forestry brought back and developed one of the finest forests of the Middle East. This was convincing proof that the destruction of the former forest was not due to an adverse climatic change. British foresters, who also had pasture men on their staff, did an outstanding job in the restoration of the forest of Cyprus.

I learned to know many young British foresters who were candidates for the British Colonial Services. One of my greatest friends was for years in India but now is the professor of forestry at Oxford, H. G. Champion. He's a very fine man and a very able forester.

Chall: And he was one of your fellow students?

WCL: Yes, we did our field work in Germany together.

There was Bill Watt, from South Africa. When I was on my trip to China we were held up in Durban, South Africa, by a wrecked engine on our ship. The American consul told me that we wouldn't get a plane for three weeks. I knew that my Oxford classmate Bill Watt was there, and made known my presence. He said he wanted to show me some of the country of South Africa.

Chall: Oh, while you were waiting?

WCL: It's amazing how these Oxford contacts have been so very interesting. There was Bill Watt, an Irishman; there was the Englishman, Champion; a Scotsman named Ian Clark, and he was a burly fellow. When he put on his kilt he was a magnificent

WCL: specimen. Then there was a fellow by the name of Nicholson who was a brilliant young fellow. Sir William threw us together.

I look back on my association with those keen, able people with a great deal of pleasure. Later on they became leading authorities in the British Empire. So I was known over quite an area: England, Ireland, Scotland, Africa, New Zealand and India--they all know me.

Chall: You could always have a little reunion when you traveled abroad.

Study Methods in Oxford

Chall: Would you explain the examination system at Oxford a little more fully?

WCL: We were not graded on the number of questions we answered. We were graded on the thoroughness and grasp of our answers. In the examination in which I got the highest grade, I answered only two questions. In the United States, if we have ten questions, you're supposed to answer the ten. But there, the fewer questions you answer, the chances are, you'll get a higher mark, if you demonstrate a thorough knowledge of your subject.

Chall: But you had to be thorough.

WCL: Yes. In other words, you were supposed to know your facts. It was what we could do with those facts that counted. And I think that was one of the most important things that I learned at Oxford--that became the basis of my studies: thoroughness.

II THE FOREST SERVICE, 1915-1917

[Written questions and answers]

Chall: I presume that now after graduation, you returned to the United States?

WCL: Yes.

Ranger in the Tonto National Forest

Chall: What was the first work you did in the Forest Service?

WCL: My first appointment was as assistant forest ranger at Payson, Arizona, in the Tonto National Forest, at ninety dollars a month, stringing telephone wires on trees to establish communications in the Tonto Forest. Some felt this was quite a comedown from Oxford, to begin in such a lowly position. But I enjoyed the frontier life, outdoor living, doing my own cooking. My fine intelligent horse was my all-day companion.

Chall: What kind of a forest was the Tonto?

WCL: There was little timber here, for the Tonto Forest was used mostly for grazing by big cattle ranchers and sheep herders who had fought deadly range wars until the U.S. Forest Service took over.

I used to say that if Suhuara cacti were trees, I had a big forest to supervise. I also policed the sheep driveway from the winter desert pasture, through the Tonto to summer pastures in the mountains, to prevent sheepmen and cattlemen from shooting each other.

In my horseback trips of inspection, I was delighted from time to time to see one cow "baby-sitting" for several calves while other mother cows sought grazing in the vicinity. Cows would take turns "calf-sitting" for mother cows who had tucked their calves close together under bushes for shade.

Chall: This was quite a pioneer experience for you. What was the spirit of these pioneers?

WCL: Well, this was a region where it was the custom to leave your kitchen door unlocked so that if any horseman passing by needed food or a bed, he could go in and make himself at home. But the unwritten law was that each guest would clean up the dishes and the kitchen and leave the wood box filled for the next person.

During the summer's inspections by horseback, I returned to my cabin after dark and on one occasion saw a bulging gunny-sack hanging from a tree branch outside my kitchen door. I cut it down and carried it inside. I lighted my coal oil lamp and opened the sack. There on my table was the most beautiful piece of beef I ever saw. I set to work to make hot biscuits, which I ate with butter and honey along with a big sizzling steak. I cleaned up the dishes, took out my pipe, put my feet up before the stove, and began to ponder who could have given me this treat of fresh meat.

I recalled that about a month before, a cattleman had come by, saying that floods had ruined his mountain road and made it impossible for his chuck wagon to get through to the store for supplies, and asking if I had any to spare. I gave him half my flour and bacon.

Shortly after I had received the meat, this cattleman rode by and waved at me and called out, "Did you get the meat?" My hunch was correct.

Later, cattlemen complained that too many people, unacquainted with the ways of the frontier, were coming in and stealing and leaving kitchens in disorder. Increase of population was beginning to have an effect on our gracious back-country living.

Chall: Did you remain long in the Tonto Forest?

Santa Fe National Forest

WCL: No, for soon I was transferred to the Santa Fe National Forest, a true timber forest that brought into play much of the knowledge I had been taught in forestry. This was a new country to me. It was a picturesque area in the upper Rio Grande Valley where mountains rose on Hicorita Peak to thirteen thousand feet. I manned the Peak with a forest guard who was a fire lookout.

Chall: What were your duties here?

WCL: In the Santa Fe Forest my duties included administration of timber sales on government land. The Santa Barbara Tie and Pole Company, which was a subsidiary of the Santa Fe Railroad, had contracted for the timber on Santa Barbara Creek to make into hewed and sawed railway ties. In the spring, these were floated down the Santa Barbara stream, in high water fed by melting snow, to the Rio Grande. Also I had to mark timber in the timber sale area to be cut, and to scale logs that were skidded into the sawmill pond. Further, it was my duty to see that lands were left in good condition and that slash was disposed of safely to reduce fire hazards. Timber was cut, up to eleven thousand feet.

Chall: Why did you leave this Santa Fe Forest work?

WCL: Just as soon as the United States declared war on Germany in 1917, I volunteered and was assigned to the Tenth Engineers, A.E.F.; that became the Lumberjack Regiment of the American Expeditionary Forces.

THE FOREST SERVICE, 1915-1917

[Taped questions and answers]

Chall: What I hoped that we could get into today was your original experience as a forest ranger. You had gained quite a bit of background in Oxford that was useful to you.

WCL: Oh yes.

Tonto National Forest

Chall: Now when you were in the Tonto Forest were you living a rather solitary life?

WCL: Well, in the ranger station there was room for me. At times the ranger's wife would have me in to meals, but ordinarily I went out to the store or to a little restaurant in the town of Payson, Arizona. Payson has now become quite a resort area. In those days there were just a few houses and stores where the ranchers roundabout got their supplies and their mail.

Chall: Where was this cabin where you were doing your own housekeeping? Did you just use that when you were out in the field?

WCL: Yes. The ranger was at Payson and the headquarters were there. But then he assigned me to Pine, Arizona, which is under the Mogollon Rim. Do you know Arizona at all?

Chall: Not well enough to know the Mogollon Rim.

WCL: It's in the Coconino Plateau, into which eroded the Grand Canyon. And that Plateau extends to the south of the Grand Canyon. There's quite a pine forest covering much of this area, and you come to what is called the Mogollon Rim, which is an old fault escarpment. When rain storms come up against this, there are terrific lightning storms. I've been out in them when the sparks were coming off my hands and my shoes cracked. I guess I was safer there than being a distance away from it, because this was where the electricity was forming and it hadn't reached such high voltages. So it

WCL: wasn't really as dangerous as it seemed. But this is the Mogollon Rim.

Chall: Were there pine forests around it?

WCL: Yes, especially up on the Coconino Plateau there's some find timber. But primarily it is more or less oaks. The Arizona cypress is endemic here. There's only a small area of the world where the Cypressus arizonica and the Cypressus labra grow. The bark peals off; it's distinctive in that respect. You find it all over the west now and it's used for an ornamental shade tree. I've seen it in England and in Europe. In South Africa throughout the Basutoland and at about ten thousand feet elevation, I was surprised to find two rows of Arizona cypress.

Chall: It had been planted there?

WCL: Yes. It's a very favored tree because it usually has a good form, it doesn't have any diseases, it's resistant to insects and also it's hardy.

Chall: Is it drought-resistant?

WCL: Yes. It is especially used for planting in rows. I always look upon it as a friend.

Chall: Then you were really doing two things while you were in Tonto. You were protecting the forest as it was, and you were also watching over the cattle land.

Lumbermen vs. Government

WCL: You have to realize that the term "forest" in the Forest Service speaks of an administrative area, and not necessarily of the type of vegetation that lives on it. In the early days there was a contest between the government and the lumbermen who were anxious to keep the land in the private domain. And they had a graft of getting school teachers during their vacations to homestead quarter-sections of land that contained fine stands of timber. These young women from the eastern part of the country came out and the land office was quite generous in letting most anything go. So they would homestead this quarter-section of fine timber and make no attempt whatsoever to cultivate it or build a house on it. Then the

WCL: lumber company would buy it from them at a very low figure.

Chall: I see.

WCL: So this kind of steal went on in the public domain over vast areas. This applied pretty much to land covered with good timber. Then we had the bordering areas which were blocked out without any attempt to follow the forest boundary. These areas were blocked out for administrative purposes and also for watershed protection, because the Forest Service is responsible not only for growing timber or growing grass for pasture, but also for controlling storm waters and erosion. In these other areas where grazing was the principle use, there was a competition between the cattlemen and the sheep herders.

Cattlemen vs. Sheep Men

Chall: Did you get into the fights between cattlemen and sheep men?

WCL: Yes, I was a part of this period. The cattlemen would say that sheep would ruin the range for cows, and cows wouldn't graze after sheep.

Chall: Well, there wasn't much left, was there?

WCL: Well, in some places there was. You can manage grazing if it's properly done, just as you can manage a forest. It's a resource, and if you don't over-graze the land give it time to rest, it recovers. You see, the nutrient portion of the plants is stored in the roots, and you have to have leafage to produce the nutrients to store in roots. If you permit rests to take place so that the leaf grows up, then you strengthen the root system and that will increase the growth of grassy forage vegetation. Then also the theory that cattle won't graze after sheep is more or less a myth. Of course, it was their competition around waterholes that brought on the fights usually.

Chall: Oh, for water.

WCL: Yes. Of course, the sheep men could come in and get out. The cow man had to have some cultivated land to grow some hay for forage, so he couldn't follow the animals around. He had to learn to graze his cattle around his headquarters.

WCL: But the sheep man had his own supplies and he could go off anywhere he wanted to. He wouldn't restrict himself to what was accepted as the cow man's country, so the cow man would shoot at him--not for fun either. Around this area, I know of about twenty men who were killed.

Chall: Well, what were you able to do then? Were you trying to encourage the understanding of the proper use of vegetation, or were you just trying to keep the sheep and cattle men apart? Were you really a policeman, or were you trying to educate?

WCL: Of course, as rangers there was nothing we would run away from. Anything that came up that concerned the use of the area and the safety of people was our concern. But before, when the public domain was open, this war went on. The cow men could run some sheep men out and the sheep men would run the cow men out. But when the area was withdrawn and brought under the public domain of the National Forests, then the Forest Service administered the land and they brought the cattle men and the sheep men together. They recognized that both had rights to raise their livestock under certain supervision.

Chall: I see.

WCL: And of course, the principal thing that the sheep men wanted was to raise their herds in the desert in the winter time. And then in the spring, migrate to where they would graze in the grassy glades in the high mountains. Then in the fall of the year they would come down again and cross over all this territory. Now, the Forest Service proposed, and got them to agree, to set up driveways. And my job was to keep the sheep and herders in the driveway. Of course if the driveway had been grazed down badly, a sheep herder might go around behind the mountain and hole up there for three days or so and feed up his herd and then come into the driveway and go on. So I had to hunt these out and keep them on the move.

Chall: I see. You must have been on horseback much of the time.

WCL: Oh yes, all the time. I lived on a horse. I had to have several mounts. Well, that I enjoyed very much.

Chall: Yes, you were a real rugged outdoorsman. Now during this period, were you studying anything new?

Personal Challenges

WCL: Well, that's where my geology came in to very good advantage, because to work out the geologic structure, the history of an area, is quite a challenging thing. Of course I had a degree in geology. So I had quite a good background to work out the geology of the area I was in.

Chall: Were you supposed to be doing this too? Or was this just a personal challenge?

WCL: Just a challenge. But that's what made our Forest Service so fine. There was William B. Greeley. He was a big, genial, keen, broad-minded man. And he had entered the Service as a ranger. So that's when you could discuss your own territory. Many of these Forestry people may not have been geologists, but they were interested in all that was going on in their region, and the wildlife too. Curiously enough, I ate more venison in Germany from the German forests than I ever did here because they managed their game there. Here we simply murdered our game.

Chall: At that time.

WCL: Of course, now in some places we have a superabundance of game.

Chall: So you were just enjoying the fruits of your background as you went around on horseback.

WCL: Well, then of course, one had to be self-reliant to be a forest ranger. You had to do what was necessary to get on and to have the right attitude. But so many young men now try to inch out, to get the most money they can per month and advantages this way and that way, without seeming to have any challenge. Some of them today don't get my admiration.

But back in this period, you had men looking to the future. Actually foresters have been the forerunners, the pioneers, in most conservation programs and philosophy, even more than our agriculturalists or our agronomists. Of course the agronomist is always thinking of the next harvest. But the forester has to think in terms of decades or hundreds of years because his crop doesn't mature so quickly. And this very act of thinking ahead, planning for the future, creates a type of mental competence, mental interest and stimulation that is good medicine, and it would be good medicine for a lot of these newer fellows today.

Santa Fe National Forest

Chall: Did you stay long in the Tonto Forest?

WCL: I was on the Tonto at first, but later on I was transferred to the Santa Fe National Forest which is a true timber forest. My only trouble with the job of fire lookout was that the snow didn't melt away until toward the end of July, so that the lower country could dry up and be a high fire hazard before we could man the Peak, so we set our lookouts lower down to give a wider view over the lower country. I've explained my duties regarding timber sales in my written answers to your questions.

Chall: Where were your headquarters?

WCL: The headquarters camp of this company was at Tres Ritos (Three Rivers), located at 10,500 feet elevation where three beautiful trout streams came together. In winter we were snowed in for at least two months with little communication with the outside. The time might have laid heavily on our hands, except that during these long, long snowbound days,the tie inspector of the Santa Fe Railroad and I decided to become proficient in chess. So we bought the books containing records of the games of the masters. We would play those to see how they would go about it and their objectives. Then we would go on our own and see how we got on. Well, anyway we had a very interesting time, and my interest in chess has never died out since that time.

Chall: Was this the first that you'd ever played chess?

WCL: Yes. I'd played checkers, but this was the first time that I played chess. When I was in the War, Captain Coolidge was the field man of the Committe des Bois de la Guerre--Committee of the War Timber. He was stationed at Paris and I was at Besancon on the northeastern front. And we had to have meetings on policies, new orders and so on that were coming out. So I would go to Paris, and after we had taken care of our business then we'd go down to the Cafe de Regence or the Cafe du Univers where the world's headquarters of chess was, and we'd play there. Sometimes we'd get whopped. But I held up much better than I thought I might.

Chall: All those winters in the woods gave you valuable training.

WCL: Among other things in the Santa Fe Forest, I was appointed to make surveys and to select lands that had deep soils with water nearby and general topography suitable for cultivation to grow food crops in case that a threat of war might come from an invasion from Mexico. But no invasion ever took place.

WCL: There was quite a feeling that the Germans would incite Mexico to invade the United States through New Mexico, because more than half the people are Mexicans in New Mexico.

Chall: I see.

WCL: And if they did that, we rangers would call ourselves a thin green line and be the first to meet the attack. And so we had ammunition. I had a rifle on my saddle and a revolver and stores of ammunition.

Chall: So you were ready.

WCL: I still derive great pleasure from my memories of the gorgeous scenery and coloring of this region, where the purplish green of the alpine fir and cork bark fir, and the bold patterns of old burns of forest fires, are marked by the golden yellows of aspen trees that come in after the burns.

Chall: After the burning, the aspens come in?

WCL: Yes, they always do. They follow the fires because the aspens start and then they grow up. Underneath other trees, in time they die out. At least the roots remain alive. Then when the fire runs over, with the removal of competition from the other vegetation around, the aspens sprout up quickly. So with a big fire, after a couple of years, you could trace the boundary of the fire by this golden yellow. And not all the area would be burned, so you would have this purplish green, especially in the shadowy, mountainous areas, and it was simply gorgeous.

Chall: It would be.

WCL: And on my beautiful horse riding on the high trail, it was really an experience. And yet I got paid for it. [laughter]

Chall: That's always even better.

WCL: Before long, the United States declared war on Germany in 1917. I volunteered and was assigned to the Tenth Engineers.

APPOINTMENT. S. 3048 1.22-13

DISTRICT No. 3

UNITED STATES DEPARTMENT OF AGRICULTURE,
OFFICE OF THE APPOINTMENT CLERK,
WASHINGTON, D. C.

August 10, 1917.

Mr. Walter C. Lowdermilk,

Forest Service.

Sir:

You are hereby notified that you have been appointed to the position of Forest Ranger, - on the miscellaneous roll of the FOREST SERVICE, at a salary of $ 1100 per annum, to take effect on August 1, 1917.

By transfer from the statutory roll.

You have been granted leave without pay from the termination of July 31, 1917, until further order, you having entered the military service.

By direction of the Secretary of Agriculture:

Respectfully,

Appointment Clerk.

Legal residence:

8-2915

III THE LUMBERJACK REGIMENT, 1917-1920

[Written questions and answers]

Chall: What did you do after enlisting in the Army?

WCL: I was inducted into the Army in Fort McDowell, on Angel Island in the San Francisco Bay. Here we trained for a month and then were shipped to Washington, D.C., and there training continued. I was promoted to Technical Sergeant First Class. We set out for England via Halifax.

The Voyage to Europe

Chall: Did your group have a good time getting acquainted on board ship?

WCL: Well, yes and no. We had a miserable voyage. It was so stormy that many of our Tenth Engineers were desperately seasick and periodically rushed to the rail. We all remember how our mascot, a little goat, staggered to the rail and knelt down on its knees alongside his American buddies and contributed his bit to the sea.

When we arrived at night and marched through Glascow, Scotland, anxious local people reached out to pinch us, to assure themselves that at last the Americans had come and that we were not ghosts. From Glascow, we were almost immediately shipped to northeast France. Our French railway cars were designated, "Capacity 8 horses--40 men."

Chall: What did your Lumberjack Regiment do on arrival?

WCL: We began at once to establish camps within the forests of the Jura Mountains to house our lumberjacks, and began cutting logs immediately to be ready as soon as the sawmill could be set up. Our expeditionary forces were in need of lumber and timbers in large quantities. The sawmill roared day and night. I remember waking up one night with a start. Then I realized that the noisy mill had stopped--the silence had awakened me.

August 31, 1918.

From : 1st Lieut. Fred Morrison, 10th Engineers

To : C. O. 10th Engineers (Thru Military Channels)

Subject : Military Administration- Recommendation Sgt. 1st class Walter C. Lowdermilk for commission.

1. Sergeant First class Walter C. Lowdermilk has been a member of Company F, 10th Engineers (Forestry) to which he and I have both been attached since August 12, 1917. He has been under my immediate command since November 1917.

2. I know him to be a man of sterling worth, fine soldierly bearing, well educated and of unusually good personality. He possesses a thorough working knowledge of technical forestry with the combined knowledge of French forestry methods and forestry practices as related to American exploitations of the forests of France. He possesses a marked ability of location and situations with respect to log ing chances. He is very clubable and speaks French fluently. I especially commend him as a man of extreme devotion to duty, industrious beyond question and I believe that he would make a valuable officer in connection with Forestry operations and related industries.

FRED MORRISON
1st Lieut., Engrs., U.S.A.

jwt

Timber Acquisition Officer

Chall: What was your personal assignment?

WCL: I was soon commissioned and assigned the task of Timber Acquisition Officer. This meant that I was to search out bodies of timber suitable for the needs of our American armies in northern France.

Chall: How did American methods of cutting compare with French methods?

WCL: The French lumberjacks were very careful in their procedures of felling trees. A man with a hoop around himself and the tree and with spiked shoes, climbed the tree, cutting off all branches and leaving only a tuft at the top. Then by very careful and accurate undercutting at the stump, they would fell the tree with remarkable accuracy within a foot or two of where they chose. In this way, the tree fell with a minimum of damage to surrounding young growth on which the new forest depended.

But our American lumberjacks refused to climb and cut the branches this way. This was war and our armies required timber, so they slaughtered the French forests by felling trees, branches and all, destroying surrounding young growth without concern for future forests.

Chall: Did you return to the United States immediately after the Armistice?

Settling Timber Account After the Armistice

WCL: Of course the operations ceased after the Armistice, but I was asked to remain on for quite a time. Then my job, with a few assistants, was to survey the timber that had not been cut but that our Army had agreed to pay for. I had to sign over to French authorities the sawmills of northeastern France (there were nearly a dozen of them), including timber and facilities, to release our American Army from any further responsibilities.

This new assignment meant that I was given a car and driver and an assistant officer, and for several months I traveled over east and northeast France. As a Timber Acquisition Officer, it had been my responsibility to see that our scalers

WCL: kept accurate records of timber cut and processed, looking to final settlement with the French government. When the French account or bill was given us, there was a discrepancy of about two million dollars in their favor. We were able to establish the accuracy of our records. They did not contest our totals. Thus we saved our government a large sum of money in the final settlement.

Commission on War Damages in Invaded Regions

Chall: How long did you remain in France?

WCL: It was a year or more after the fighting stopped. Part of the time I spent in Paris on a Commission that ended far too soon, for we had a good set-up, good pay and generous expense money. This was a special Commission of about five of us, set up at the request of President Woodrow Wilson, who questioned the accuracy of the big claims made by France against Germany for war damages in the invaded regions. Somehow, the Allies came to an agreement and our Commission was terminated.

THE LUMBERJACK REGIMENT, 1917-1920

[Taped questions and answers]

Timber Acquisition Officer

Chall: What were some of your duties as Timber Acquisition Officer?

WCL: This meant that I was to search out bodies of timber to fill the needs of American armies in France, and to locate mills and other sites in northern France to saw up this timber. For example, we had to build docking facilities at St. Nazaire, France. The docking facilities that the French had built were quite inadequate for the use that was made of them.

When we began to bring over our military supplies in great quantities, then we had to increase the docking sites, and so docks had to be built and we needed piling. Trees suitable for piling must be a certain size, straight, and also not too big in diameter. So I had a small staff of cruisers, and we cruised the forests to find out what kind of timber and how much there was within the range of our sawmill.

Chall: For all kinds of purposes that you knew you needed?

WCL: Yes. So that was one of my jobs. Of course, French foresters didn't want to see us cut this fastest growing stage of timber--small, straight. The big trees were all right. So then I said, "Monsieur La Bode, here is timber of those sizes we most need, and here are others." And he then said, "Oh, mon dieu, vous connaissez mon bois mieux que moi!" ("My God, you know my forest better than I do!") Then of course we had to have barbed wire and entanglement stakes by the millions.

Chall: Your ability to speak French must have served you well.

Settling the Two Million Dollar Claim

Chall: What caused the two million dollar discrepancy between your figures and those of the French?

AMERICAN EXPEDITIONARY FORCES
HEADQUARTERS SERVICES OF SUPPLY
France, June 20, 1919.

ENG.

Special Orders.
No.171.

GS/w.

Extract

Pursuant to authority contained in 1st Indorsement, GHQ, AEF, dated June 12, 1918, the following-named officers, of the 20th Engineers, are relieved from assignment to that organization. They will retain their present stations and duties under the Director of Construction and Forestry at the places indicated opposite their names:-

Lieut-Colonel	W. B. Greeley,	Tours,
Lieut-Colonel	R. H. Benedict,	Bordeaux,
Major	C. M. Granger,	Tours,
Major	Francis Kiefer,	Tours,
Major	Swift Berry,	Bordeaux,
Captain	A. W. Higley,	Captieux,
Captain	Fred A. Ames,	Paris,
Captain	A. W. Elam,	Pontenx-les-Forges,
[illegible]	[illegible]	[illegible]
2nd Lieut.	W. C. Lowdermilk,	Besancon (Doubs).

Brig.General Connor,
By Command of [illegible]:
E. E. Booth,
Chief of Staff.

Official:
L. H. BASH,
Adjutant General.

38a

WCL: The French depend on volume tables. Of course one of the things we always do when going into a forest area, is to work up volume tables which are based on the diameters and heights of trees. And then we have formulae to determine the amount of volume within trees of certain diameters and certain heights. Now in the cruise of the timber, the size of the tree at breast height--four and one-half feet above the ground--is measured or estimated.

Of course in France we measured trees with calipers. But when it comes to the height of the tree, the French determine the average height of trees for these dimensions, and record and work out the volume. Now the heights of the trees, as I said, were determined beforehand. But the French set up averages for different sites.

Where the soil is fertile the trees will grow taller and the dimension of the tree will be quite different. For example, if you are on a sandy dry slope, the height of the tree will be much less; the average height, even though for the same diameter, of the tree will be shorter. Now if you have two bodies of timber, and in one the soil is fertile and the slopes face north and there is a cooler moister climate, then your trees will be taller. But on the dry sites, your tree will not be so tall. Well, ordinarily the French will outline certain areas where they will take these two heights and average them, so the volume of timber for this area will then be based upon the average height for these measured diameters. Now in order for this volume table to work, it would have to be based on an average height. But if your forest authorities want to see that you get the timber on a rocky slope and be charged as if it were the average, the quantity of timber is less and yet you have to pay more for an adequate supply to meet your needs. And you see, nobody had pointed this out.

I explained it to Colonel Greeley. He saw my point. So we Americans made a stand. We contested the scale of the French foresters, which wasn't a very nice thing to do, since we were Allies in a victorious war, but we were paying a big price anyway.

Chall: So the French accepted it when it was pointed out to them.

WCL: The French had no comeback, because they knew they had used this trick. Then there was one other case. We also included the branch wood which the French use for fuel. They piled it up in what they called "steers," that is, a meter tall and a meter on each of three sides--this equalled a cubic meter of piled wood. And of course we Americans wouldn't pile it, we left it on the ground as slash. But I had kept a scale on

WBG*WRC

6 June, '19.

Captain Roger K. McGee,
Engineers (Forestry), Levier (Doubs).

Assignment of Lt. W. C. Lowdermilk.

1. Lt. W. C. Lowdermilk has been detached from the 24th Company, 20th Engineers and instructed to report to you for duty at Levier. Lt. Lowdermilk will be carried in the Engineer Establishment and will not be assigned to any vacancies in your command. The purpose of the above instructions is to have Lt. Lowdermilk available in the Besancon District for the next three weeks in order to assist this office and the American Delegate on the C.I.B.G. at Paris in investigating matters which may arise in connection with the settlement of timber purchases, damage claims, or the transfer of lumber or technical engineer equipment to the French. Lt. Lowdermilk should be held available for duties of this character and should not be given an assignment as detachment commander. He will, of course, be available to assist yourself in carrying out any instructions which you may receive in regard to the above subjects.

By direction of Brig. Gen. Jadwin:

W. B. GREELEY,
Lt.Col.,Engrs.

WCL: this. So they accused us when their scale didn't agree with ours. And they said, "Well, you lost it in the branch wood which you didn't make use of." I let them make that point. Then I reminded them that at Gevrey Chambertin they had wanted the branch wood themselves. And all we were charged for by the French government was supposedly just the stem wood. And they agreed to it when I showed them the discrepancy. In this case, we were both working on the same basis. And then I said, "The reason why the volume is different is because your foresters only marked where the trees were short, and not where the trees were tall." Then they finally said, "Well, we have conceded on price, and we expect you to concede on volume."

Chall: I guess your ability to keep records was of vital importance during these transactions.

WCL: Well, it was very interesting. It was rather a tense situation because for instance, they said, "You've got all these branches left in the woods and the uncut ends of trees." Then I got crews from our own forces and a lot of string and I set these boys out to run string to mark off lanes. And then I had the boys measure every piece of wood in them that was a meter long or thirty centimeters in diameter. There were thousands of pieces, and I had it all listed up on paper and presented it. And the French foresters thought, "What will these Americans do?"

Chall: These brash young men.

WCL: Then they couldn't use the argument that we had left it in the woods anymore. Still, their volume was short. We were paying them for more timber than we were getting.

Chall: But even with all that, you came out two million dollars or so ahead?

WCL: Well, they agreed to accept our figures, and then we didn't lose it. This gets me back into a very interesting stage of my life. Oh, I had lots of fun.

Chall: You enjoyed the challenges.

Commission on War Damages in Invaded Regions

Chall: What was your work on the special commission set up by

Chall: President Wilson?

WCL: He questioned the accuracy of big claims made by France against Germany for the war damage in the invaded regions, such as fields riddled with trenches and buildings destroyed, railroads and equipment ruined, forests shattered and ruined by shell explosions and embedding of shrapnel. You see, when the shrapnel would embed itself in the wood they couldn't use the logs in the sawmill, because the saw would cut into the shrapnel and be ruined. It was worthless except for firewood. So the French had a legitimate claim here. The bridges also of course were destroyed. France had suffered heavily from the invasion of the German army, and apparently they wanted adequate repayment. But then somehow the Allies came to an agreement and our Commission was terminated.

Chall: How did it happen that you were appointed to these special commissions?

WCL: Well, of course, we were there. And I might say that I had a rather distinctive position because I had had very good training and also experience in German forests, which was quite something in those days. Then of course I was active and on the staff of our Commander, Colonel Greeley, and so they put me to work.

IV THE FOREST SERVICE--MISSOULA, MONTANA, 1920-1922

[Written questions and answers]

Chall: What did you do when your war work was ended?

WCL: Of course I came back to the U.S. Forest Service where I had a good job!

During World War I, my chief in the Tenth Engineers was Colonel William B. Greeley. After my extra time in France on the Liquidation Commission, I returned to the United States and visited Colonel Greeley in Washington, D.C. He was now Chief of the United States Forest Service.

Colonel Greeley gave me an opportunity to choose the line of work I wished to follow in the Forest Service. He said the three most promising branches were administration, forest protection, and forest research. I chose forest research.

Therefore, I went to Dr. Earle Clapp, Chief of Research of the National Forest Service. He had surveyed the status of forest research throughout the national forests, and had been successful in getting several Forest Experiment Stations established and equipped. He had appointed capable forest scientists to man these Experiment Stations. But with all this, there was still little application of the results of this research by the Operations staff of the Forest Service.

So when the war was over, Dr. Clapp got the support of Colonel Greeley to set up a new position in each National Forest Region of the country and to man this position in each case with a well-trained forester. This new officer was to be called Regional Research Officer. Dr. Clapp had traveled widely around the nation to interview candidates and to instruct the appointees in objectives in this nation-wide project.

Appointed Regional Research Officer

Chall: Were you one of those interviewed by Dr. Clapp for this position?

WCL: Yes. There was need for one such officer for each region of

WCL: the Forest Service. I was interviewed and offered this position for Region One; that included the so-called "Inland Empire" of the western white pine (Pinus monticola) belt and tributary forest areas. This region included the northeastern part of the state of Washington, northern Idaho, and northwest Montana. Missoula was my headquarters. My goal was to get the results of forest research put into practice by the Operations or Administrative Branch of the Forest Service.

Chall: How did you carry on this new type of work?

WCL: There were no precedents. Each regional man was thrown upon his own resources. We had a free hand to imbue operations personnel of the Forest Service with the importance of research and the desirability of applying the results of research wherever fitting. An unmentioned objective was to overcome the slurs cast at forest scientists, called by Operations, "long hairs." Presumably, we were impractical theorists.

Chall: How did you begin this work?

WCL: First I visited and became thoroughly acquainted with all members of the Forest Research Station and field staff of Region One, and with the problems under study and the status of findings so far reached. Having done this, I visited the Operations staff, including logging silviculturists, marking timber to be cut, and forest protection people, providing for detection and suppression of forest fires, and road and logging railroad construction. I became well acquainted with such problems and works.

Chall: About how long did this take you?

WCL: It took me a few months to isolate a number of urgent problems and to ask many questions under all kinds of circumstances. Then I began a search for the key problem of the woods under forest management.

At last, after about six to eight months, I decided that slash disposal, associated with the logging of forest trees for timber and lumber, was the measure that, despite strict regulations, was costing a heavy charge against the timber stands of the national forests. Here results were the least satisfactory.

Chall: What kinds of timber species were you dealing with?

WCL: Forests of the Inland Empire enjoyed ample rainfall, were favored with good soils and rapid growth of all species. These forest tree species included:

WCL:

1. Western White Pine (Pinus monticola)
2. Douglas Fir (Pseudotsuga Douglasii)
3. Western Larch (Larix occidentales)
4. White Fir (Abies grandis)
5. Western Red Cedar (Thuja plicata)
6. Western Hemlock (Tsuga)
7. Englemann Spruce (Picea Englemannii)

Chall: Which of these species was in greatest demand at that time?

WCL: Western white pine was in greatest demand. The big trees provided clear lumber, an exceedingly high-quality wood. Trees were six to eight feet in diameter and brought good prices. In those days, the Diamond and Ohio match companies were sharply bidding against each other for these glorious and magnificent trees. What a pity it was to cut these beautiful logs for the lowly purpose of making little matches!

So the Forest Service was induced to call for bids to log these woods. But species other than white pine which are valuable today would not at that time yield returns to justify logging and processing. These so-called "weed species" were left standing!

Problems of Slash Disposal

Chall: Were there laws at that time to clean up the slash left on the ground?

WCL: According to Idaho state laws, it was necessary to set fire to logging slash to reduce fire hazards after logging. Such slash fires also killed weed species and under-sized trees. By this means the forest floor was burned more or less clean for a time. Fire hazards were reduced until dead weed trees began to rot at ground level. All such dead and dry trees then blew down and left the cut over and burned over forest land a jackstraw-like pile of flammable material.

Chall: Then I suppose these became another fire hazard?

WCL: Yes, all too frequently succeeding fires burned where past fires had been. These burned out the humus from the soil. On these burned out soils, ashes were compacted by the rains; storm runoff was increased and contributed to higher flood stages and soil erosion. Thus natural forest conditions were

WCL: destroyed. In the end, the condition of the forest land was deplorable.

A forest stand so badly damaged was sure to deteriorate; restocking of valuable species was woefully inadequate.

Chall: Then did you decide this was the key problem for your studies?

WCL: Yes, I decided that for Region One, the key problem was how the disposal of logging slash was to be carried out for the best results.

Jim Gerard, an able and a practical self-trained silviculturalist, who was also our regional logging engineer, collaborated with me in a series of slash disposal experiments in logged over areas. Along with customary piling and burning of slash, we tried out "live burning" of slash. This practice consisted of starting fires at convenient distances apart in damp or wet slash. We would use dry wood to get a hot fire going. Then we tossed branches of slash and other logging debris onto the hot fires. Such hot fires would dry out the slash even though soggy with wet snow. From then on, even in light rains we were able to reduce the hazards of logging slash by live burning!

Wet slash would be burned out in this manner, but the forest mulch or forest litter would not be burned; it would remain in place and protect the soil and favor infiltration of waters from rains and snow melt. Thus we controlled erosion and conserved soils of logged over lands also.

Chall: Did others in the Forest Service recognize this as a key problem?

WCL: Yes, we were so successful in this method of disposing of logging slash that state authorities recommended that Idaho law be revised by the Legislature in accordance with our findings. This was done.

WCL: This slash disposal problem was tough. Do you feel your Oxford and German training helped you to solve it successfully?

Chall: Yes, perhaps so. We made more progress in its solution in Region One than anywhere else. For this success, I give credit to my thorough training under German Forstmeisters as well as to the technical studies in the School of Forestry in Oxford under my venerable Professor, Sir William Schlich, and to collaboration with able field men in our forest regions.

Development of Forest Conservation in the United States

Chall: Dr. Lowdermilk, will you discuss the development of forest conservation in the United States at this time.

WCL: Theory and practice of forestry aroused a powerful appeal in a small group of public-minded Americans. In the first place, forest resources of America were enormous. Land covered by primeval stands of the finest timber in the world made up much of the public domain of the new country of the United States.

In accordance with the long-range policy of Abraham Lincoln to settle up the vast domain, it was possible for timbermen to connive with people of the frontier, including hundreds of school teachers, to homestead land with stands of valuable timber. These homesteads were then deeded over to timbermen, and this enabled them to build up great fortunes in timber holdings for a small amount of money. These vast timberlands became a great steal! Early Americans seemed to feel that our forests were inexhaustible and conservation unnecessary.

Also, these bodies of timber were cut and burned in a careless and wasteful manner that aroused the indignation of forestry pioneers. A few great spirits joined together to protect and to manage these forest areas in line with principles of sustained yields of forest management, and of regulation of regimens of streams.

Chall: Who were some of those who tried to reverse the policy of exploitation of forests?

WCL: One of the first and greatest was George Marsh, a Vermonter, who first gave expression to a theory that mankind was wastefully destroying natural resources in such a manner as to undermine the future of the country.

Abraham Lincoln had appointed George Marsh Ambassador to Italy during the Civil War. Being a studious man, and with little to do as an Ambassador far from our Civil War in the United States, George Marsh became interested in the decline and destruction of resources of the ancient Roman Empire.

He traveled over much of the Mediterranean lands and wrote an epoch-making book, called Man and Nature. Further studies amplified the theme and in another book, The Earth as Modified by Human Action, Marsh described the ruins of the populous and prosperous Roman Empire. Marsh deplored the ruin of resources and consequent fall of Rome.

WCL: These implications aroused a few great minds and gave rise to the call of governors by Theodore Roosevelt to the White House Conference in 1908, to consider problems of the conservation of natural resources.

Several excellent papers were read at this Conference. Among them was one on mineral resources; one on land resources by Professor Salisbury, a geologist; and one by Gifford Pinchot on the horrible fate of timber resources.

Out of these deliberations the case of forest destruction caught the public ear, whereas wastage by erosion of the soils, more basic than trees, did not. Pinchot aroused the people of the new nation to the importance of saving the forests and managing them to supply the present and future needs of a rapidly growing country. Pinchot warned of an on-coming timber famine.

Chall: How did the government react to this newly aroused public opinion?

WCL: Responses developed in different ways. One was to set aside tracts of land, called the Public Domain, into National Forests.

You will be interested that in California the cry of an on-coming timber famine induced many people to plant Eucalyptus trees--a rapidly-growing tree species from Australia--to get rich quick. In selecting this species for thousands of plantations, tree planters overlooked one item--the wood was worthless except for fire wood because of its twisted grain. It's one of the best examples of how one needs to know all the facts before he acts.

Chall: Was there opposition to setting aside forest lands for the Public Domain?

WCL: Yes indeed. The timber interests were most vocal against setting aside forest lands for National Forests, for this interfered with the building of timber empires and great fortunes at public expense. There then began a race to include as much timber lands in National Forests as possible within the authorization by an Act of Congress. This became a lively subject throughout the land.

Forestry Pioneers

WCL: But there were few opportunities of learning about scientific

WCL: forestry in the United States. Bernhard Fernow, a Professor of Forestry from Germany, was made the head of one of the first schools of forestry in the United States, at Cornell University. Others were established. Dean Henry Solon Graves set up the Yale School of Forestry, and on his faculty was a foremost silviculturist, Professor James Toumey.

Professor Carl Schenck established the Biltmore School. It was a unique traveling school of forestry, for sons of wealthy men. The idea was to save time and quickly to introduce his students to actual forest properties undergoing management. Lectures were held on shipboard and stops were made to inspect forests and lumbering in different locations as field work. The idea of this sort of school was good, but the school failed because students treated their education in forestry as a lark.

Chall: How was scientific forestry introduced into America?

WCL: This happened in a rather unusual way. The East India Company of British India induced the German government to send them a trained forester to draw up a program for growing and management of teak forests, to replace those being rapidly logged out in India. The German government sent William Schlich to British India. The Company was well pleased with Schlich's plans and employed him to carry them out. Later, his success earned him a Knighthood when he became a British subject in about 1886.

Sir William Schlich of course knew German foresters and the new science and practice of forestry. He was considered the greatest living authority and his textbooks were widely used.

It became a common practice for Americans interested in forestry to call on Sir William in Oxford, who would conduct them to forests on the Continent where some of the best examples of managed forests could be studied. So there were many meetings with Gifford Pinchot, Henry Solon Graves, Fernow, Raphael Zon and many others. Thus Americans were introduced to the practice of scientific forestry in Germany. Forestry became a popular enterprise.

By this time, the Forest School at Oxford was commissioned to train forestry candidates for British Colonial Forest Services, under the guidance of William Schlich. It was about this time that Hugh Bryan and I arrived in Oxford, and I chose to "do" two schools, one in forestry and the other in geology in my three years at Oxford. I did practical forestry field work in the State forests of Hessen Nassau. Dr. Schenck's traveling school was closed down before my arrival in Germany.

Chall: Apparently Professor Schenck and these pioneers in forestry had a stimulating influence on you. Were there others too?

WCL: I certainly give great credit to Sir William Schlich, who was my professor all through my studies in theory and practice in Oxford and had a great influence in directing my thinking in forestry. Also, I had opportunities later to meet Gifford Pinchot, especially at his home in Washington. He continued to arouse public interest and support to save our diminishing forest stands.

Then too, there was Raphael Zon, during the first part of this century, who brought to the United States a fund of knowledge on the influences of forests on floods and stream flow. For some time his published works on forests and waters opened up this subject to us. Some years later, I followed on into forest hydrology and Zon's mantle fell on my shoulders for a time.

Then too, I knew Roy Headley, Chief of Operations of the Forest Service. In fact, he supported my approach to the study of logging slash disposal referred to above.

Dr. Clapp's book, A National Program of Forest Research, influenced me too. There was Aldo Leopold, a fine man and a personal friend, in the field of fish and game, who was also our outstanding philosopher in conservation of natural resources.

Also, my good friend, Ridgley Chapline, with whom I often discussed erosion problems on grazing lands. Clarence Forsling and I worked together in research in the southwestern region. When Samuel T. Dana, Director of the Forest Experiment Station at Amherst College, came west, I showed him around, and we discussed our problems in establishing research in forest management of forest lands of the west.

I also worked closely with Walter Mulford, head of the Forestry Department of the University of California. He was on the committee for my doctorate and we also had close contact during the years of my erosion studies in California.

Chall: Were there also forestry schools developing during this period?

WCL: There were a number of universities besides Cornell and Yale establishing forest schools in response to a general demand for learning the science and practice of forestry. Some of them developed into fine schools, as those in Anne Arbor, Michigan, and the Missoula, Montana Forestry School. The Universities of Oregon, Washington and Wisconsin developed outstanding Forest Products Laboratories.

THE FOREST SERVICE--MISSOULA, MONTANA, 1920-1922

[Taped questions and answers]

Chall: So then after the various settlements had been worked out, you came back to the United States.

WCL: When I came back, I was interviewed by Dr. Earle Clapp and offered the position of Regional Research Officer for Region One. That included the so-called inland empire of the Western White Pine belt and tributary forest areas.

Chall: You really went into the wilds, didn't you?

WCL: Oh yes. Missoula was my headquarters and my chief was the venerable R. H. Rutledge as Regional Forester, a wonderful man. He was one of those gentle, thoughtful, fair, honest men that the Forest Service seemed to produce, a man who had the confidence of the people with whom he dealt. You needed such men, because in those days the settlers and cattlemen were not very favorable toward the Forest Service.

Chall: No, you were curtailing their complete freedom.

WCL: That's right. We wanted to see regulations carried out.

Chall: By the way, where were you when Mr. Clapp interviewed you? Did you come back to the Tonto or the Santa Fe Forest?

WCL: He found me in Region Three at the Albuquerque headquarters. And incidentally, Region Three of our Southwest established an esprit de corps. If you'd once been in the Forest Service there, somehow you were especially attached to it as you went to other places. For instance, we have Starker Leopold at the University here, who is the son of my close friend, the late Aldo Leopold of Region Three. His two sons, Starker and Luna, are both of them marvelous fellows, very able, very effective.

Duties as Research Officer

Chall: This is a most interesting sidelight on the Forest Service. What now did you have facing you in Region One?

UNITED STATES DEPARTMENT OF AGRICULTURE
FOREST SERVICE
DISTRICT 3

ADDRESS REPLY TO
DISTRICT FORESTER
AND REFER TO:
O
Personnel
Lowdermilk, W. C.

GAS AND ELECTRIC BLDG.
ALBUQUERQUE, N. MEX.

November 20, 1919.

Mr. Walter C. Lowdermilk,

Missoula, Montana.

Dear Mr. Lowdermilk:

Upon the occasion of your leaving this District to assume your new duties in District 1, I want you to know that we are heartily appreciative of the good work that you have done here and that we feel proud to graduate you into your present important position in spite of the fact that we, as a District, are the losers by the transaction. It cannot be too strongly emphasized that the entire Forest Service is still very much in need of young technical men who have the combination of experience, personality, earnestness and enthusiasm.

It is our hope that you will feel that this District has contributed something to what you will undoubtedly accomplish in your new position and we hope that we shall occasionally have the opportunity of seeing you and hearing of your work and progress.

Very sincerely yours,

FRANK C. W. POOLER, Acting District Forester,

By Frank C. W. Pooler

WCL: As Regional Forest Research Officer, I began my task. I visited and became thoroughly acquainted with all members of the Forest Research station and field staff, and with the problems under study and the status of the findings so far reached.

Chall: What were some of these findings?

WCL: Now, for example, research had discovered that the white pine seed, of the Western white pine (Pinus monticola), are stored in the duff or litter, and if we could preserve that duff, then we could be assured that the white pine seeds were stored--more or less as in a refrigerator--and they would grow when the stand was opened up to sunlight. This was established at Experiment Stations before I came into the picture. The operations people dealing with slash were supposed to keep this in mind.

Slash Disposal

Chall: After you had become acquainted with the staff and their problems, what did you do?

WCL: In a few months I had isolated a number of urgent problems. Then I began to search for the key problem of the woods under forest management. What I call the key problem is one which, when solved, solves many other sub-problems along with it.

Chall: Oh, I see.

WCL: You know that in a log jam, there's some key log; if you blow that out, then it frees the whole jam.

Chall: And you decided that slash disposal was the key problem?

WCL: Yes. In these days, as I mentioned in my written answers to questions, the Diamond Match and Ohio Match companies were bidding against each other for the Western white pine.

I used to rebel against it, but of course, really, we were cutting those stands too early. And I advocated the principle that a stand of timber was not economically ripe to be cut until the cut stand would pay for measures to conserve the crop. Because, as I have written, the other trees in the forest were not considered valuable enough to pay for any special measures, or even to cut them, so they were left standing.

Then a state law in Idaho required that after a cutover area is finished, the lumbermen had to go in and burn the slash,

WCL: but this slash disposal would burn and kill all these other so-called weed trees. It removed the slash from the forest floor for a time, but in a short time these dead trees rotted off at the ground level and they would fall, becoming great piles of dead timber.

I made a study of slash disposal, with Miller, the Dean of the Forest School of Idaho, entitled "Minimum Requirements in Forest Management." And then there's the study I made with Jim Gerard. He hadn't gone to forest school. But I told him he was one of the best silviculturists we had in Region One. "Well," he said, "I never went to forest school." I said, "But you've got the knowledge; I don't care how you got it, I give you credit for it."

Chall: Was he one of the operational men?

WCL: Yes. And that's where we worked together. I made him senior author in my study of slash disposal.

Chall: So this first burning of slash, while seemingly a protective measure, created a serious problem.

WCL: Yes. It was an accepted practice of the time and the place in this inland empire. Fire hazards were reduced until the dead weed trees began to rot and blow down. Then in fact, it was practically impossible to fight a fire in that material because it was so flashy and fire advanced so rapidly in it. So whenever a fire occurred in this material, we had to retreat back to the green forest where we had a better chance of stopping it.

Chall: How long would it take between the time that the first fire had been made over the original slash and the dead trees began to fall down?

WCL: Three to five years usually. It would depend on the size of the trees, because the dead tree would begin to rot at the soil surface. And if the tree was big, it would take a longer time, and smaller trees would fall over in a shorter period.

But it was these contrasts that I photographed and also sampled with our methods of cruising, in studies of slash disposal to determine the relative amount of timber and size, that made such an impression on Roy Headley. Here we were supposed to cut the forest, clean it up and safeguard it from further damage, but with all these jackstraw piles of dead trees, it increased fire hazard in dangerous proportions. In other words, we weren't achieving the purpose for which these measures had been taken.

Chall: Right, and also you were reducing the opportunity for new growth; fires were burning out the undergrowth.

WCL: Yes, exactly. That's a very important point. The restocking of timber growing trees had practically stopped. Succeeding fires burned out the humus that was lying on the surface of the soil. And then the ashes of such fires were compacted by the rains, so the runoff and erosion were increased. Flood stages down river were increased. So we had evidence here that things had gone wrong in a big way, and therefore we had to make a new approach to safeguard the forests from conditions that had destroyed the forest land and left it in a deplorable condition. The old forest stands were badly damaged and began to deteriorate, so the restocking of species was inadequate.

Thus the forest fires in this area were a very critical problem. Vast areas of natural forest had been burned over. We made studies of these burns, because we were concerned with restoring growing stands of timber. We classified the burns into first and second and third burns. The first burn through the green forest killed many of the trees, and then in many cases old snags would catch on fire, and if they were on a slope they'd burn off and then the stem of the tree would fall and shoot down like a fiery arrow.

This sort of thing is very difficult to deal with in fighting a fire. You might have a fire halfway up a slope and with these arrow-like snags on fire, the punk or rotted material would be slowly smoldering. They would shoot right down through the fire line, spreading fire down the slope. The only thing to do in a case such as this was to drop down to the bottom of the slope and establish a new fire line.

These first burns would not entirely burn up all the green timber, because there were moist places in the soil. Green timber served as a barrier to fires. Then there would be trees left in rocky places and they would serve as seed trees. Such trees that had escaped the first fire would re-seed those portions that had been burned over, and the stand would not necessarily be totally destroyed. Such areas would be restocked in a reasonable time.

But if after a time, when some of these trees had rotted off and fallen to the ground and young growth had grown up vigorously, then if there was a second fire, all this dry material became fuel for a very hot fire. And then these hot forest fires destroyed all the young growth and burned out the dead and downed material and the litter.

Chall: It was the second fire that was the most dangerous.

WCL: This second fire is very destructive and it burns out the humus from the soil, and steep slopes in the soil begin to creep and roll downhill. Winds come in and whip up ashes. They are terrible places to be caught in, because the ashes become dust.

There were times when enough material had survived these other two fires to become fuel for a third and still hotter fire in the area. This only added to the destruction of the second fire. So the forest was destroyed, leaving only ashes with brown-reddish oxydized minerals. These were powdered, puffy sorts of ashes to be taken up and carried by the wind into dust storms of acrid ash.

Chall: You just lost more and more forest with each successive fire?

WCL: That's right. So slash disposal was the key problem. As you can see, if we could solve it, then other problems would automatically be solved. Jim Gerard was the logging engineer and operations man of the Forest Service while I was the research officer. We sought to bring theory and practice together in the forest, so we worked out a live burning technique.

The accepted practice of the Forest Service was to pile and burn logging slash, and logging engineers allowed from fifty cents to a dollar a thousand board feet for the burning of the slash. The logger didn't have to pay because it was assumed that he would use that money to dispose of the slash by this pile and burn method. Many times the handling of fire in the woods was badly done. One must know what he's doing when he sets a fire in the forest.

So the great difficulty was that these piles of slash became wet from rain or snow and would not burn. So many times the woodsmen tried using coal oil and torches to start the fire going, but that oftentimes didn't work.

Then finally they set the fires on the lower slopes, because that was most accessible, and since they were having difficulty in getting the slash to burn, the woodsmen became careless and set these fires along the base of slopes. As the sun came out and the wind rose and dried out the forest, the fire was burning at the most dangerous location. Because the fire runs up slope so readily, they were in trouble, because chances are, they couldn't put out the fires. So again we weren't accomplishing what we set out to do.

Chall: The whole process was incorrect altogether, wasn't it?

WCL: It certainly was not working. Now the method that Jim and I agreed on, was to go out into the forest where it was wet--

WCL: even snow might be lying on the ground. We prepared dry material and we set fires going at regular intervals. Then we would toss onto the fire the pieces of slash, branches, tops and butt cuts.

The fire itself then dried out this slash material, and it would burn. We had a crew of men to keep adding wet slash onto the hot fires. And we thus burned up this hazardous portion of the slash, but the forest litter in between the piles was not burned.

Chall: I see. You could control what was still growing.

WCL: And this litter, you see, would increase the intake of rain and make possible the infiltration of rain into the soil and prevent erosion.

Chall: You were getting at the key problem. Now did this take more men to control the proper spacing?

WCL: Yes, some more, but it was effective, and the forest was left in a safe and satisfactory condition. Later on we devised methods to locate the hazardous areas, for instance, on both sides of a trail, where hunters might be traveling through the forest, and we'd fire-proof a strip on each side. Also on roads where trucks and wagons traveled, and then along streams where fishermen walked up and down--we treated these, but did not try to treat all the forest. In this way we reduced the labor costs of slash disposal with better results.

Even in light rains we were able to reduce the hazards of the logging slash. The wet slash was burned, but the forest mulch, the forest litter, was not burned and remained to protect the soil, to increase filtration and reduce soil erosion from the overland flow of unabsorbed storm waters. So successful were we in this method of disposing of logging slash, that the state laws on burning slash in Idaho were changed.

Plant Succession

Chall: During this period in Region One, you also made studies on plant succession and restocking, did you not?

WCL: Yes, I have a paper on plant succession and will place it on file with you. And then there was the Milacre study on restocking, which was a breakthrough in methods in surveys of vegetative types. An adaptation of this method was used in the forest type survey of California.

WCL: This was the method of surveying restocking conditions, what I call the Milacre Restocking Survey. For instance, as the result of these fires that burned the logged over areas, the Forest Service was trying to bring pressure to bear on the private lumbermen to increase the intensity of fire protection. They charged so much per acre for fire protection. For instance, one, two, or three hour controls, meant that any portion of the area could be visited by a man ready to fight fires within one, two or three hours. In other words, we set up controls so that we could be sure that fires wouldn't get away and burn out of control. At least, that was our hope.

Now, we had many of the timbermen deny that they had ruined the forests, saying that they had only obeyed the law. I said, "Let's determine how much of this area is restocked." At first we used a chain--sixty-six feet long and one-tenth of the chain wide, that was what we called a strip traverse for surveying. Then for each of these strips, we'd count the seedlings of trees that came back from seed showered from seed trees.

At that time, this was the general and accepted method of what we call ecological studies. To determine the vegetation, what the mixture was, and how many different species, one sampled an area.

I developed another way of estimating the spacing between seedlings that would give the number of seedlings in a plot by area. We wouldn't count them, but we'd estimate the total number of seedlings in a strip a chain long and a tenth of a chain wide--66 x 6.6 feet. Then I realized that in one chain various conditions would be represented. A spot on one end might have thousands of cedar seedlings, so many more than could possibly grow into trees. They'd choke themselves out. At another place there would be no seedlings at all.

"Our method is all wrong," I said to Dean Miller of the Idaho Forest School, who represented the state of Idaho in our cooperative study of the U.S. Forest Service with state forestry departments. I couldn't sleep that night until I had worked out this scheme of using a milacre--a milacre is a thousandth of an acre--as a unit of restocking instead of a number of seedlings.

I said, "Now all we need to know is: Is this or that milacre stocked or not?" Because obviously if we had a hundred seedlings growing on one milacre, all could not possibly grow into forest trees.

Chall: But some would, is that it? Did you try to determine why one section was well stocked and another one barren? Or were you

Chall: concerned only with the fact that part of it had some seedlings on it?

WCL: When we began to study the area, we made observations of the aspect--of soils, of the slopes, whether facing north, south, east or west--and we recorded this by milacres. I would record the surface conditions by milacres, whether there was forest mulch, bare surface, erosion pavement or stony ground. That way, we were able to determine and record conditions favorable or unfavorable for restocking.

Forestry Pioneers

Chall: Did you know Raphael Zon? Can you tell me something about him?

WCL: Oh yes, I knew him very well and thought highly of him. In fact, as a young forester I wanted to follow in his footsteps.

Chall: And Graves or Schenck?

WCL: Oh yes. I met Schenck; he was in Germany not far from the center of our field studies at Essen Darmstadt. But Henry Solon Graves I knew very well. I had not met him personally until 1927. I'd been to China and had come back, and I took part in the annual meeting of the American Society of Foresters in San Francisco.

When I met Solon Graves there, I said, "I'm very delighted to meet you, Dean Graves. Do you remember the Gasthoff zum Engel in Sal Munster?"

"Oh yes, yes, yes," he said. "That's where we used to stay."

And I said, "Do you remember that in the Gasthoff there is a book, and in that little book there is a list of the names of all the foresters who had drunk an unusual amount of beer at one sitting?"

He didn't answer.

And I said, "Did you know that your name is in that book?" [laughter]

This was the Gasthoff where we stayed while studying under

WCL: Herr Forstmeister Hebel. We enjoyed it very much. You know, actually there was a very choice group of minds and people that took part in the early developments of forestry.

Chall: You were in on the birth of it, and that's what made it so exciting.

WCL: Yes.

V CHINA, 1922-1927

[Written questions and answers]

Chall: Why did you leave the Forest Service when all was so rosy for you?

WCL: Well, it may sound foolish, but it was a young woman that caused my decision to leave.

Chall: Yes, I understand you had an interesting romance and that it led to your work in China. How did this come about?

WCL: It was in Arizona that this most far-reaching influence which changed the course of my life work took place. I met a girl named Inez May Marks, whom much leter I married. We had met in the little white church in Wilcox, Arizona, when I was home from the University of Arizona, waiting for the time to enter Oxford University. She was spending a few months with her parents.

Her father had been a Methodist minister and was in Arizona for his health. Inez and I met a few times on social occasions and at church. Once or twice I spent Sunday after church on their ranch, four miles out in Sulphur Springs Valley. Years later, she complained that I never even held her hand.

Then Inez returned to Pasadena and attended the University of Southern California at Los Angeles, and I went to Oxford. We kept the world between us for eleven years. She got her Bachelor's and Master's degrees from USC, and then in 1916 went out to Szechuan Province, China, on the border of Tibet, where for five years, she was an early version of a Peace Corps worker, under the Methodist Church. She opened and organized seventeen primary schools in cities surrounding Chengtu, the capitol of Szechuan Province. She was responsible for twenty-six teachers and more than six hundred little Chinese girls in their schools.

Inez also pioneered in persuading parents to allow the unbinding of their daughters' feet. They resisted this new movement because only slave girls had natural feet at that time, and they feared their daughters would not find suitable husbands unless their feet were bound according to time-honored custom.

Letters from Inez told of fascinating and challenging

WCL: experiences and courageous contacts now and then with bandits of Szechuan during this tumultuous warlord period. Being of pioneer urges myself, I grew to have much interest in her experiences and achievements.

Eleven years after our meeting in Arizona, writing off and on--mostly off--we found ourselves for the first time, back in the United States at the same time. I had an urge to see her again after all these intervening years during which we both had changed much, so I wrote and made arrangements to visit her in Pasadena for the Rose Parade and football game of New Year's Day, 1922.

After forty-eight hours, we took the tram up Mount Lowe and walked out to Inspiration Point, for that was in pre-smog days. I proposed to Inez and she accepted me, but immediately said, "I hope we can go back to China together for China needs you more than does our Forest Service. Others will take your place here, but in China there is no one to do the big job required on famine prevention but you."

We returned home and shocked Inez' parents by announcing we were engaged. Inez tried to calm them by saying she knew our marriage was made in heaven. Her father replied, "It must have been made in heaven for there was not time to have made it on earth."

Lowdermilk's Marriage and Decision to go to China

WCL: I was very dubious about going to China, because as Research Officer for Region One, I had been advancing rapidly, but my fiancee was optimistic and never doubted I would go. She urged me to send my qualifications to the new Famine Prevention Project, carried on by the Union University of Nanking, China, which had headquarters in New York. It had received an allotment of two million dollars left over from the great famines of 1920-1921.

Rains had been early and crops good so the money raised in the States had not been needed. Since these funds could not now be returned to donors, the plan was to have experts go out to China to improve Chinese agriculture, such as improvement of cotton seed, irradication of wheat rust, and production of disease-free seeds for distribution to Chinese farmers. Other experts had developed disease-free silk worm eggs so that

ACCEPTANCE OF RESIGNATION.

S. 7411 L.81

DISTRICT NO. 1

UNITED STATES DEPARTMENT OF AGRICULTURE,

OFFICE OF THE APPOINTMENT CLERK,

WASHINGTON, D. C.

August 11,1923.

Mr. Walter C. Lowdermilk,

Forest Service.

Sir:

You are hereby notified that your resignation from the position of Forest Examiner,- - - - - - - - - - - - - - - - - -

at a salary of $ 2500 per annum -, on the miscellaneous- roll of the FOREST SERVICE, has been accepted to take effect at the termination of August 15,1923.

By direction of the Secretary of Agriculture:

Respectfully,

Appointment Clerk.
Chief Personnel Officer.

8—2440

WCL: silk worms would not die just as they were supposed to spin silk.

Men for all these agricultural projects had been secured, but Mr. John Reisner, Dean of the Nanking Agricultural and Forestry School, had been unable to find a trained and experienced forester who was willing to go out on the limited salary of a professor at the Union University. These famine funds, you see, were strictly for the benefit of Chinese farmers and not for enrichment of foreign experts.

Immediately word came back from New York, urging me to leave at once for China as the other experts had already been there one year. I did not know just what I was to do as a forester about preventing famines and floods, but I was to begin at once my year of language study.

We were married August 15, and after a brief honeymoon at Santa Barbara, we sailed for China the first of September, 1922.

Chall: So that is why you left the U.S. Forest Service and went to China. How did you find out what you wanted to do there?

Developing the Theory of Man-Made Erosion

WCL: It was from my first expedition into interior China, in 1923, after my year of language study, that the course of my life work was changed from forestry to that of land and water conservation. This ultimately included the relation of peoples to their lands and has led to many ramifications since then. On this first expedition, the full and fateful significance of soil erosion and its consequences was burned into my consciousness.

The Yellow River and Silt

I had wanted to see the Yellow River and examine the site where this river, in 1852, broke from its enormous system of inner and outer dikes and changed its course four hundred miles to the north, to empty into the Gulf of Chihli, instead of the Yellow Sea. This flood, and others like it through the centuries, snuffed out millions of lives.

WCL: As we traveled across the flat plains of Honan Province, we saw a great flat-topped ridge, reaching from horizon to horizon. This was the outer dike. We climbed this forty to fifty foot ridge and looked out on another vast plain some ten feet lower than crests of the dike. About seven miles further on rose another flat-topped ridge which we climbed. This was the inner dike. Before us lay the Yellow River, "China's Sorrow," laden with silt eroded from inland China's farm fields. Now the river was flowing quietly, with the low gradient of one foot per mile on the delta plain, and silently dropping its burden of silt.

Here in a channel fully forty or fifty feet above the surface of the plain, this gigantic river had been lifted up off the plain over the entire four-hundred-mile course across its delta and had been held in this uplifted channel by hand labor of millions of men--without machines, or engines, without steel or construction timber, and without stone. These millions of farmers, with bare hands, carrying poles with little baskets at each end, had built here through thousands of years, a stupendous monument to human cooperation and the will to survive.

Since the days of Ta-Yu, nearly four thousand years ago, the battle with floods with this tremendous river have been lost and won, time and again. Any lack of vigilance would cause a break in the dike and Herculean cooperative work would be required to put the river back again into its channel.

As I stood there with a cold November wind tugging at my trench coat, I meditated on what these Chinese farmers had endured and would continue to do to survive, toiling on by the millions in a situation that was hopeless. For there was no end to the demand of the river for higher and higher dikes. As it annually dropped its burden of silt, it lessened the capacity of the channel between dikes to carry flood waters.

Then suddenly it dawned upon me that silt was the villain! Silt was the great enemy causing this endless, hopeless struggle! Silt had defeated the courageous toiling farmers, valiant as they were!

I then and there determined to see from whence came all this silt. Where was all this excessive erosion taking place? The famine prevention funds gave me ample financing to make expeditions with my Chinese colleagues and students.

Chall: This must have been an exciting kind of expedition.

WCL: Yes. We prepared to make a series of carefully planned agricultural explorations. On this first trip we were fortunate to have along with us Mr. O. J. Todd, an engineer who later, in

WCL: 1935, put the Yellow River back in its channel. We made a two-thousand-mile survey up into the province of Shensi, west of the Yellow River, into the great loess deposits of wind-laid soils of northwest China. It was here in these fertile soils that the Cradle of Chinese Civilization developed, and here China had her Golden Age.

During the ice age, there was insufficient moisture to build up an ice sheet. Instead, this dry region developed into a great dust bowl, and soils from the desert of Gobi blew in to form these fertile but highly erodable lands. It is through these deep loess deposits that the Yellow River drains and picks up its burden of silt.

Chall: Did you make any interesting discoveries on this expedition?

Temple Forests Thrive Amid Eroded Land

WCL: When I saw the headwaters of some of the tributaries of the Yellow River, I made a surprising find. The great American geographer, Ellsworth Huntington, and a great German geologist, Ferdinand von Richthofen, had ascribed the decline of northwest China to an adverse change of climate. There were evidences enough that there had been periods of greater prosperity and more populous cities.

Now, scant numbers of people living behind city walls within great empty spaces, and large formerly used irrigation works now filled with silt, out of commission and useless, indicated a change from former prosperity to decadence. But around some Buddhist temples, I was astonished to find temple forests which priests had preserved for places of meditation, and managed for growing timber for repairs.

Being a forester as well as a soilsman, I was pretty much excited. I studied these forests carefully and found that there was no erosion of soil within them, that the ground was covered with forest litter and the trees were reproducing themselves naturally, in response to the climate and rainfall of the day. Outside the country was cut with enormous gullies, some of them up to five hundred feet deep. I measured one up to six hundred feet deep.

Then I said that before we accept the conclusion that the decline and semi-depopulation of northwest China is due to an adverse change of climate, let us discover how far this erosion of the land has brought on such a decline. It seemed apparent enough to me that erosion alone was sufficient to

WCL: account for the decline of a civilization and that we didn't need to rely on a theory of change of climate. Because of my scientific training, I determined to make a series of experimental studies to measure the rainfall and runoff to see what had happened in various watersheds of the region.

Setting up Experiments to Find out the Facts

Chall: Will you be more explicit concerning these first experimental studies?

WCL: My first summer's work during the rainy season was a great disappointment. The streams ran so full of soil and debris and boulders that at my cross sections of the stream, I was unable to measure the flow accurately. Then I hit upon the idea of going back where the raindrops strike the ground and set up what we called runoff plots. This was one of the first times such tests had ever been made.

In 1925, we set up three installations about one hundred miles apart. I did some of the hardest work I ever did in my life, but nonetheless some of the most fascinating. We were able to get quantitative measurements on runoff and erosion from comparative plots within and outside these temple forests. Even in heavy rains in the same area and with the same gradient, the water that filtered through the forest litter ran off through the plots only slightly murky, whereas it flowed off the denuded plots as liquid mud.

It was now that I realized with certainty that here was the monster enemy that had brought about a change in China's northwest. It was not an adverse change in climate as Ellsworth Huntington and Ferdinand von Richthofen had suggested. Erosion, because it brought about lesser carrying capacity of the land, had been equally capable of undermining and destroying a civilization and reducing its population.

Lowdermilk set in Direction of his Life's Work

Chall: So this momentous discovery changed your direction from

Chall: forestry to concern for erosion and its effects on peoples and civilizations?

WCL: Yes, a radical change came over me. Heretofore, I had worked hard at whatever work I undertook, but I never felt fully satisfied. On each birthday I would say, "Here I am, X years old and have not accomplished a darned thing yet." But these revealing studies proved to me the importance of the relation of peoples to their lands in the rise and fall of civilizations.

It was here that I coined the now much used expression, "Man-made Deserts." I knew what had happened to China. Now I wondered if this same enemy, erosion, had been responsible for creating man-made deserts in North Africa and the Middle East, in old Roman lands that formerly were flourishing but were now sterile and rocky, for I had seen pictures and read about the desert conditions of formerly prosperous and populous lands there. Now there was no question as to my life work. I knew I was on the right track for me.

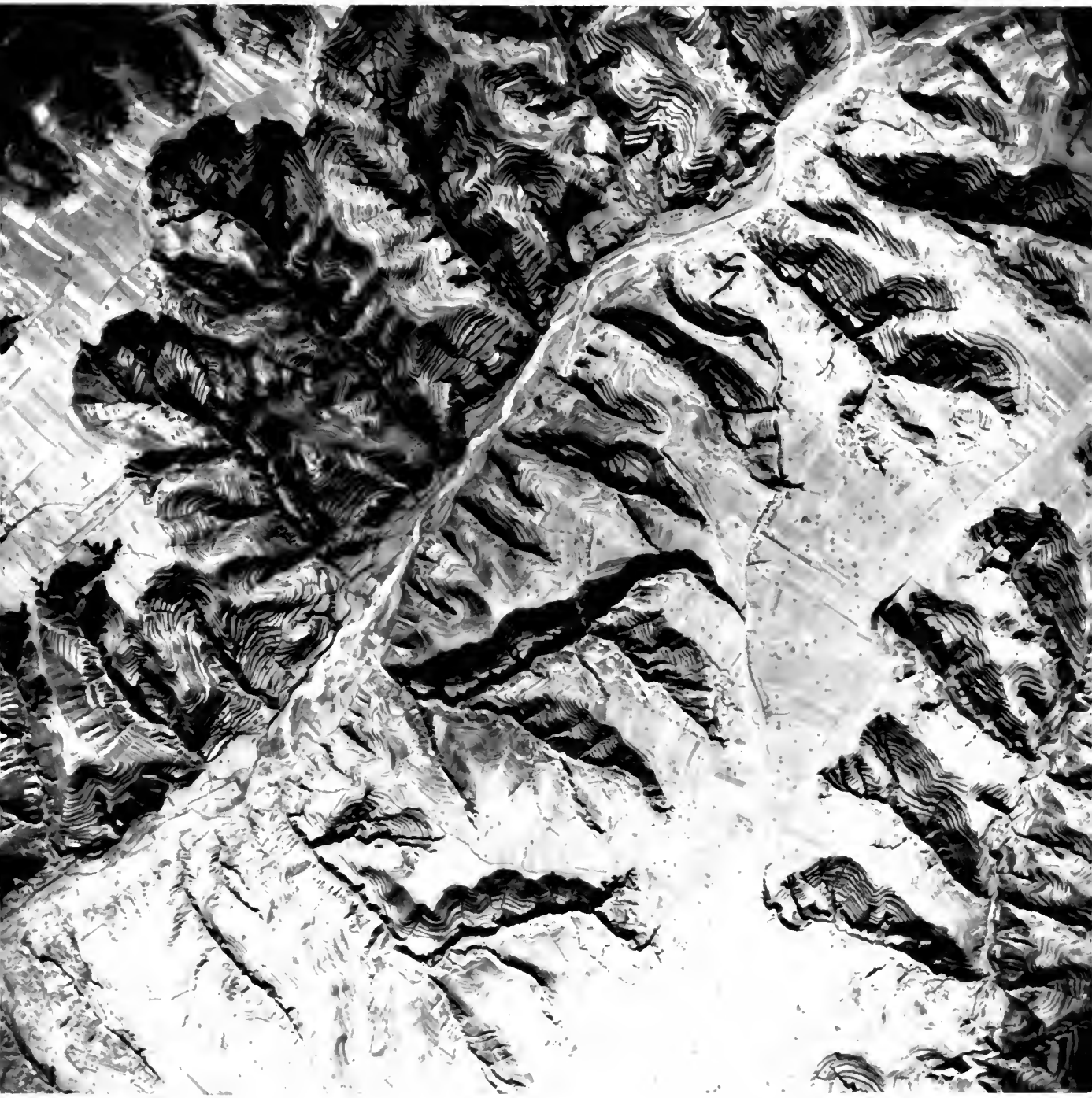
Reporting the Results of Experimentation

Chall: Did you immediately write up these discoveries?

WCL: Yes, a fine opportunity presented itself. I was asked to represent the United States Forest Service at the Third Pan Pacific Science Congress in Tokyo, Japan, in the fall of 1926. The Japanese made a great deal of this meeting, which brought together representatives and scientists from most countries bordering the Pacific Ocean. It was to be their coming-out party, to show that Japanese scientists had made remarkable advances on their own and were not simply copyists as had been thought.

I chose this opportunity to give my first report on my experiments in China to an international body of scientists. It was entitled "Factors Effecting Storm Runoff and Soil Erosion." My findings aroused considerable interest and much attention was given the paper, for as far as I know, this was the first time that anyone had ever set out to measure what happens to rain when it falls on soils which are covered and on soils which are bare of vegetation.

Chall: Your headquarters were at the Union University of Nanking,



Northwest China - Hwai River Basin. Erosion on a tremendous scale in highly erodable loess soil. Farmers have terraced gullies in order to grow food.

Chall: China. Did you do any teaching there?

WCL: Of course, my first duty was to make regional studies, to formulate my hypotheses, and to work out and develop practical and workable programs. But when not on expeditions, I taught some courses in forestry and agricultural geology during school terms, and taught physical education to young college students.

This was a new thing for college students in China at that time, for it had been the custom for scholars never to exert themselves physically and above all, to do no manual work. (They even hired a coolie in those days to carry their hymn books to church for them.) This was one reason why I insisted that we go out into the fields with farmers and work along with them to give dignity to the farmer in this most important of all professions, that of growing food for all the people.

Chall: Where did you get your equipment for your experiments?

WCL: China had few if any scientific instruments. It was necessary for me to design and have Chinese tinsmiths in Nanking use what materials were available to make my tipping buckets. These devices measured rainfall and the amounts of erosion in the runoff. This had to be all original work for it had never been done anywhere before, as far as I know. I credit my pioneer father's example and inventive ability as helpful to me in China when there was no equipment I could buy for my experimental studies.

Chall: Did you speak English or Chinese on your expeditions?

WCL: I had had a full year of study at the famous University of Nanking Language School and I could speak Mandarin, the main dialect of China, and make my simple wants known anywhere north of the Yangtse and from the coast to Tibet. But fortunately, all my Chinese staff spoke English quite well and this was helpful for us all in our scientific discussions.

Hwai River

Chall: I see that you made a very extensive study of the Hwai River during your famine prevention assignment.

WCL: Yes, this report on the Hwai River study was given to William E. Souter, General Secretary of the Chinese Foreign Famine Relief Commission in Shanghai, and to John R. Reisner, Dean of the University of Nanking School of Agriculture and Forestry.

WCL: I submitted this on March 4, 1927, just three weeks before the Nanking Incident when all our constructive works ceased and we were ordered out of China. I entitled this report "Cover and Erosion Survey of the Hwai River Basin."

This Hwai River report contains the results of a survey of vegetative cover and erosion, chiefly of the mountainous area that covers some 330 miles in the Hwai catchment basin to the south of the main river. This region contributes large volumes of torrential runoff into the Hwai floods. Erosion in these lands generated movements of sand that followed down the drainages, filling the channels of the Hwai River and its tributaries so that they became actually rivers of sand.

This voluminous report contains some 160 typewritten pages, besides scores of pages of illustrative pictures, maps and charts. At the end is an appendix of Famine and Flood Records, which cover a period of a thousand years and more. The Yellow River first burst its banks or dikes in the fourteenth century and overflowed into the Hwai, but the floods in the Hwai did not become very serious until the sixteenth century.

These excessive floodings began with the rapid increase in population, when pressure for food-growing lands pushed cultivation up the slopes of hills and mountains. There were no measures for erosion control on these soils suddenly bared of vegetative cover of trees, shrubs and grasses. This suicidal agriculture on sloping lands deprived farmers of their fertile topsoils and caused enormous loss of life on the flooded plains toward the sea as the waters dropped their burden of silts.

Other Studies Reported

Chall: Was this Hwai River survey the most important you undertook?

WCL: I would not say so. I made a three-year study and survey of erosion and floods on the Fen Ho in Shansi Province. This is what I reported to the Third Pan Pacific Science Congress in Tokyo in 1926. Then I made a survey and wrote "A History of Wu Tai Shan in Shansi Province," which was published in the proceedings in the Royal Asiatic Society of London, 1938. Also I made a vegetation and erosion survey in Anwhei Province, and also a survey near Nanking of "Purple Mountain and its Reforestation."

One two and one-half month experiment I shall never forget was in the summer of 1925 at Tsin Tao, northeast China on the

WCL: coast. I set up instruments to measure runoff and erosion on the slopes of protected forests that the Germans had reforested when Tsin Tao was a German colony. A corresponding set of plots I put on adjoining denuded lands in this region where rains are proverbially scarce. Immediately the heavens cooperated by pouring down the average rainfall of twelve inches in thirty hours. Rain continued to fall off and on most of the summer. I was thrilled, for my instruments worked perfectly, and the water ran only murky as it flowed through the litter-covered soils in the forested plots, and poured off as liquid mud from the denuded plots.

The poor people of Tsin Tao were drowned out. Rumor spread that the excess rain was due to this man's prayers for erosion in action. An editorial in the local city newspaper in English urged this erosion expert to desist his prayers for rain and allow the community to dry out.

Chall: Did you use special methods of study for all areas?

WCL: Yes, my method of study was to make regional explorations and surveys. I wanted to discover major factors in the landscapes and to set up experimental studies of stream-flow, runoff and erosion, and to evaluate the significant processes involved. We made use of the historical records of the "Gazetteers," or county records, which often date back a thousand years or more. Then we compared the descriptions of China in the past with present conditions as we found them.

It was a great disappointment when all these studies and planned surveys for the future were suddenly terminated by the first Communist drive which forced all of us to leave this part of China. All these surveys were preliminary to programs of works that could have been adapted to help Chinese farmers control erosion to save their lands and grow more food.

Fifteen years later, on my second trip to China in 1942, I carried out these programs in some areas of northwest China, to demonstrate to farmers how to save their lands and increase production. I will report on this when telling of the second trip to China.

Theory on Famine

Chall: After five years on the Famine Prevention Project, what were

Chall: your conclusions regarding famines?

WCL: It has been forty-five years since I began studying famines. I have come to certain conclusions regarding starving peoples. Today again, we must face up to the hideous spectre of famine. Two-thirds of the peoples of the world are undernourished now, and hundreds of millions go to bed hungry every night. In this world-wide population explosion, 180,000 new hungry mouths arrive daily on this planet, or something over sixty-five million every year. Of these, one million each month arrive in India alone, as reported by F.A.O. Demographers tell us that the present population of some three and one-half billion will become seven billion souls by the end of the century.

These seven billion are not mere statistics, but are individual human beings who will be our children's children and must have food, clothing, housing, jobs, and services of all kinds.

In spite of our embarrassing surpluses, which we had shipped in millions of tons around the world to hungry peoples, the food situation for them is getting worse rather than better. Starvation on a gigantic scale looms on the horizon that will make the 1920-1921 Chinese famine, when twenty million died of hunger, seem peanuts in comparison.

Chall: I understand the Food and Agriculture Organization of the United Nations is taking steps to improve this food situation?

WCL: Yes, with this prospect of famines in the offing, the F.A.O. has launched a campaign called "Freedom From Hunger," and seeks to enlist all members of the UN to take part. The emphasis is laid on self-help in producing a nation's own food supply. But so far, the response is very disappointing.

Chall: Dr. Lowdermilk, what happens in time of famines?

WCL: In my opinion, there is no more horrible way to die than by starvation. Food riots are terrifying. Starving people will not keep the peace, neither will they stay within their own borders, neither will they keep their treaties. A starving farmer will eat his seed grain, even though he knows that it is disastrous for his future to do so. Parents will sell their children for a little food for themselves and the hope that the child may be kept alive by someone else. The entire fabric of society falls apart. The law of the jungle rules as people fight for food. But in the latter stages of starvation, people become tragically silent, and almost motionless as they wait out the long days and nights of slow death.

Chall: This must have been most difficult for you, with your western

Chall: attitude of the infinite value of the individual.

WCL: Yes, it was appalling to me to see people in China in this slow dying condition and be able to do little or nothing to help them. The Chinese said to me often, "Why are you so concerned? When one dies there will be one less mouth to feed. Don't you know that this is heaven's way of reducing population so that there will be more food for the ones that are left?"

Prospects for the Future

Chall: Do you feel that it is possible for our earth to feed, with a good standard of living, all the present populations?

WCL: For years I have been saying that civilization is running a race with famine, and the outcome is very much in doubt. The doubt is due, not so much to shortages in resources of the good earth, plundered as are some, and unused as are others, but to the lag in the take-up of modern ways of farming. In my opinion, our planet could feed, on a higher standard than that of today, twice the present population if all earth's resources were fully developed and used with scientific conservation methods.

Chall: You especially studied famines in China. How about your studies in Africa?

WCL: I fear that in the not-too-distant future, Africa also will suffer severe starvation. I found some countries doubling their numbers in twenty-five years or less, yet still the farmers largely practiced an iron age agriculture, using primitive tools, and using fire and shifting cultivation which destroys the soils for sustained use. They could not grow foodstuffs enough to keep pace with these explosive rates of increase in population.

In my reports on African studies later on, I shall discuss at some length just why it is that farmers in these less developed nations have this lag in the take-up of modern methods of growing food.

Chall: Do the farmers recognize their critical situation?

WCL: No, except perhaps a few. When I spoke to a conference of African ministers, explaining why their fields produce less and less and the farmers were falling behind in growing

WCL: foodstuffs, one minister rose and said, "Now we know why hunger already done catch us."

Chall: Would birth control give us time in this race with famine?

WCL: Some, of course, but there are difficulties in making it acceptable. I know of one International Chinese-American Commission some years ago in China, where the chairman managed to get both Chinese and American members of the mission to agree to a watered-down resolution that indirectly advocated some type of birth control. But a Chinese told me afterward that the reaction of the Chinese members was, "Ah, America fears our numbers."

At another time during an International Farmers' Convention in Israel in 1959, a resolution calling for some measure for limitation of population was voted down. Representatives of African states said they wanted nothing to do with such a resolution. They said, "This is a white man's trick to keep down the numbers of black peoples." They said, "On the contrary, the African states want more people to give them more power in the councils of the United Nations."

This indicates the delicate situation and difficulties in dealing with this issue of birth control across international borders.

But despite all our technical assistance and the sharing of a maximum of our depleted surplus foods, hungry nations will remain hungry unless they themselves adjust their numbers and at the same time increase production of their own food supplies.

Chall: You made a report on famines in China, did you not?

WCL: Yes, in my report on the Hwai River, I have a heartbreaking record of more than twenty principle famines which we found detailed in county Gazetteers dating from 966 A.D. Elsewhere I have a record of some famines in droughts in centuries B.C. In my Hwai records, we noted that deaths from starvation at various periods took from fifty percent to ninety percent of the population. These records of famines tell of people eating others who had died, of relatives eating members of the family, and how people ate clay to have something inside them. A famine is a ghastly curse on humanity.

Studies of Typhoons and Floods

WCL: Another interesting study during this period was one on typhoons and floods that I was making with the Catholic Sicawey Observatory near Shanghai. Father Froc and Father Gherzi collaborated with me especially in recording the movement of typhoons. I had money in my famine prevention fund with which to buy instruments, and Father Gherzi had churches and priests at various locations in the hinterland. These priests were very meticulous in reading the instruments and keeping accurate records of rainfall, and flood stages, temperature and humidity. We sent all this recorded information to the Chinese government; I gave a copy to the Sicawey Observatory and kept another in my files. We were pioneers in this type of scientific research in China.

I wanted to study floods as the result of the typhoons that came from the western Pacific and swept inland into China. We found we could plot floods by the way these typhoons invaded and advanced across the land and up the drainages of rivers.

While typhoons were sometimes disastrous, especially near the coast, they were also necessary and beneficial to carry quantities of water into the interior to drop as heavy rains. If they failed to reach far enough inland, then drought conditions would ensue, and the rivers would be too low to provide enough water further down for irrigation.

Chall: Were these Catholic Fathers scientists and eager to take part in this research project?

WCL: Yes, these Jesuit priests were keen and fully grasped what we were attempting to find out. We were all especially interested in my theory which I called epicycles. When typhoons blow inland and drop heavy rains, of course part of them rush back rapidly toward the sea.

But there also begins local evaporation on the land where these rains fell. As this evaporation rises, the moisture is caught in the upper current of winds still blowing inland. This evaporated moisture then becomes incorporated into the original moisture in the typhoon winds and enables more moisture to be blown still further into the interior, to fall as rain.

Chall: So this phenomena was what you called epicycles?

WCL: Yes, I aroused quite a lot of interest among scientific groups in China. My hypothesis was that if forests were cut and lands grazed or cultivated, then, unless the lands were prepared by

WCL: conservation measures to hold the rains that fell, there would be considerable runoff and water would be sent back in floods toward the sea. This would prevent the evaporation previously described and less moisture would rise into the upper air to join the winds blowing inland, thus reducing the inland sweep of rains on the land.

The Nanking Incident

Chall: The Nanking Incident seems to have brought about a complete change in your life plans.

WCL: Yes, completely so. The tragic and historic event that took place on March 24, 1927, in the great old walled city of Nanking, China, also brought about a change in the lives of millions of people.

For me, it meant giving up all my work and plans for China. It meant losing all our possessions and returning penniless to the United States to find a new job. The only bright spot for me was that I was able to help save the lives of the 120 Americans within the city around the large American Union University.

For Chiang Kai-shek, it brought about a complete reversal from friendliness to Russia and Communism, to the bitter hatred toward Russia and Communism, against whose forces he has been at war ever since.

Immediately after leaving China, early in April, 1927, I wrote up a report on my activities during this terrible day and I will give it to you.

I wrote this report just after our return from China with the thought of publication, but I never had it published. My original informal report on which this is based was sent to New York to the Famine Prevention Committee who had employed me through the Union University of Nanking.

THEY INTENDED US TO DIE AT 3:30 P.M.

At eight o'clock, on the morning of March 24, 1927, President A. J. Bowen, Vice-President J. E. Williams and I were on the campus of the American Union University of Nanking, China, when a frightened Chinese ran toward us panting, "Soldiers are looting Dr. Horton Daniel's home. They threaten to kill."

We supposed these looters were retreating northern soldiers fleeing from the victorious new revolutionary army sweeping northward from Canton. We told them the southern army had entered the south gate and they had better run to the opposite city gate. We were totally unprepared for their reaction to our warning.

They fired their rifles into upstairs windows and yelled, "Da wei guay ren! Da Yang guey dza!" ("Kill the foreigners, kill the foreign devils.")

A child in a neighboring house opened a veranda door and immediately a soldier wheeled and fired his rifle but missed.

This was our first realization that Nationalist soldiers were anti-foreign. They cocked their rifles, roughly ordered the three of us to hold up our hands and began to rob us. While one soldier prodded us with his bayonet, another stripped us.

As one soldier reached for Dr. William's watch, the heavy gold chain caught in his vest. He held on to the watch, saying, "Please, I'll give you anything, but don't take this last gift from my mother."

A shot rang out and Dr. Williams crumpled at my feet where they continued to rob him as he lay dead.

As they robbed me, I kept saying in Chinese, "Why did you kill him, why?"

They tore off my wedding ring, watch, billfold, glasses were smashed on the ground, fountain pen taken and my overcoat and sweater yanked off. One swaggering little soldier with finger on the trigger started to shoot me. I expected to fall beside my good friend, Dr. Williams.

Just then his corporal said, "Don't shoot him yet!" They then fired into the air and walked away with their loot.

Soon Chinese professors and students learned of this tragedy and carried Dr. Williams' body to his house and hurried me and others to join the group of Americans which our Chinese colleagues began to assemble in Bailie Hall.

Significantly they said, "This building will not burn."

Prior to this day of infamy, the ancient walled city of Nanking, China, was a delightful and stimulating international community with cordial relations between Chinese and some four hundred Americans and two hundred British.

Despite disturbing rumors, we were totally unprepared for this brutal anti-foreign attack by Russian-trained vanguards which had infiltrated the Chinese Nationalist army, driving northward.

Communist infiltration into China had followed refusals by England and the United States to make a loan to Sun Yat-sen's new revolutionary government. Whereupon, Russia offered money as a gift and in addition, agreed to equip and to train special units for the army on condition that the Russian, Borodin, have a free hand in Communist propaganda in China. When Sun Yat-sen died, Chiang Kai-shek became his successor.

Cities fell by propaganda, rather than by battle. Shanghai fell with little shooting. Nanking was the next objective.

Our fear was that the 200,000 retreating, undisciplined northern troops from Shantung, under the ferocious war-lord Chang Chung Chang, might be unable to cross the Yangtse, and trap us in the city walls in a siege, or loot and burn the city.

Previously I had been appointed contact man with the American Consul and the U.S. destroyers on the Yangtse, to represent our large community around the American University and to evacuate nationals should an emergency arise.

For the most part, these Americans were educators, training Chinese in many fields required to modernize an old nation. I was one of a group working on a Famine Prevention Program; others were members of the Medical Schools and Hospitals. Most were teaching in various branches of this great American University or in the complex of auxillary institutions, including religious schools and churches.

I appointed a leader for each section within our part of the city, to maintain contact day and night.

On March 21, we heard cannonading to the southwest. We took steps to evacuate women and children to save them from possible consequences of an attack upon the city. Early next day, we put 177 of our refugees quietly aboard the U. S. destroyers "Noa" and "Preston."

However, there still remained some 120 Americans who were either unable to travel because of illness or refused to leave their posts. Over her strenuous protests, I saw my wife and our two-year-old son placed with others in a small compartment directly under the big gun on the "Noa." I little dreamed of their subsequent ordeal under fire.

March 23, the frantic retreat began. From our high "Drum Tower" which overlooked the campus and converging streets, I watched northern army officers in over-loaded autos, carriages and rickshaws, force their way through masses of gray-clad foot soldiers, in a dash to reach and cross the Yangtse with its limited boats, before these retreating hordes arrived.

With Dr. Williams' murder and mounting harrassments, we realized that it was the victorious southern soldiers who were fanatically anti-foreign. I sent trusted Chinese with notes to each of my section leaders, urging them to have all Americans in their groups disguise themselves and make their way inconspicuously to Bailie Hall in all haste.

I phoned the United States Consul, J. K. Davis, down in the business section near the port at Hsia Kwan, that Dr. Williams had been killed in cold blood at my side and that I had barely escaped with my life. He told me to keep in touch with him but the phone went dead.

Later, we learned that at that time, soldiers were looting the Consulate and threatening the lives of all taking refuge there. The group fled to Socony Hill, whence they could signal the U.S. destroyers on the Yangtse.

But our contacts with American authorities were broken. We were trapped deep within the city, surrounded by hostile and anti-foreign "mobs" of soldiers, determined to rob, humiliate and massacre us.

It was a motley array of Americans, in all sorts of disguises--as Chinese laborers, farmers, or men dressed as Chinese women--who were straggling into the top floor of Bailie Hall. Each told a chilling story of brutality and narrow escape.

On the back of a map, which I still have in my possession, I had each sign, and checked them off as they were brought in by friendly Chinese who were heart-broken at this shameful treatment of their American friends.

Each escape was unique. Dr. C. S. Trimmer, in the University Hospital, saw himself cut off by milling mobs. He played upon Chinese superstitious fear of madmen--grabbed a bottle of mercurochrome, and smeared the vivid red liquid over his blonde hair, his face and arms. Then yelling and wildly waving his arms like a crazy man, he dashed through the startled mob and raced to Bailie Hall.

Some Americans were caught and severely manhandled, as were Professor Harry Clemons, Dr. P. F. Price and Dr. W. E. Macklin. It was the Chinese custom to make criminals kneel for execution by beheading, and soldiers with beheading knives tried to force saintly Dr. Price to kneel to be killed.

He steadfastly refused, saying, "I am not a criminal; I will not

kneel to be killed!"

His unusual command of the Chinese language enabled him to hold off his captors until friendly Chinese came and ransomed him for six hundred Chinese dollars.

Devoted Chinese also finally ransomed beloved Dr. Macklin in his famous hospital after a harrowing experience.

Some soldiers dragged American women in the hospital from their beds and robbed them. Local Chinese rescued them but some others were raped in their homes.

Professor Taylor was at home when soldiers looted his house and tied a rope around his neck. He choked as they dragged him outside to kill him. With a sudden superhuman effort, he broke loose and made a wild run to the campus.

Soldiers pinned some of us against walls and prodded us with bayonets as they increased their demands for more money and valuables.

At the Claude Thompson home, soldiers started to shoot the grandmother because her wedding ring was stuck behind enlarged joints. Her daughter flung herself in front of her mother, with an impassioned promise to file off the ring and produce more money. This saved them both temporarily.

But when a ring on the finger of Dr. Smith of the business community could not be pulled off, the soldier cut off his finger.

Chinese friends in Nanking were magnificent in risking their lives to save ours. They poured out their cash and treasures to bribe soldiers to release Americans they were tormenting. They provided all of us in Bailie Hall with blankets and warm clothing. They brought us hot food. All the while, Communist soldiers derided them as "running dogs" of foreigners.

Borodin had ordered his Russian trained units to "Kill and destroy all foreign life and property in Nanking." When General Chiang Kai-shek, head of the revolutionary army, learned of this, he issued orders to the advancing army, "Protect all foreign life and property in Nanking." This conflict of orders explained why some soldiers rescued and protected, while others were intent on murder, as in the rescue of Professor Jones and others.

From the top floor of Bailie Hall, we watched American buildings burn, and our homes looted, first by soldiers for valuables and then by civilian mobs whom they ordered to complete the job.

Meantime some ninety Americans had, by devious means, reached Bailie Hall. Among them was Pearl Buck, author of "The Good Earth,"

and her family, so dearly beloved by the Chinese. They had been hidden and protected in the hut of a Chinese family that Pearl had befriended.

Vicious soldiers with rifles and beheading knives continued to climb the three flights of stairs to rob and terrorize us. The frightened children stood trembling with their tiny hands in the air as soldiers robbed them, even taking off their shoes. Repeatedly soldiers threatened our group with death if we did not produce more valuables.

Unknown to us then, the hour of 3:30 P.M. was set for the general massacre of all foreigners in Nanking. Bowen and Jones listened through the lattice under the eaves and heard the leader of our tormentors take a vote to come up again and demand one thousand Chinese yuan per head ($45,000 for ninety people).

"If they don't pay up at once, shall we kill them all this time?" he yelled.

The soldiers shouted their approval and dashed into the building, shooting as they came, amidst ricocheting bullets.

At the same time, Americans of the business district, gathered with Consul Davis on Socony Hill near the city wall, had suffered equal terrorizing and some deaths, besides robbery and mal-handling.

Here the Chinese army had set up field guns to demolish the building on Socony Hill with its seventy or more foreigners, including our courageous American Consul. Then as a last resort, Consul Davis signalled our American destroyers to open fire.

They laid down a barrage accurately around Socony Hill, leaving the side nearest the sixty-foot city wall open for refugees to escape by using tied sheets and blankets as rope. These events at Socony Hill were described by Alice Tisdale Hobart in letters to her family and printed in Harper's, in July, 1927.

Without knowing it, Consul Davis and our U.S. destroyers had, at the last minute, saved our lives also and prevented a massacre of both groups planned for 3:30 P.M.

As our "executioners" at the University came up the stairs toward our helpless group, thundering explosions shook the building. The soldiers stopped, terrified. These were not Chinese guns--they must be retaliating guns from the American destroyers. Their officers blew whistles to recall all looters, whom they marched away in formation in the opposite direction, indicating they were under orders all the while.

This bombardment was a voice of authority these red soldiers and officers understood and respected. At last we were free from our tormentors and all was quiet.

Mr. Li, a Chinese professor who worked with me on Famine Prevention, and I secured a car and two young soldiers as guards, to seek out missing Americans in the dark.

We first drove down to the American Consulate. Lights still burning revealed a sacked and empty wreck. We stopped at several other places in our area where Americans were in hiding. I called their names at the top of my voice to come out, so they would recognize an American voice and know this was not a Chinese trick to reveal their hiding places. We sent everyone we found to Bailie Hall.

The Theological Seminary was a pall of smoke and the central building was in flames. No one responded to our calls.

Late at night after devious leads, we found Anna Moffett, a courageous young teacher who was shot twice in the abdomen and had lain unattended for fifteen hours, hidden by Chinese friends under straw in a bamboo grove. We hurried Anna to Bailie Hall where her wounds were cared for by Dr. Daniels and she survived.

Early next morning we renewed our search. We found one American in an empty cistern, another covered with discarded dirty uniforms in the back of a police station. Others had been hidden in their looted homes or in the straw huts of Chinese friends or servants.

By noon, I reported to President Bowen that all thirty missing Americans were accounted for, and he instructed Reverend Roberts and me to make the perilous six-mile trip to the Yangtse River to contact our naval forces.

We made our lonely way amid sullen, scowling faces and decapitated heads attached to street poles and sign boards, to discourage looting.

Here at the water front, we picked our way around bodies of dead animals and dead soldiers. Communist officers on horses were haranguing crowds of defeated northern soldiers on the great benefits of Communism and "San Min Chu I" ("The Three Principles of the People," taken from Lincoln's "Government of the People, by the People and for the People").

Our destroyers were anchored far off in midstream. Our hired boat was peppered with bullets each time we tried to leave shore.

Finally, a Japanese landing party signalled our destroyers, and a launch with Consul General Davis and U.S. Marines, bristling with guns, took us to Admiral Hough on the flagship. He ordered us to evacuate everyone immediately and abandon all property and belongings.

It was fortunate that Consul Davis persuaded Admiral Hough to delay until word came from us before carrying out his ultimatum to Chinese forces, to deliver all Americans within the city by eleven o'clock or he would shell the city gates, arsenal, military headquarters and all

fortified points. The hour passed. Had he done so, with our 120 Americans still in the city, few would have gotten out alive.

We returned to the University and assembled our cavalcade. I led the long line of horse carriages and rickshaws while Revend Roberts brought up the rear, to see that no one was left behind.

Leaving Bailie Hall, we passed between double lines of our Chinese friends, co-workers, fellow faculty members and students. Many were weeping and all showed unspeakable grief in their faces. They realized we were all leaving, possibly never to return. It was a heart-rending experience for all of us.

As darkness fell and we had not arrived, the Admiral was on the point of carrying out his second ultimatum which ended at dusk, but Consul Davis again urged delay.

When three hours overdue, the head of our cavalcade arrived, and all of us were distributed among American and British naval ships. Finally all our International Community was safely aboard, except the eight dead left behind.

Comment on the Nanking Incident

WCL: Just as the Germans tried out techniques of "blitzkrieg" against helpless Spaniards, so the Russians, in this Nanking Incident, used trained Chinese Communists to try out on us, for the first time as far as I know, Communist tactics of arousing and leading mobs to wreck American consulates and institutions, to humiliate nationals of the free world--to burn, loot and destroy property--to mal-treat Americans especially, and in Nanking, plan a massacre of all foreigners.

It was this "Nanking Outrage" that showed to General Chiang Kai-shek that the Russian Borodin and his comrades were wolves in sheep's clothing. They had discredited him before the Great Powers. From this day forth, General Chiang began his long and bitter fight against Communism, forcing the Reds to make a six-thousand-mile trek to northwest China. It is to his credit that he compensated all foreigners who made claims for their losses through their respective consulates.

Moreover, this "Day of Infamy" began a breach in the "Favored Nation" friendship between Chinese and American peoples that dated back to America's "Open Door Policy," that prevented

WCL: the partition of China by Empire Builders of the last century, also the United States return of Boxer indemnities in scholarships for Chinese students.

As Chinese Communists gained more and more control of government, this wedge, begun here in Nanking, China, has ever widened.

This breakup of friendship between our two great peoples is one of the greatest tragedies of the twentieth century.

The Return to the United States

Chall: Your Nanking troubles were very serious. Did things go well with you after you fled Nanking?

WCL: I should say not. The tragic Nanking Incident that had driven us all out of China was over, but our troubles were not.

For three days, I had had little or no food as I searched out Americans in hiding, until all except the eight fatal victims were safe on American destroyers. Only then did I have my first meal. The main dish was American tinned beef that proved to be spoiled, so we all became violently ill with ptomaine poisoning.

My wife had reached Shanghai three days before the U.S. destroyer arrived with us aboard. She secured the last cabin available for the next sailing, in five days, on a President passenger liner bound for San Francisco.

Sick as I was, I could not or would not go to the hospital as I should have done. There were too many things to attend to in leaving China. I had no clothes except what I had on, no watch, no glasses, just totally cleaned out of every personal possession. My wife and boy only had with them the one small suitcase they had taken for the temporary stay on the destroyer while waiting in Nanking.

My wife has taped the story of our voyage back to the United States in a raging typhoon, so I'll not go into that, except to say that it was a grim experience.

CHINA, 1922-1927

[Taped questions and answers]

Methods of Determining and Carrying Out Research

Chall: Dr. Lowdermilk, how did you decide how to proceed with your studies on famine prevention and erosion?

WCL: Of course as a scientist, one rounds out a problem in its general terms, and then begins to gather information on it. How can one overcome famines? How can one stop famines in a country with 700 million people?

One is faced with a tremendous challenge and must have simple procedures to get at some of the basic problems.

As I told you before, one of my methods is the progressive hypothesis, which is really a geological type of observational study. You set up, on the basis of what facts you have, a hypothesis. Then you proceed further, gathering more information. And if one is intellectually honest and finds evidence against his hypothesis, he will accept that and modify the hypothesis in accordance with the new findings. This is a provisional hypothesis of course.

Then as one goes on and finds more information, one must modify the hypothesis again, and so on. In other words, it's a progressive thing.

Often there will be questions that we cannot discover by superficial observational studies. We need some sort of an experimental treatment. Especially where one is dealing in natural forces, there are situations that depend upon many factors. One must isolate those factors somehow to get a measure of their importance or their functions in the integrated whole.

One makes surveys, and then these observational studies, and then the experimental step. Then one must put all of it together and see how it works. Sometimes it does, sometimes it doesn't. If not, you've overlooked something. You find one thing and that leads to another.

Contacts With Other Scientists

Chall: Did you ever find that sometimes somebody else making a study in another part of the world might come across your conclusions and carry on from there? Or even that, independently, they were making studies similar to yours?

WCL: Oh yes. For instance, I had my papers picked up by Russians, and they translated and reprinted them in Russian. And then, regarding my forest litter studies, I got to know a Dutchman in Indonesia. He had discovered the same thing and they were keeping litter on the ground on rubber plantations. They were putting in sort of a banquette type of terraces to catch water and prevent it from running off, allowing it to sink through the litter.

Then I had another case in Tiflis, Georgia, south of the Caucasus. This acquaintance was based on a paper I'd given for the International Soils Science Society in Oxford back in '35, and the Russian scientist and I got in touch with each other then. He too found that forest litter is important in the management of a watershed.

So he had the river basin surveyed for depth and spread of litter. Those areas where the litter was deep and widely spread and unbroken gave him an assurance of regulation, and when they had less than this, they worked toward building up a litter cover.

Well, I was tipped off on this by Nick Mirov in the University of California Department of Geography. Nick Mirov was originally a Russian, but now he's an American citizen. He told me that it was dangerous to this man for me to write to him, because that was in Stalin's time, when they were very suspicious of any contacts Russian people had with the outside world. So I stopped writing.

Then there's J. Russell Smith. He was a geographer at Columbia University. He had come to China, and when he found me studying erosion, he got excited because he had also been studying erosion. In those days I didn't have much of a build-up on publications. So he made me a co-author with him on an article. I furnished the photographs and he and I wrote it up. It was published in the Geographic Magazine. I believe the title was "Erosion in Northwest China."

Chall: What was Mr. Smith doing in China?

WCL: He had a sabbatical and was on a trip around the world. He had realized this erosion problem early. He found a solution in

WCL: what he called tree crops. In Italy, he saw how they were growing chestnuts and other fruits and nuts on steep hillsides as a part of their food supply. With these trees they were able to maintain the soil in place without losing it by erosion. He wrote a book on tree crops.

When he found in me another kindred soul who realized what this erosion was doing [laughter], I had a friend forever. We had the most wonderful friendship. He was one of my staunchest supporters.

Visual Evidence of Erosion in China

WCL: Here is a copy of my doctoral thesis, "Factors Affecting Surficial Run-off of Rainfall and Surface Erosion of Soil Profiles." It has pictures in it which will give some idea of the problems I confronted in China. Here is one of those temple forests in which there was no erosion, but here are terraces--the country's been gullied up.

Now here's inside of this temple forest--it's beautiful. This is Li Teh I, my first assistant. This land has been cleared of forest. I found the timber lying beside these fields was rotting, showing that they cleared the land not for timber but for the food they could grow in the forest soil.

Very few people have seen this part of the world, but here we are on the frontier of advancing cultivation. . . . . Here's another temple forest and this picture is inside a temple forest; there's no erosion. [Flips pages] And the runoff--see, this field has washed off until just stone is on the surface. We called this "Contrast Valley," and I set up installations in here, and also out on this land where cultivation has been abandoned, and then down in this field which was still being cultivated but eroded. Here are the installations I set up and the machinery that I worked out with a tinsmith.

Measuring Runoff and Erosion

Chall: What exactly did you have going there?

WCL: I had two tipping buckets. The Weather Bureau has what they call a tipping bucket rain gauge that is diagonal, and when it fills up it tips and this sets off an electrical contact. So you have a strip recorder to record the rate of rainfall as well as the amount. You see, we are very much interested in the intensity of rain.

I had the tipping bucket rain gauge. Then I decided to make a bigger tipping bucket for measuring the runoff.

Chall: How did you measure runoff?

WCL: I had to establish plots, so that the water wouldn't run off except through our outlet pipe and wouldn't run inside from the outside. In other words, we'd catch only the rain that fell on the plot on which we had established the borders.

Chall: These plots represented all the kinds of land that were actually in those areas, so that you could test them?

WCL: Yes. These were sample plots. You see, it's impossible to find out an average for all these things. You have to isolate your factor to get decisive results. You do not measure three or four things when you really want to measure only one.

Chall: Had nobody before measured what was running off?

WCL: There were Dooley and Miller. They did not have an automatic device; they simply caught the runoff in a tank. They let it settle and then dipped off the water. This left the silty material.

Chall: And where had they done this?

WCL: They did this in Missouri. The fact is, I had spent a whole season in northwest China trying to measure runoff from small watersheds by the method that had been used before in Switzerland. But when I was up in this farming region, the rain came down as fast as an inch an hour or faster. Well, actually that isn't so intense, but when the soil surface is bare and it's sealed over, then the runoff factor is very great, enormous, really.

I spent a whole summer with a pack train for our equipment and three assistants doing work up in Shansi. This wasn't book stuff; this was work. We spent a whole summer without any quantitave results.

But I had observational information. I used photographs, and then I gave a hypothetical explanation of what was going on as the basis of the hypothesis. I couldn't say that this was

WCL: actually done, because we hadn't experimentally established it.

When the runoff from the rain of an inch an hour rushed down off the slopes, there was a roar because the runoff was full of soil and debris and boulders. One could hear the boulders striking each other, sort of a muffled sound like cannonading. The smaller gravel hitting against the boulders sounded like machine-gun fire. In other words, these were torrential flows--we called them mud flows, they were so powerful.

Since then we have much information on mud flows, as we found in Mexico in the study of the Paricutin erosional phenomena in the volcanic ash material. One can get fifty to sixty-five per cent and that usually gives a density of two; water has a density of one. With a density of two, such mud flows will actually float out large stones. That's the only way one can explain the great stones down at the end of outwash fans.

Chall: You were actually measuring then how much soil the rain took with it from these barren lands? And then contrasting it with what happened in the temple forests, where apparently you didn't lose anything?

WCL: That's right.

Chall: It must have been quite exciting.

WCL: I should say it was. I never have worked so hard, and there was nobody cheering because we were way out in interior China. But we didn't need to be cheered on.

Reaction of Chinese Scholars to Field Work

Chall: How did your colleagues feel?

WCL: Oh, they were fine. We'd get out in the field and analyze the problem, and what should be done. I always treated them on a par. They were graduates from accepted agricultural and forestry courses, but this was all book knowledge.

Chall: Then they didn't go out into the forests and fields as you had already done.

WCL: But when I went out, they too would go. One time when we were making a cross-sectional survey of the vegetation of one of

WCL: these drainage basins we used for experiments, we climbed up following a compass line. You can't deviate but must follow your line. We had a steep climb, so I sat down to rest.

Then I asked them, "What do the neighboring Chinese farmers think about this?"

They said, "We Chinese couldn't go out here and do this if you weren't along."

Chall: I see. It would be beneath their dignity as scholars.

WCL: Exactly. And of course they expect a foreigner to do foolish things. [laughter] But I explained how we had to get on the ground, to find out what actually happens so as to establish our measures, or corrections, or improvements from a definite area of knowledge that we had established.

Later, I would send my staff out on their own, assign them an area to make a similar survey. They were very enthusiastic. One of them got into a bandit territory where the Chinese were kidnapping people with money--landlords particularly--and holding them for ransom. If one dressed as a scholar or as gentry, he would be liable to such capture and kidnapping, and his family would have to pay ransom. And if they didn't pay, they'd kill him.

It was dangerous and no fun. So my boys disguised themselves as lowly farmers and then went about the countryside and got information. [laughter] Those were wonderful boys.

Chall: It's interesting that now in modern China the Communists have insisted that their students get out onto the farms and fields to work.

WCL: They're only doing what I said in the first place.

This was our group. [showing pictures]* This was Mr. Ip, who was a professor of forestry at Nanking, China. He was educated at Yale, so ordinarily he wouldn't get out.

Here's Li Teh I. He's a very intelligent chap and loyal. After we were attacked in Nanking and our navy had laid down a barrage around the Socony Hill where many of the Americans had taken refuge, I said to Li, "We've got to get out and find these people." I knew I could trust him in any emergency.

So he got a car, and we began to hunt out the missing Americans. It's quite a long story, which I've written and included in this chapter.

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*In Dr. Lowdermilk's report on the Survey of the Hwai River.

WCL: Li and I found that this first night, our foreigners were so well hidden by friendly Chinese, they wouldn't be found by the Communists. Also I realized we couldn't take many people in our small car, so that if we found any, we would disclose their hiding place. There were some thirty or forty people around the University and we couldn't rescue them all that night. I decided it would be better to let them stay hidden where they were until daytime.

Chall: But he was a help to you.

WCL: Yes, I would not have gone out without him. We had tramped over a lot of country in northwest China and been in tight places, so I knew he wouldn't lose his head in an emergency.

Then there's Ren Chen Tung. He was the son of a farmer up in the province of Shansi. There they have lime in the soil, and men grow tall. Ren was very loyal. He risked his life for me. When Communist soldiers were coming up the stairs in the University, shouting they were going to kill us, Ren put himself in a dangerous position and blocked their way. They might have killed him.

Chall: They didn't though?

WCL: They didn't--surprisingly, for they were mean fellows.

Whenever I went into northwest China when I was a professor at the University of Nanking, the Chinese were very generous in their attitude toward me. I was often asked to make talks, even way out in central Asia, where there was some student who had graduated from the University of Nanking. He might be on a military assignment or a jaunt of some kind.

Later on when I began to publish reports, I made my three Chinese assistants co-authors with me. Although they did not write anything, they were taking part in the accumulation of data and helped me in many ways.

These papers were written in English. When I left China as a result of the Nanking Incident, my assistants wanted these reports published to give them prestige. They translated them into Chinese and published them, so that they were read all over China. When I was back in '42 to '44, I found out that I was well-known by these writings in the hinterland of China.

Chall: Very interesting. They were still quoting your theories and your findings and solutions to quite a number of problems?

WCL: Yes, and this gave me a great deal of satisfaction.

Reading the Ancient Chinese Gazetteers*

Chall: Could you go back for a moment and show me the ancient gazetteer you told me about the other day? You must have been having somebody translate them while you were still in China.

WCL: Now this record [reading from a gazetteer] goes back to 966 A.D., and these county gazetteers report famines due to drought, famines due to floods, which were restricted to less areas but were much more destructive and violent. Then we have famines due to grasshoppers--locusts. Time after time there are references to them and to how they were so dense in the sky that they blotted out the sun. Then there are references to plagues and diseases.

Chall: You were concerned with famine due to floods primarily?

WCL: We were interested in famines whatever the cause, but my approach was, "What can be done in this field that may enable us to prevent or avoid or alleviate famines?"

Chall: What exactly are these records you call gazetteers?

WCL: In Chinese history, the county seems to be the most permanent division of the land. You go back through early dynasties, and the boundaries of these county records will still be the same. These are the gazetteers, which were revised about once every ten years. These record the events or conditions that affected the people of that time; for instance, eclipses of the sun or moon, great storms or rains, floods, and that sort of thing.

Now here are three different counties in the same province, and these are their records.

Chall: They go back a long way. Did one of your assistants do this translation for you?

WCL: Oh yes. Some of my assistants were excellent translators who knew English well. When it came to the gazetteers, I just sat down at the table and opened up this book. Then I would say to the translator while turning the pages, "What's this about?" And he'd tell me. If it was something I wasn't interested in, we'd pass it up. Then when he came to something on floods or famines, I'd have him translate it and put it in the records for our file for building up information.

Let me just read this little item from the year 1504:

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*More on gazetteers in Chapter VIII.

WCL: "1504--Famine and flood in Hunan, Yanchou, Luchou, Fengyang. People eating each other. Flood rising in Fengyang about fifteen feet higher than ground level."

Well, here's another one, in 1599. "People eat each other. Serious famine." There are many cases of cannibalism. This is why I say that in a famine, civilization falls apart.

When famines reach these extremes, the situation is practically hopeless. In a country like China, there was inadequate transportation, so that there would be famine one place, but a short distance away there would be plenty. The country is large enough to have favorable rains occur in one place and not occur in other places. Without transportation to exchange products or move food materials, then people were dependent pretty much on what was under foot.

One of the methods of famine relief in ancient times was that if a population was undergoing starvation conditions, they would set out on a migration and go to those areas where there was food and where crops had not failed. It was understood they wouldn't stay very long in one place but move on. Often migrations would go up into the mountains or places where foods are not grown in such quantity but where there is usually greater diversity and perhaps animal life in addition to vegetables.

Chall: Then would they ultimately stay some place, or would they go back?

WCL: They generally went back to their original area and started all over again. There are reports of migrating groups caught by floods and being wiped out.

Chall: Did you have the feeling that if you had been able to stay in China, you might have established land practices that would have provided more food and helped prevent floods, and that you actually could have been of some permanent help to the Chinese?

WCL: Well, if one is a conservationist, one must be an optimist, and believe that somehow, somewhere, and sometime, you will be able to find the basic problem and do something constructive to save the lives of people involved. That is one's basic approach.

The Hwai River Report

WCL: This is one of my reports of the Hwai River drainage. I used

WCL: the device in this, of going to old honorable men of the community who knew what had happened in the past and got from them important evidence.

For instance, one of the problems here was this river of sand coming out of the mountains into the Hwai River and filling it up to the banks. Then when flood waters came, they overflowed the banks and spread all over because the channel was clogged.

Chall: You mean clogged with sand?

WCL: There's erosional debris too; that's finer material. Here's a picture of one of the sand rivers. We have an historical record that formerly the sand had not yet reached this place. Here is a picture showing how they floated produce down river with rafts.

Chall: Is that because it was so sandy they couldn't use a boat?

WCL: Yes, the water became so shallow, they couldn't use boats anymore, and so they used a very clever device of making bamboo rafts. When I get out with these people and see them doing things like this, I admire their ingenuity. They have an expression "giang ju," which means "adjust to circumstances."

Joint Expedition With O. J. Todd to see Effects and Meaning of Silt

Chall: How did you happen to plan your joint expedition to Shensi Province with O. J. Todd?

WCL: I had seen where the Yellow River had broken out of its dikes in 1852, and instead of flowing into the Yellow Sea as it had for seven hundred years, it broke through the dikes and flowed to the north, four hundred miles into the Gulf of Chihli. I had heard that Todd was in China and we met to talk over the situation.

Chall: Hadn't Todd been in China before you?

WCL: Yes, because he had started out early in the famine. I really got there after the famine was over. There was much still upset, distorted and disarranged, but the people had had a crop and the Famine Relief people had been able to get seeds for the farmers. That was important, because farmers had eaten

WCL: all their seed grains. Then when the first crop came from new seeds and there had been favorable rains, they felt the relief period was over, and henceforth it was more or less reconstruction and assistance work.

Chall: Who proposed this expedition together into northwest China?

WCL: I told Todd, "I had to go up to see where all this silt was coming from." I talked to him about silt, but he had never been up the headwaters [of the Yellow River]. He had not been out in Shensi in northwest China, and was anxious to go and see the old irrigation project called King Ho, established in 225 B.C., at about the same time as the Gwanshen project, 240 B.C., which I told Todd about seeing.

This King Ho irrigation scheme is the most striking example of how destructive erosion and silt can be. In the case of the Gwanshen project in Szechuan Province, the water came from the Min River drainage, on the eastern borders of Tibet in which the country rock is hard, not erodable like the loess soils. Stone decomposed very slowly, and soils were shallow and with considerable forest. Little could be farmed, so the native vegetation, as azaleas and rhodendrons, bloom in all their glory, and honeysuckles grow wild. It's a marvelous place in springtime.

The Gwanshen project had clear water, but had what we call bedload, that is, gravel and boulders that are moved and rolled along the bottom of the stream bed but there was very little suspended material to make the water muddy. So by a simple engineering device that Li Bing worked out, they were able to farm this Chengtu plain of half a million acres for 2,250 years without a flood and without a famine.

Now across the mountains in the loessal region to the north where the wind-laid soil covered much of the country and there were great gullies in it, the King Ho irrigation project had been established, and this was what Todd and I wanted to see. see.

In Szechuan the project was a continuous successful operation with never serious interruptions, but over here in the King Ho where they had to deal with massive quantities of silt, our study of records show that up to a certain time they mentioned the silt as fertilizer, and were glad to have the land covered with sediments from streams. But then later these records tell about this mud that is very harmful to the ground. It packs the surface and doesn't take water in for irrigation.

The depth of silt in irrigation waters had built up the land higher and higher until the intake was not high enough to give a flow to water. Then they had had to go higher upstream in order to have a grade so that water would flow down into the

WCL: area to be irrigated. Each time this happened, the irrigation project was put out of commission until these repairs were made and the canal dug higher or deeper upstream. This irrigation project failed time after time. We have in this gazetteer the whole sad story of how many times this irrigation project had failed in the past.

Todd and I were both interested in this particular irrigation project. He hadn't seen it, and I was eager to see where this silt was coming from, so we set up a cooperative expedition. I had the funds from our Famine Prevention program, and he had funds from the International Famine Relief Commission.

Chall: Todd was struggling with this problem of silt in the work relief projects in rebuilding dikes, was he not?

WCL: Yes. Todd carried out work relief, and he paid workers no money but paid them in food and grain. Actually he was responsible for putting more men to work than anybody has ever done in any place in the world, unless perhaps ancient Egypt.

Then at a later time, he put the Yellow River back in its channel. After the Japanese invaded China, the Chinese broke the dikes so floods would drown the Japanese armies. Then later on, when conditions became settled, Todd put the river back in its channel. That's an event of heroism.

Chall: Todd stayed there for many years then.

WCL: Oh yes, longer than I did. He went back after the 1927 incident.

Chall: When you were out with Todd, you had the feeling that much of this erosion was caused by improper use of land. According to your written material, you had already begun to assume this?

WCL: Now, to answer that question, I want to show you a picture: [shows picture of land deeply eroded, from "Ancient Irrigation in China," p. 215] These are tremendous gullies. Look, those little parcels are farms. There's a village. In places here they have even begun to terrace the slopes of these gullies.

Just ponder this picture. Here live hundreds of thousands of people and this is their land of fertile loessal soils; it's very susceptible to erosion. This is the country out of which water comes for this King Ho irrigation project. This is why the Yellow River is yellow. The Chinese call it Hwang Tu, yellow earth.

You see how this erosion undermines a civilization? One does not have to have a microscope to see this destruction of land. In other words, here we're dealing with forces that

WCL: determine the destiny of all civilization. It's difficult to get out and talk to even our farmers and get them to comprehend what this picture should tell us--should warn us about.

Chall: What could be done? Is it possible to farm this kind of land?

WCL: The whole situation is so complex that we can't come out with a ready-made answer. When you propose something that can be done and that people will do, then you have advanced a long way. That's why I have called for pilot projects.

Chall: How did Todd react to your conclusion about the origins and meaning of silt?

WCL: He was in complete agreement. He was an engineer and I was a geologist and we were both trained observers in such matters.

Solving Problems Caused by Erosion

WCL: I told you about that canal; here is a picture of the intake ["Ancient Irrigation in China," p. 217]. They've extended this intake up into the limestone country. This is Li Sheh, a good friend of mine who was a Chinese engineer. They had diverted water just about as far upstream as they could go, so they cut a tunnel through but this still brings in muddy water.

Here's a picture of the diversion that tunnels water through the mountain to feed into the irrigation, but if the silt content goes up beyond fifteen percent by weight, it is necessary to shut off the water even though it is needed for irrigation.

Chall: Then what do they do, shovel the silt out?

WCL: Oh no. It's too tremendous.

Chall: Could it be done with machinery? Do you just go on diverting endlessly?

WCL: No. Of course they've got to reduce the erosion wherever it takes place. Where the raindrop strikes the ground, there's where you can really do something about it.

Chall: Can you do different kinds of planting in the loess land?

WCL: Oh yes, we can grow trees. But the situation which makes it so difficult is that demands of the people to grow food on the land are now so high they can't permit trees to grow. If they need fuel, they'll go out and pull up the trees they have planted for fuel, and to cook their food. So fuel becomes a part of their food supply, and as I've said many times, we have to be in possession of a certain amount of abundance to act in an intelligent way in the conservation of our resources, for "a starving farmer will eat his seed grain." You'll do it and I'll do it when we're faced with this grim decision.

How can we catch up with this population explosion, and get a pause long enough to restore what we call forest conditions, or rebuild the organic content of soils that have been so deprived of vegetation?

It is a tremendous problem for which there isn't any ready and rapid solution. It would require a consistent and continuing program based on measures that will work.

You see, when land is cut up in gullies, it's ruined for food crops. We'll have to take these areas and terrace them. But economists will say you can't do that because it won't pay. But I say, "Yes, you will, because you will do what is necessary to survive. Survival is more important." Economics only sets priorities.

Lowdermilk Finds his Life Work

Chall: So when you saw this struggle with silt, you decided your life would be devoted to the study of silt and its consequences.

WCL: Yes. I said, "Why should farmers of China have to work so hard moving all this earth to build up dikes, to protect their lands from flooding?"

Previously I had said to Inez, "What am I doing out here? I can't teach these Chinese how to improve making things grow. They know all this. So why am I here?"

But when I made that trip to the headwaters, and I found out where the silt was coming from and why, and saw the contrasts in the Buddhist temple forests, the problem took on its aspect of being a region-wide, world-wide problem, affecting all mankind and his future as well as the present. And then I

WCL: knew why I was there.

Forestry in China in the 1920's

Chall: What was the position of forestry in China at that time?

WCL: I discussed this in an article, "Forestry in Denuded China,"* but I will tell you a little more about it.

In the first place there were no national forests at all. There were only those held in ownership by a few persons, generally families or clans. Where the land was too rough to cultivate, there was nothing else to do but leave forests and native vegetation to develop. Timber was cut out of them by the clan or family.

Then as time went on and the clan became more and more numerous, the land also was divided up, until the parcels that were left were so small that it didn't justify putting a boundary around the forest. So the farmers became joint owners of a tract of forest.

Then if one wanted to cut timber out of it, those who had certain rights to it would get permission to cut trees, from some of those who were joint owners.

Chall: Was there a head man in charge?

WCL: Yes. A person could go ahead and cut forest once he had permission, but no one protected the forest. It was nobody's real concern. There was no forest management; even protection from fire wasn't very rigidly taken care of. In other words, the forests had a very weak position. No foresters had responsibility.

The only forests that I found were those controlled by Buddhist priests. These were the temple forests I spoke of. Of course these gave us a sample of what the forest of this whole region may have been like at one time. I don't believe there was very much planting of forests by the priests--the trees reproduced naturally. The priests protected the forest

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*Annals of the American Academy of Political Social Science, Vol. 152, November, 1930.

WCL: to have shade and seclusion and an agreeable atmosphere for meditation. If and when they needed repairs for their temple, they would cut one or more trees as they needed them.

Now, I've been speaking of forests up in the Yellow River basin. China can be divided into three parts: there's the northern portion in which the Yellow River drains most of the land where there's an average rainfall of around twenty inches a year; then the Yangtze River basin which gets about forty inches of rain a year; and then south China, which has the Pearl River, the Red River and two smaller rivers, and where rainfall averages about sixty inches. So you can see that where there is a great amount of moisture available, you have a corresponding growth in forests when it's permitted to grow.

In the Yangtze River basin, bamboo flourishes and the Chinese manage it and treat it as a crop. They eat the bamboo shoots as a food. Bamboo is called the farmer's best friend because it has a thousand and one uses. It is a practical material and grows rapidly and is strong and easily worked.

There were areas where I had my boys make surveys. One of them ran into a big bamboo area where they were managing it as a forest. One characteristic of this bamboo that made it so useful was that it isn't heavy but very strong.

The weight of logs would be a real problem in China. I showed you that bulletin on the Hwai River and the picture of the men carrying the bamboo rafts on their shoulders. Although these carriers were tremendously strong, logs were heavy and there was a limit to the load they could carry. For this reason, farmers wouldn't let trees grow beyond a certain height or weight, because they had to be carried by men from the woods down to the stream. Because there were no roads, no carts, men carried by muscle power the logs from the river to lumber yards in the cities.

Chall: You mean they had no donkeys?

WCL: No, they didn't even have donkeys up here.

Chall: No animal labor at all, just human muscle?

WCL: The farmers had what they call a yellow cow, a draught animal for plowing, but for some reason, the donkey didn't seem to thrive in this northern part of China.

Now there's one other interesting thing about forests in the Yangtze belt of drainage. Fuel was one of the most important uses of woody material. I took some foresters over to show them what forestry was in China, and showed them how the

WCL: people cut the grass every year with sickles, and store this grass as their fuel supply. Then I showed them the differences between the cutting and burning practices of the villagers and of the Buddhist priests.

We went into the kitchens of the Buddhist priests to see how they had designed their cooking stoves to burn grass, nothing else. An old man or woman would use big chopsticks and reach into a bag of grass near the fire, take a little bit of grass and put it under the thin iron basin to heat food to be boiled or fried. One advantage was that when they didn't want any more fire, they didn't put more grass under, so they used the minimum of fuel for cooking purposes.

I showed these guests Purple Mountain which we re-forested as part of our famine prevention program. In the annual cutting of grasses with a sickle, they also cut new sprouts of the hardwood species where it was coming out from the edges of the root. Where we protected areas, these hardwood species began to grow. If the Chinese grass cutters would let them grow, the hardwood species would become another forest.

I said, "We don't need to plant seedlings here."

But they said, "If we don't plant pine, then we cannot get woodcutters to cut the grasses to bring into the town to burn."

In some cases they set up regulations to protect grasses and seedlings and let them grow. Since the people couldn't distinguish the hardwoods, the authorities planted pine. If cutters had pine in a bundle, it would give away the fact that they'd been cutting where they weren't supposed to.

Often in forests that ought to have been growing timber, there was no timber at all, just grasses. But down in the valleys, one might see trees in rows, and irrigated. This was especially so out toward central China in the dry regions. This growing of timbers became more and more a feature of the countryside because the Chinese needed large timbers for houses.

Chall: So they were growing trees for a purpose. This was sort of a management technique.

WCL: Oh yes. They not only set aside land for the trees, but would have little streams of water coming down to irrigate them.

Chall: And who was doing that?

WCL: The farmers would do it. You must remember that China never had landlordism to a very great extent. The Chinese might have a small home in the village and as he prospered, he would buy

WCL: some land. His ideal was to buy up four or five acres which he would rent out to a farmer. Then he became in time a man more important in the community, and would continue to improve his condition.

The father of one of my assistants, Feng Chao Lin, had acquired a few acres to rent. When the Communists came, they said, "You're a landlord," and they killed him. But landlordism, as in Egypt, Italy, Africa, or the Middle East, where a man held great areas of land, did not exist in China.

There was the New Life movement going on in China at that time. Many of the governors were trying to develop their people and their industries, as Yen Shi-shan, who was the model governor of the province of Shansi and who cooperated with me and sent out police to see that my installations were not molested.

These governors also set up schools and some had forestry departments. Forestry especially had a good name in China. General Wu Pei Fu, the scholarly war lord, had a model forest. Many of these governors or departments of forestry would plant up areas wherever they could get land, sometimes by ousting an enemy and taking over his land. Especially if there had been a political war, the man who won would take over the land of the other. Then he would plant it up with trees. This is the way a certain number of jobs were created for foresters who had been trained. Chinese didn't have large sums of money to develop programs like we have, so they largely depended on farmers to do the tree planting as well as the agriculture.

Memories of Pearl Buck

Chall: Dr. Lowdermilk, you and Mrs. Lowdermilk have mentioned several times that you regard Pearl Buck as one of the most brilliant women you have ever known (the other being Rachel Yarden in Israel). Did your acquaintance with Mrs. Buck begin when you lived in China?

WCL: Yes, Pearl and Lossing, her first husband, were our next-door neighbors for five years in Nanking. We remember our delight when her first short stories began to be published. I do not believe Pearl had any real conception of her remarkable talents that were to bring her international recognition, considerable wealth, and many honors and prizes, including the Nobel Prize for literature. But it was interesting to watch her development

WCL: which was forced on her by the urgent need to provide every possible opportunity for the development of her sadly retarded only daughter.

When they stopped to visit us in Berkeley, enroute back to China with their adopted daughter, leaving Carol in an institution, Pearl said, "I must return to China, and though I can't hope for a best-seller, I must write a sufficiently good book to take care of Carol if anything should happen to me."

The result was The Good Earth, which brought her fame and wealth and was the first of many books. She wrote rapidly, seldom had to even rewrite a sentence. Her secretary typed the manuscript, Pearl read it for corrections and it was ready for the publisher of Day and Day Company, who became her second husband.

Pearl adopted some ten orphans and established "The Buck Foundation" to care for Oriental orphans left by our U.S. soldiers.

Mrs. Lowdermilk Tells of her Experiences During the Nanking Incident

Chall: Mrs. Lowdermilk, I wanted you to tell me about your experiences in the Nanking Incident, during most of which, as I understand it, you were aboard ship.

Mrs. L.: That was a terrible experience for everybody. Walter has written up his story, telling of his experiences within the city of Nanking. Altogether I had been through thirteen wars in west China. I was not afraid and refused to go onto the gunboat. However, my husband was the liaison in time of crisis between the American destroyers and the American consul, for the safety of the 120 American citizens in the city, largely around the American Union University. He insisted our two-year-old son and I go for temporary refuge; otherwise, he could not insist that other wives and children leave their homes and crowd onto the American destroyer.

The Northern army was retreating because of the advance of Chiang Kai-shek and his forces. It was feared the Northerners might retreat into Nanking, close the city gates, and we would be trapped in a besieged city, in which case we couldn't

Mrs. L.: get food. Or we might be subjected to general looting as the Northern troops waited for boats to cross the Yangtze River.

So the captains of the two U.S. destroyers and the American consul decided all women and children should be put aboard our destroyers anchored out in the Yangtze River. I objected vehemently because it was most inconvenient to take a little two-year-old boy and crowd into ships quarters.

We were allowed only one suitcase. We did not know whether we would stay for three days, a week, or what. But Walter said, "You've got to go, whether you want to or not. I can't make the other women go and take their children unless you go." So I had to be obedient in this case. [laughter]

We had impossible quarters. We were crowded in the prow of the boat right under the big gun. In a space that was for six sailors, there were altogether thirteen women and babies. Our husbands came down to see us the next day, and we all wanted to go home, for everything seemed to be perfectly safe.

Then the next morning, we heard shooting and saw a pall of smoke hanging over the city. We couldn't have our portholes open at all for fresh air, because soldiers were shooting from the shore at us and bullets were popping against our ship.

In the afternoon, the time, 3:30, apparently had been set by the Communists within the Nationalist army to kill all foreigners. Word had gone out from the Russian adviser Borodin, "Kill and destroy all foreign life and property in Nanking."

We didn't know what was happening to our husbands within the city at the University, neither did we know what was happening at Sha Guan, where the Communist soldiers had set up guns to destroy the home on Socony Hill where Consul General Davis had gathered seventy or more Americans under his protection. He realized that the guns could demolish the house and kill all of them. As a last resort he sent one of our sailors up on the roof to wig-wag a message to our destroyer to open fire. Of course, the ship knew the location of this gathering place that had been agreed upon in case of this emergency.

At that moment, a sailor came running down the ladder steps and threw cotton on the table, saying, "Stuff the babies' ears immediately. We're going to open fire, and it will burst their eardrums." So each mother grabbed her baby on her lap. I had told our little son, who was interested in animals, that the big gun right on top of us, on the steel

Mrs. L.: plate overhead, was going to talk. I put my hands over his ears in addition to stuffing them with cotton, and of course it was only a few moments until there was this terrific explosion, which shattered all the electric light globes, and we were in darkness with the screaming youngsters.

From the explosion which sent the projectile off, we got the ejected huge cartridges as they tumbled down on the steel plate over our heads, which was also a bang. Then we got the sound when all that TNT exploded around Socony Hill. Altogether we had 180 explosions to endure.

If I had known what was happening, I would have felt very differently about this shooting into the city, which I deeply resented. Actually this shooting saved the lives of our husbands in the city at the University, and also saved the lives of the seventy Americans who were with the American consul on Socony Hill. But as it was, I thought that we were blowing up the city gates and the arsenal and important places in the Chinese city.

I loved the Chinese, and I felt that this was the last straw for the white man, especially Americans, to do to our lovely city. So I was emotionally just furious as we listened to the 180 explosions. Of course, this was very hard on the screaming children in the darkness, for it lasted so long.

Then when it was over and the shooting ceased, we still could not open any of our portholes because of firing from the shore. When it was dark, I went up the ladder steps onto the protected side of our destroyer to find an officer. I looked across to the north side of the river, and Pu Kow was all in flames, and one could see people silhouetted against the fire carrying their aged, their household bundles, or their children on their backs as they fled along the river bank.

The retreating soldiers had gotten into all the boats they could commandeer and had crossed the river. Then when safe, they began to loot and burn. But there was no shooting from that side, so I felt safe.

When I found an officer, I said, "If we have no light at all, may we open a porthole?"

He said, "No, lady, they're shooting too much from the Nanking side, but we are going to move you onto a refugee ship about midnight. So you will just have to put up with the situation as it is until then."

As they loaded the boat on the north side away from Nanking

Mrs. L.: and the shooting, I was standing ready to be loaded down the ladder steps when I heard one of our sailors say to an officer above, "Don't load her too heavy; the engine's on the blink tonight."

It was an open boat where we sat entirely exposed to the elements. It was bitterly cold and was sleeting. The Yangtze River was flowing down, and the tide was coming in, so when the two of them met, the waters were very rough and choppy.

We had thought it would be a short ride from our ship to the refugee ship, but we had a rude shock. All ships on the river were blacked out. Great huge hulks loomed up in the darkness, none of them with lights, and no one knew which were enemy ships or where our friendly refugee ship was anchored. Our boys had started out apparently without sufficient knowledge.

A couple of times the engine stopped, and the sailors put their little caps over the flashlight as they worked with the engine, but immediately bullets began to pop around the water near us, and we were in a dangerous situation. Finally they got it started again, and twice we went up to big black hulks, and the sailors called out, "Are you expecting any women and children refugees tonight?" I remember one very blasphemous (unprintable) emphatic, "No!" So we had to start out searching in the darkness for our refugee ship again.

In the meantime, we had been wandering around on this turbulent Yangtze River in blackness (except for the distant light from the burning city of Pu Kow across the river) for more than two hours with a crippled engine, unable to find where we were to go. I was frozen and stiff holding our little boy on my lap as the waves tossed us about and sleet stung my face. I remember distinctly having the feeling and almost a prayer that we would go down suddenly and have it all over with, instead of this suspense and utterly freezing misery.

Finally our engine went totally dead again, and we bobbed helplessly about. But by this time, we were quite a distance up the Yangtze. Our sailors saw an occasional flashing light way down the river and assumed it might be a signal for us. Our sailors guided our boat in the current down to the light that from time to time seemed a signal. Finally we reached the landing craft beside the boat.

I was frozen stiff and unable to lift our son off my lap, and to make things more difficult, I was also pregnant with our little girl who was born not too long after our arrival in America. One of the Marines took our two-year-old boy and carried him up the ladder while another one helped me.

Mrs. L.: At the top of the ladder was Consul Davis, and I said, "What do you know about the men in the city?"

He said, "The only word I have had was at eight o'clock this morning from your husband. He said that he had been with Dr. Williams when he had been shot in cold blood at his feet. They had all been robbed. I told your husband to keep in touch with me but the phone went dead, and I have never heard from anyone within the city since then. However, we do know from some Chinese reports that some Americans have been killed, and that many of their houses were burned and all homes were looted."

Our refugee ship which was built for only eighty-five passengers now had 275 aboard. Everybody was hungry; nobody had been fed. This ship had all the seventy-plus refugees from Socony Hill. The ship's sailors made sandwiches by the hundreds and got together what food they could to feed people without having them sit down at the table. Some stood, many sat on the floor, and everyone was excited, telling of their experiences.

Of course, we were very alarmed as I heard that when a ring wouldn't come off of Dr. Smith's finger, they just chopped off his finger, and when somebody else had resisted being robbed he was killed.

During this day, eight foreigners altogether had been killed, so we were much concerned for our husbands up in the city. We knew our homes were gone, but our hope was that something had saved our men from the mobs.

Of course, we didn't know at that time that three-thirty had been set as the hour for the general massacre. Neither did we know that the Chinese Communist soldiers at the University campus, who had robbed and re-robbed our Americans until there was no possibility of getting any more money or valuables, had still voted whether to demand one thousand Chinese dollars each, or about ninety thousand dollars, immediately or they would kill them all.

It would have been easier had we but known the American lives our destroyer was saving by our big guns, but we didn't. We left Nanking on the refugee boat not knowing whether our husbands were dead or alive. We were terribly crowded and there were no sleeping facilities except on the floor.

The next morning we passed a Chinese fort. The captain came along ahead of time and told us to all lie down flat on the floor so that if any guns shot from this fort, we would be down low where the steel hull was under the windows. Sure enough, we were shot at, but no shells hit our ship.

Mrs. L.: When we arrived in Shanghai, I knew this was the end of our stay in China. We were due to leave on furlough anyway in two months when our five-year term would be over, so I went immediately from the boat to the "President" passenger ship offices and secured almost the last cabins available on the next sailing to America.

Then I had a terrible three-day wait. We didn't know whether our husbands were dead or alive. You see, it was before the days of radio, which might have enabled us to know immediately what was happening.

Finally we had word that third day that an American and a British destroyer were coming down with the Americans from within the city that Walter had gathered in Bailie Hall. Then, as he wrote in his report, it was up to him to locate and rescue the other thirty or more who were hidden and had not been able to reach Bailie Hall. He found one in an empty cistern, and another one covered up by old dirty police uniforms in the back of a police station, and others here and there. And Anna Moffett--he discovered her late at night lying in a bamboo grove covered up by her Chinese friends with straw. She had been shot at eight o'clock in the morning twice through the abdomen and had lain there all day--fifteen hours--without medical attention.

My husband was able, through the Chinese, to locate her, get her back to the University Bailie Hall where Dr. Daniels treated her wounds, and fortunately she survived; whereas, if Walter hadn't gotten her that night she probably would not have.

We were overjoyed when we heard our husbands were coming, and of course all of us waited in eagerness at the dock to greet them. I had a shocking experience. The first man that I saw get off and walk past me was my neighbor, Mr. Holroyd, a six-foot-three, big strong man. He was white and tottering.

I said, "What has happened? How are you?"

And he said, "Oh, we've been through hell."

Well, I thought, "You mean to say a great big man like you would go to pieces just because you had war experience?" I had been through enough of them. I had seen Chinese heads hanging by the dozens from telephone poles as I had come down, and I had seen them in west China, and I didn't think that there was anything a foreigner would see in China that should make him go to pieces like that.

Then a little later, came the Dean of the School of

Mrs. L.: Agriculture and Forestry, Mr. Reisner, who was such a wonderful man, and who was Walter's chief who had gotten these famine funds for the University to put on this famine prevention program. He came by wearing a lady's overcoat and my best velvet hat. You see, all of their clothes had been stolen from them. The Chinese came up again and again to demand more from them in Bailie Hall, even taking the shoes off the little children's feet.

These Communist Chinese soldiers had beheading knives, and they were very fearsome and you gave them your clothes or anything else that they wanted. Then later, our Chinese friends gathered up looted material to take to the shivering Americans. So I saw my velvet hat and this lady's coat on Mr. Reisner, and I thought, "This too is strange."

I rushed up to him, and he also was white and tottering. So I said, "What has happened?"

And he said, "Walter's coming on the next small boat from the destroyer to shore, and he'll tell you."

I had the inner assurance that my husband, who had been an army officer and who I heard was the hero in the rescue of these foreigners from inside Nanking, that he wouldn't be overcome by anything the Chinese could do. When I saw him coming, I rushed to him and was astonished to find him white and tottering. I took his hand and led him over to a bench, and said, "For heaven's sake, Walter, what has happened? What is the matter with all of you men?"

Then he told me how he had done without food for three days while he was hunting up the missing Americans and gathering them together, and of his trip down to the Yangtze to prevent our Admiral from blowing up the city gates, as he had threatened if the Chinese did not deliver the Americans to the river bank by a given time. Walter had had practically no food for three days.

Then finally, when this whole cavalcade that he had been leading reached the destroyers and all were safe on the destroyers, he had his first real meal in three days. This must have been before the days of our pure food laws, for what they were all given was spoiled meat from tin cans, so all of these men had terrible cases of food or ptomaine poisoning.

Some of the men were taken directly on stretchers to hospitals. Walter should have gone too, but we realized we could leave in five days. Walter had no possessions at all; everything had been stolen. He didn't have another pair of socks or a sweater or coat or hat or watch or glasses or

Mrs. L.: shaving kit or any of the numerous things a man must have. So he kept staggering around to do the necessary things to get off.

We were most thankful for Julian Arnold, our American commercial attache in Shanghai. He had already closed his beautiful home for the summer and sent his servants away, and his family were already in Tsing tao and he was leaving. But he knew Walter and John Reisner, and when he found out the desperate situation, he returned, opened up his lovely big home, called back his servants, and we stayed there for five days.

The Reisners and others stayed on for two weeks before they could get ship passage. In our living room, that cream camel's hair rug with the blue border came from Julian Arnold's floor. He was good enough to sell that to me so that I would have one Chinese rug from my whole household of rugs to take back to the States. I thought that was lovely of him.

The Voyage Back to the United States

Mrs. L.: We got on this first boat and immediately started out into one of the most terrific typhoons on record. It was not only between China and Japan but followed along with us, or we along with it, all the way from China to the Hawaiian Islands. Our cabin was on the second deck above the machinery deck, and yet waves would come entirely over the whole ship and leave us, even at that level, in total darkness.

Walter estimated that the ship rose and fell sixty feet with each wave and roll. I'm the seasick kind anyway and I just die in a storm. Of course Walter was seasick too. Once an enormous wave hit our ship with a bang; it must have gone over the smokestacks. Our ship quivered down in darkness under the great weight of water. I remember how Walter threw himself back onto his bed, and said, "Well, if the ship goes down, I'm not going to try to save either of you." [laughter]

WCL: How do you know I said this?

Mrs. L.: Oh, I remember it very well. I've always had a sense of humor, and even in my seasickness that amused me. But this time he was so seasick he could watch both his little son and me die without trying to save either of us. [laughter]

So we landed in America utterly penniless, looted of everything, not a possession except what we had been able to secure in those brief days in Shanghai to start life over again.

Mrs. L.: From Honolulu to San Francisco, the storm was still somewhat raging, but it was not a typhoon.

Decision About the Future

Mrs. L.: Walter worried constantly. He said, "Here I am coming back after five years, and now I've got to begin over again at the bottom. I don't know whether they'll take me at the Forest Service; I don't know whether I can get a government job again." And he stewed and stewed.

Finally I said, "Well, Walter, the Lord has taken care of us this far. We can depend upon it that something will open up." But he was very, very pessimistic.

Everybody all over the United States was interested in the arrival of these first refugees that had been driven out of China under fearsome circumstances. Suddenly, Walter found himself being offered seven different, well-paying jobs, a number of them to be chief of various Forest Experiment Stations, one back in Missoula and another down in the south somewhere. He was offered other excellent jobs.

But now, our way of life was broken up so this we felt was a turning point. Walter in China had decided that his life work was to be the relation of peoples to their lands, and what farmers can do to the good earth to make it unfit for future habitation and growth of foodstuffs--in fact, it is the determining factor in the rise and fall of civilizations, as he had seen in China. We decided that now would be the best time to get his Ph.D. and go ahead with these erosion studies that he had carried on for the past five years, and continue scientifically to measure soil erosion and runoff and its relation to the depletion of soils.

Walter said, "Well, I'll leave it with you whether we take a job and begin to live again, or whether we continue for another period of extreme difficulty until I get my Ph.D."

Without any hesitation I said, "Now is the time for you to get your Ph.D. Then after that we can go ahead in any kind of life work that you choose to do."

We have never regretted that decision. Since then we've had a wonderfully fascinating time together. He had his work in the United States, we have made studies in more than thirty countries, and I've been with him in all of them except two--Puerto Rico and Mexico. While I didn't go on Walter's second

Mrs. L.: trip to China, nevertheless I had formerly been into the edge of Tibet when in west China, whereas Walter made his expedition into Tibet from the northwest.

When we landed in on my people in Pasadena, I was ill, the little son had measles and pneumonia, Walter had not recovered from his ptomaine, and we were stunned and bewildered, but thankful for the warm welcome from my family. My sister was wonderful. She is a capable practical nurse, and she took complete charge of the boy and probably saved his life.

The family rallied behind us, and because of their loyalty and willingness to share and cooperate, I lived there with them for a year in Pasadena while Walter got his Ph.D. in Berkeley.

VI STUDYING FOR THE DOCTORATE, 1927-1929

[Written questions and answers]

Decision to get a Ph. D.

Chall: Mrs. Lowdermilk said in the material she taped about your return from China that you decided to go back to school and get your Ph. D. and delay, for a time, earning a living.

WCL: Yes. During the eighteen-day voyage home, I had worried about having no position after being gone so long in China. However, this was needless worry, for I was immediately offered seven fine positions, all of which were tempting in our present financial state.

In China, I had wished I might continue my erosion studies and get my doctorate. Now with this break in our lives, it seemed this was the time to do it. The Forest Experiment Station, located in Giannini Hall on the University campus at Berkeley, which collaborated with the University Agricultural Department, offered me a fellowship with funds to set up experimental installations on a more comprehensive scale than I could do in China, to study factors in processes of runoff and erosion.

I could use artificial rain over my plots, free from vagaries of rainy or dry seasons. I could choose light or heavy rains of any given duration as experiments required. This appealed to me.

Experimentation on Runoff and Erosion Begins

Chall: How soon did you start work at the University Experiment Station?

WCL: In the summer of 1927, I registered at the University of California for my postgraduate study to lead to a doctorate. My major was forestry. I took two minors, one in soil science and the other in geology. My problem, as approved by my advisor, Professor Arthur Samson, SAMPSON was entitled, Factors Effecting Surficial Runoff of Rain and Erosion of Soil Profiles. The problem

WCL: involved evaluation of factors which determine the division of rain into runoff from soil surfaces and its infiltration into soils and the consequent effects upon erosion of soil profiles.

Chall: How did you begin this work?

WCL: Pretty much in the same general way as I made my studies in China. First I began the task by reading all the material that was available to me covering a period of more than one hundred years. Later my intensive review of this literature was made into a Bulletin as Part III of my thesis. I separated reports of experimental studies from those that were merely observational studies. I then evaluated these experimental studies within the light of my experiments and with my new findings.

Chall: Where did you develop the outdoor experiments?

WCL: The first Berkeley experiment was located on Oxford Street Tract. It was designed as a Water Cycle Study, to differentiate it from surficial runoff plots on slopes.

The most important finding of this experiment was the large difference between the runoff from soils covered with natural forest litter and runoff from soils where the litter had been burned bare.

This comparison showed the very high percentage of rain as runoff from plots burned bare of litter. These differences varied from two to ten fold.

Devising and Maintaining the Soil Tanks

Chall: Did you use the plot method as you had done in China?

WCL: No, for here I designed tanks of galvanized iron, encased in wooden frames. There were eight of them, with horizontal dimensions of two by five feet. They were built to provide for soils two and one-half feet deep, with four inches of sand and gravel on the bottom and with a surface slope of thirty percent. We wanted soils used in these experiments to be uniform in their characteristics of percolation.

Chall: I understand you had a special method of filling the tanks with soils. What types of soils did you decide upon?

WCL: Yes, I proposed to take up soil samples in shallow layers and then to repack them in layers in their original order, in one- to four-inch layers. I tamped them uniformly to their original volume. I decided on three widely separated soil series for samples.

(1) The Aiden soil series, a clay loam, was collected near Placerville, California.

(2) The Holland series of fine sandy loam was collected thirty miles east of Sonora.

(3) The Altamont series, a heavy clay loam from the Berkeley hills.

These three widely separated soil samples represent typical soil profiles covered with characteristic vegetation. They were selected largely because of differences in rates of percolation through them.

After the soils had been packed in tanks, forest litter or mulch which had covered the soils in the state of nature was placed on their respective surfaces. The soils were then permitted to settle during the rainy season from November, 1927 to March, 1928. The experimental runs then were begun. We had set up eight tanks in pairs, with litter or mulch on all tanks. Then litter or mulch on tanks one, three, five and seven was burned clean with a Hauk torch before the application of rain.

Artificial Rain

Chall: I am interested to know how you produced artificial rain.

WCL: Artificial rain was provided by means of two horizontal 1.0 inch pipes, fitted with special Skinner overhead sprinkling nozzles, size 2. These nozzles were from fifteen to twenty feet over the tanks and were spaced at two-foot intervals on each pipe, so as to stagger jets of water, one foot apart, and spread the fall of drops like rain. The angle of the line of jets was adjusted to varying wind velocities. Berkeley hydrant water was used under pressure of sixty pounds per square inch.

Chall: How was this rainfall measured scientifically?

WCL: I went into great detail about this in my thesis. But briefly, my method of measuring artificial rainfall involved the setting up of an installation for collecting the rain, natural and artificial, in a battery of standard rain gauges and troughs along the sides of soil tanks. This rain water was computed in equivalent depths of rainfall over the experimental installation to permit the direct reading of water runoff and amount of percolation.

Chall: Did you have visitors coming to see these experiments?

WCL: Oh yes, this was quite a show place. Many Americans as well as foreign scientists came to see these experiments in operation. It made quite a hit to be able to read by the gauges just what was happening. They could see how the percolated water through the soil profile was collected in the layer of gravel and sand on the bottom of the tanks and was conducted thence directly into the percolation tank.

Chall: Were you able to accomplish more in your experiments by using artificial rain than you did with your plots in China?

WCL: Decidedly yes. It also shortened the time for securing data. This artificial rain installation made it possible to:

(1) simulate rain in various amounts and at various intervals,
(2) measure surficial runoff from each tank,
(3) separate and measure material eroded by surficial runoff,
(4) measure percolated rain waters.

We could make reruns when and as we wished and imitate or duplicate any storm, including duration and intensity.

In our studies, we applied artificial rain in seven series of ten rains of equal duration, totaling a depth of 198 inches in six months. This was besides natural rains, which we allowed to seep through before applying our artificial rain.

In all experiments, the surficial runoff from tanks in which the litter had been burned was greater in every instance than runoff from tanks with litter-covered surfaces. The most significant feature of the experiments was that litter continued to function regardless of the duration or amount of rain.

The original experimental runs were completed in August, 1928. The installation was maintained throughout the following year, and repeat runs were made in July and August of 1929, to discover if further settling or other influences might change the relationships discovered in the first series.

In all experiments, the forest litter or mulch served to maintain the soils under them in a state of far greater

WCL: absorptive or infiltration capacity than the same soils which had been burned bare of forest litter.

Soil Tubes

Chall: Did you devise any other experiments to develop your erosion theories?

WCL: Yes, and I believe the one I called The Clear Versus Muddy Water Experiment, gave us the most important information. This experiment was carried on in the laboratory. It was designed to test relative rates of percolation of clear and muddy water through columns in the absence of a litter cover. Four soil tubes were filled and uniformly packed with the same soil samples. Clear water was run through the four soil tubes for parts of seven days to establish the percolating characteristics of each tube.

Then a muddy water suspension was prepared by stirring samples of the same soil into water. Muddy water for the experiment was siphoned from the supply mixture containing soil particles with diameters of .05mm and less, in accordance with Stokes Law for the rate of fall of soil particles in a liquid. Only silt and clay fractions were thus contained in the muddy water. This muddy water was agitated by a paddle driven by an electric motor to prevent settling in the supply container.

As soon as the muddy water was applied to tubes, the rate of percolation diminished and within six hours the rate had further fallen to less than one-tenth of the clear water rate. We switched muddy water into the clear water tubes and clear water into the muddy water tubes. Immediately the rate of percolation diminished when muddy water was applied.

The decisive results of this experiment demonstrated that muddy waters percolated at only a small fraction--one-tenth--of the rate of clear water through the soil of the experiment under otherwise similar conditions.

Thus we found that fine suspended particles were filtered out at the soil surface, forming a thin layer of fine textured material, which determined the rate of percolation quite independently of the percolation capacity of the soil column. The differences in the rate of percolation due to the muddy condition of water were sufficient to account for the major differences in absorption discovered in the Berkeley tank experiment. I worked

WCL: almost day and night for nearly three weeks to complete this series of experiments.

Thus the formation of a fine textured layer at the surface of a bare soil, as a result of filtering out suspended particles of soil from a percolating muddy water, is concluded to be the decisive condition which increased the surficial runoff from bared soil surfaces. This was a new concept of the function of forest litter and is now being used generally by hydrologists.

Summary of Findings

Chall: Will you make a summary of your findings in these experiments?

WCL: Yes. We came to certain conclusions and published them in the Journal of Forestry [April, 1930].

1. Forest litter in these experiments greatly reduced surficial runoff particularly in the finer textured soils.

2. Destruction of the litter by fire, and consequent exposure of the bare soil, greatly increased the amount of eroded material and reduced the rates of infiltration into the soil.

3. Suspended particles in runoff water from bare soils were filtered out at the soil surface and to significant degrees sealed the pores and openings to seepage into the soil sufficiently to account for the marked difference in the rates of absorption between bare and litter-covered soils.

4. The capacity of forest litter to absorb rainfall is insignificant in comparison to its ability to maintain the maximum of percolating capacity of soil profiles, and is Important in retardation of flood flows at their beginnings.

These findings of the Berkeley experiments appeared to clear up some of the difficulties and discrepancies made apparent in my review of a voluminous literature. A statement could now be made which more accurately described the role of a mantle of vegetation and its natural mulch in water and erosion control.

Definition of Accelerated Erosion

Chall: I understand that you coined the expression "accelerated erosion." Will you explain what you mean by this?

WCL: The geologic norm of erosion is erosion that goes on no faster than soil is formed. It is geologic erosion that carved out the valleys and gave rise to many of the spectacular beauties of nature. But "accelerated erosion" is where man or his agencies have cleared and bared the soil of its natural cover of vegetation, and set in motion erosion that goes on faster than soil is formed. It is this rapid destruction of soil that is the menace to nations and civilizations.

Receiving the Ph. D.

Chall: With the completion of studies in geology, soil science and your experiments in runoff, were you granted your doctorate?

WCL: Yes, at the commencement exercises in June, 1929, I received my Doctor's degree. But actually, this was only further development of my theoretical and practical studies in erosional phenomena which continued at Strawberry Canyon installations, at Bass Lake, and North Fork in the foothills of the Sierras, and culminated in my big San Dimas venture which was at that time the largest and most complete hydrologic study ever done.

It was here that our objective of experimentation was enlarged from influence of vegetative cover on erosion to the influence of vegetative cover on the yield of water from watersheds under different conditions of cover. This was vital to Southern California where water is more valuable than gold and they wanted to abstract the last drop of water possible from their watersheds for domestic and agricultural uses.

Mrs. Lowdermilk and I were both relieved that my ventures were proving successful and that we could again set up a permanent home, this time in Berkeley.

STUDYING FOR THE DOCTORATE, 1927-1929

[Taped questions and answers]

Review of a Century of Literature

Chall: You have written quite extensively of the research work for your doctorate. What about the review of literature on erosion which you spoke of the other day?

WCL: This review of literature was to be the third part of my thesis. I describe these different experimental studies through the previous century and evaluate them in the light of the discoveries we made. And I wanted this to be a part of the thesis, to give background so we would have a clearer understanding of what we had really discovered or done.

I had to summarize this material to satisfy the University of California requirements, but I was never satisfied with it myself. The original manuscript, which I entitled "Influence of Forest Mulch and Litter on Surficial Runoff and Erosion," was published in the Proceedings of the International Union of Forest Experiment Stations, in Sweden.

My thesis was first published there because I had a fight here. I felt that my review of the literature showing where these other honest investigators had missed the point, where they had failed to get the full comprehension of what was involved, was important. But they said "no," they just wanted a brief review. But I wanted my original manuscript to be published to include this.

Chall: So it was in Sweden that the complete thesis was published as you had desired.

WCL: Yes.

Chall: What, briefly, were some of the theories of the pioneers in forest litter study?

WCL: For instance, in 1873, Gustave Wex, who was a flood-control engineer on the Danube, had found as the drainage of the Danube was cleared for cultivation, that floods supposedly increased, while Becquerel, a French engineer, in 1878 said floods had diminished. Wex came out with his conclusion that the diminution of water in wells and streams occurring in forests in the

WCL: basin of the Danube could be ascribed to progressive clearing of forests.

Then, an American named Hough was early interested in this question and wrote a book that was published on the order of Congress.

Chall: Oh, when was this?

WCL: This was way back in the 1870's. Hough claimed that as forest areas were cleared and denuded, floods had increased. He referred to what a Frenchman, Imbenaux, had said on this subject. The Frenchman had referred to what Hough had said. It was very amusing, that kind of criss-cross of evaluations.

The French engineer, Belgrand, didn't find any increase in stages of frequency of floods on the Seine River as the result of the clearing of the forests like that Gustav Wex thought he had found in the clearing of forests in the drainage on the Danube.

So Engler set up in Switzerland the Emmenthal experiment, to clarify the confusion in this field. This was 1903-1917.

Then my findings began to be reported in the literature and the mantle of Raphael Zon fell on my shoulders. That's why my international reputation is based on hydrology. But out of that has come this very detailed development of studies and experiments on the effect of forests on the stream flow and on erosion.

The Berkeley Experiments

WCL: The whole problem of water and forests was set up in the Berkeley experiment station, and in 1930 I was made project leader in erosion stream-flow studies. These studies were financed by an appropriation from Congress. Funds were divided two ways, one part for agricultural or soil surveyors and the other to the Forest Service. The Forest Service supported my studies. I carried on the Berkeley experiment and wrote many papers and reports on my work.

Chall: I have seen a copy of a paper entitled "Forest and Agricultural Influences in Streamflow and Erosion Control--A Summary Review of Literature up to 1930," which was published by the Department

Chall: of Agriculture. Is this the same review of literature which was summarized as Part III of your thesis?

WCL: Yes, it was.

Geology

Use of the Progressive Hypothesis

WCL: I continued my study in the geological aspect of erosion at the University of California. My background in geology enabled me to develop what I call my progressive hypothesis in field work. We set out on the basis of what facts we have available, then draw up a hypothesis. As new information is gathered, if it corroborates the first hypothesis, all the better; if it doesn't, then we hunt for additional information. So our final hypothesis is more nearly a solution than any former hypothesis.

It's really a geologic procedure in observational study. That's why I put geology as a basic science, along with mathematics and physics and chemistry. The reason I do this is because in chemistry and in physics we have a laboratory type of study in which we control the variables. If we can control the variables, good. Then we have a controlled experimental approach to the problem.

Now when we come to the earth with its multiplicity of physiographic processes, we cannot control these variables but have to deal with a complex. So we separate these variables by mathematical analysis and procedures. The method has been worked out in the science of geology to a very refined degree.

Professor Louderback

WCL: Louderback was my professor here at the University of California when I did my doctorate. I did two minors, big heavy minors. One was soils, the other was geology. Of course, I'd had geology before. But I took additional work in this minor under Louderback. He was one of the towers of strength in the field of geology. Louderback was a past master in the progressive hypothesis, which geologists accept as their method.

WCL: We have, on the one hand, the experimental method of establishing information, and on the other hand, the method of observational studies, in which statistical treatment establishes the trends within a series of variables. We have to recognize that we are dealing with a complex. We set up a hypothesis which explains as best one can the observations that have been made. When this is not adequate, we continue the collection of pertinent information.

Of course, we can combine the two methods, like we did at Paricutin Volcano [Mexico], where we took samples of the volcanic ash and measured its characteristics with laboratory techniques to answer certain questions.

Chall: This is the method you've always used?

WCL: That's right. Throughout my field notebook, I have written down hypotheses that came to me at the time, on the basis of field observations. It's an interesting record.

Chall: Yes, it would be. And to check back where you started and how different your ideas might have been at the beginning from what they are at the end.

Evaluating Experimental Data for Thesis

Chall: Was your experimental data on the value of litter and mulch in runoff and erosion quite a clear proof of the importance of litter?

WCL: I took the data to a very famous biometrician, from Harvard. He had been asked by the University of California to be available to consult with the graduate students doing research on the treatment of data, to get the most benefit by biometric methods. I presented my material to him. He said, "Ah, well, the more you have to use statistics in evaluating your studies, the less sure you are of your results." [laughter] I replied, "Well, here's a man that can cast doubts on his own field; he's one after my own heart--he's not afraid of anything."

Chall: And what did he feel about your statistics?

WCL: These were so decisive, he said, "You don't need to apply these coefficients of reliability and all."

VII FOREST EXPERIMENT STATIONS AND SAN DIMAS, 1929-1933

[Written questions and answers]

Chall: What did you do after receiving your Ph. D. in June, 1929?

WCL: The Forest Experiment Station authorized me to establish centers where various factors of the hydrologic cycle could be studied and measured: precipitation, temperature, evaporation, runoff, infiltration, percolation and transpiration.

Forest Experiment Centers

Chall: Where and when did you locate these centers?

WCL: The first one I had already established before 1929. This was what we called a center for the study of forest influences in stream flow and soil erosion. It was established in Strawberry Canyon, immediately adjoining the University campus to the east. Another large installation was located, shortly after I completed my Ph. D., at North Fork, in the chaparral lands near the headquarters of the Sierra National Forest.

Later we put in installations for experiments at Bass Lake. These two were located in the foothills of the Sierras, east of Fresno, California. These were subject to occasional winter snows and provided new factors in our studies.

It was our plan to establish other experiments higher up where precipitation fell principally as snow. I had just arranged for a plane flight over the area, to locate suitable places, but I was called to Washington for emergency work at the beginning of the Franklin D. Roosevelt regime. I had thought I would return to my San Dimas experiment, which I consider the most important of my California experiments. It has also been the most publicized.

Developing the San Dimas Experiment

Chall: Why do you feel this San Dimas experiment was the most important?

WCL: Perhaps because this was the first big responsibility to which I had been assigned after returning from China and joining the Forest Service again. Ed Kotok, Director of the California Forest Experiment Station with headquarters on the campus at Berkeley, appointed me Project Leader of Erosion and Stream-flow Studies, after I completed my doctorate. This was for Region Five where I worked until I went to Washington.

In my doctorate studies, I had thoroughly gone over the literature on several watershed experiments: (1) the Emmenthal Watershed experiment by Engler that involved a comparison of behavior of stream flow from two neighboring watersheds of similar altitude and area which differed in type of vegetative covering; (2) the Wagon Wheel Gap experiment, which was well done, and an improvement over the Emmenthal experiment, but still was incomplete; and (3) the Great Basin experiment, which also failed to answer urgently required scientific data.

My staff and I sought to develop a program which would be a larger and more thorough watershed study than had ever before been undertaken. Director Ed Kotok gave us his approval in June, 1932, for what became the San Dimas experiment.

Before we could obtain appropriations for such a large scale watershed study as I envisaged, which would run over a period of fifty years, it was necessary to develop our working plan and send it to the Forest Service headquarters in Washington. Here experts studied and appraised the plan to see if the project justified the expenditure; and then it was presented to Congress for an appropriation. Fortunately for us, it was quickly approved.

Chall: Were there any restrictions placed on this big watershed study?

Specifications

WCL: Yes. The area must be located in southern California with predominately chaparral cover, (2) be on National Forest land, thus protected from fire and free for continuity of study, (3) permit the entire flow to be kept under complete observation as well as flow from its several branch drainages, (4) be provided with reservoir basins sufficient in capacity to catch and to

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Berkeley, Californria.
Revised November 15, 1932

I. Project Watershed and water conservation study in the chaparral region of California

II. Object To determine methods of management of chaparral forests for maximum beneficial yield and conservation of water, and for flood control.

III. Scope

(a) Reasons for the study

Studies of the role of non-commercial chaparral forests in water supply and conservation are omitted from investigations of water resources in the State-wide water plan (1930). Such studies are required to complete information essential to enlightened management of watersheds. Practically all water yielding mountain watersheds lie within exterior boundaries of national forests and the study becomes primarily a Federal responsibility.

The critical condition of water supply in southern California further justifies such a study. The State Engineer reports that projects planned and under way to increase water supplies for the south coastal basins will cost in the aggregate the enormous sum of $350,000,000.00 (1930). Additional supplies may come from the following sources;

1. Salvage of local flood waters

2. Salvage of local evapo-transpiration losses.

3. Salvage of sewage waste

4. Importation of water from Mono Basin and Colorado River.

Effective increases by various means are estimated sufficient to cover 2200 square miles one foot deep each year, or more than 1,400,000 acre feet. The salvage of local waters is estimated to comprise 20 per cent of this amount, or about 300,000 acre feet annually. Stored water in this region has values for urban and irrigation use of from $15 to $20 per acre foot. Salvaging of present losses from local supplies would have an annual value of 4 to 6 millions of dollars, which represents a capitalized value of about 100 millions of dollars.

From: "Provisional Working Plan for Watershed and Water Conservation Study in the Chaparral Region of California," written by Walter C. Lowdermilk, November 15, 1932.

WCL: hold both flood waters and sediments that might be caught and impounded, (5) be of such size that it would provide a number of sub-drainages each with a perennial flow, where it would be possible to obtain data on stream-flow and sediment with a minimum of cost and effort, (6) be one with a minimum of man's former activity or present occupancy, (7) have a minimum of water diversion except at the control dam, (8) be supplemented with a natural detrital filled basin below the control dam, so that replenishment and depletion of the basin could be measured as a reflection of recharges from flow off the drainage area.

Locating the Watershed

Chall: This sounds like a difficult order. How did you go about finding such a location?

WCL: First I went to the Forest Supervisor and Los Angeles flood control engineers and the presidents of local water companies. All these people concerned with water knew the southern California watersheds and the amounts of flow from each. After consulting all these, I rented a plane and flew over all prospective suitable sites.

The San Dimas watershed seemed to fill all the previously mentioned requirements among the twenty-two possible watershed sites. Faults around the San Dimas watershed left it as if on a pedestal, isolated from the San Gabriel and San Antonio canyons.

Now with this location decided upon, I wanted to make a close personal survey of the ground cover. Herb Gilman, a grand fellow, and president of the San Dimas Water Company, and one of the strongest and best informed on water problems of this region, accompanied me on these ground investigations.

We found the chaparral cover so dense in places that we either had to crawl under it, or if we were on steep slopes, get on top of the branches and literally roll down the slope to where we could find open footing. Our shirts were torn to shreds and we were covered with scratches--but we were thus introduced to our new thirteen-thousand-acre watershed experimental area.

Herb Gilman had a wonderful sense of humor. I must relate one instance. A disgruntled citrus grower was going to the water company office to complain that they had cut off his irrigation water before he had received his allotment. He met Herb Gilman, who said, "What is the trouble? You look

WCL: disgruntled." The man explained his indignation. Herb Gilman said, "Yes, a man has to look after his own interests. Do you know what they are doing now?"

The man said, "No, what are they doing?" Herb Gilman replied, "They are diluting the water."

The man was still more belligerent--then suddenly realized that he had gulped down Herb's ludicrous statement.

Chall: Now that you had located your watershed, how did you begin?

WCL: Our project required us to put on a big construction program. We had to have dams, buildings, laboratories, offices, living quarters for permanent staff and stables for horses, because distant rain gauge readings were done on horseback. Heretofore, the Forest Service had prescribed pre-fab box-like buildings. These were ugly, stereotyped, without thought of suiting them to topography or the function they were to serve.

A New Design for Forest Service Buildings

WCL: At this time the depression was blighting the country. Men were unemployed and the government appropriated large funds for projects where numbers of men could be put to work. I knew of a very fine combined architect and contractor named Williams, who was so eager to keep himself and some of his men at work that he was willing to do the work of an architect at regular carpenters' wages. I made floor plans for what we needed in buildings and had him design these buildings and fit them artistically into the landscape.

Then I went to San Francisco to the Region Five headquarters of the U.S. Forest Service. I dealt with Mr. Barrett, Chief of Lands. He was in charge of pre-fab structures on request of field staffs for housing units. I presented our special needs, but he was adamant in insisting that I choose from among the five standardized types of buildings. I asked him how long it would take to get these from him. He said there was a big backlog and it would probably take between six months and a year.

Chall: Did this refusal discourage you?

WCL: No, for I had an ace card to play. I opened out my plans and said, "Here are my fully developed plans. They are ready to put men to work tomorrow. If you continue to insist that I use these poorly adapted, unsuitable pre-fabs, you will hinder

WCL: my project and stop employment of large numbers of men needing immediate assistance."

Government orders had gone out to put men to work, so finally precedent and red tape were scrapped and we were told, "Go ahead."

Chall: This must have given you great satisfaction.

WCL: Yes, and the satisfaction did not stop here. The buildings went up, they were beautiful; they fitted into the mountain canyon landscape, each building was different, each suited the purpose required.

The Chief of the Forest Service, Mr. Silcox, heard of this and came out to see it, and he was pleased. Then M. L. Wilson from the Agricultural Extension Service came, and he was pleased. Then Henry Wallace, Secretary of Agriculture, came and he was pleased; and hundreds of others came to see this new San Dimas Watershed experimental area. There were bunk houses and facilities so that rather large forestry conferences were held there. They built a guest house which became my headquarters.

Chall: I imagine after seeing your setup in San Dimas, it would be hard to go back to the former pre-fab houses.

WCL: Well, as the result of my getting the fine buildings which gave the atmosphere of things well done, others claimed the same right. Soon the new range experiment station in the foothills of the Sierras was building a simple but beautiful tamped earth headquarters that was appropriate for the region, fully suitable for their requirements. And so it went. Numerous ones said they never ceased to bless me for fighting it out and getting Forest Service housing improved.

Chall: What else besides new type Forest Service housing did San Dimas have to show?

Experiments

WCL: There were many things. We were a beehive of activity all over the thirteen-thousand-acre hydrologic experimental area. Construction was everywhere. Surveys established two sets of triplicate watersheds, one at a two-thousand-foot altitude at Tan Bark headquarters, and another at Fern Canyon, 5,300 feet above sea level.

We set up two hundred standard rain gauges and fifty

WCL: recording rain gauges whereby we measured the amount of rainfall and its intensities. This project alone required contour trails one thousand feet apart in elevation, a total of two hundred miles of roads and trails along which we placed our recording instruments. This enabled us to locate rain gauges in the bottoms of the canyons as well as on the ridges.

All units of the watershed were equipped with elaborate setups in which electric signals permitted us to record into the central instrument room at headquarters, hydrologic phenomena that were going on in a storm.

Also we set up at headquarters, a soils laboratory with all the latest equipment for determining the characteristics of soils--water holding capacity--and for measuring moisture content in place. We set up twenty-six lycimiters to determine the amount of transpiration and evaporation from sample plantings of native vegetation.

Then too, we had six dams under construction all at the same time, with installations to measure runoff, base flow and storm flow in various sub-watersheds. We had devices to capture and measure erosional detritis that was moved off slopes of the watershed. These enabled us to regulate storm runoff and to pass it on to the San Dimas flood control reservoir, and from thence into the Puddingstone reservoir, from which Herb Gilman recharged his ground water basin so as to prevent any water from escaping to the ocean.

Recharging Ground Waters

Chall: What do you mean by recharging ground waters?

WCL: People are only beginning to realize how important it is to recharge underground water aquifers when irrigation depends on pumped water. Irrigation demands have often caused over-pumping of stored ground waters, as happened in the San Dimas citrus growing basin.

At first, artesian water flowed from seeps and was ditched off for irrigation. Then as the water table dropped, small centrifugal pumps were used. When they had to pump from eighty-five feet, deep well pumps had to be used. Year by year this underground table sank lower and lower until the water company was pumping irrigation water from 461 feet.

They realized they were hitting the bottom of the natural underground water storage of the basin. Unless some miracle

WCL: happened, these valuable citrus groves would again revert to desert.

Chall: This must have been alarming. What did they do about it?

WCL: Herb Gilman, with all of us cooperating, set out to keep every drop of rain that fell locally and on the watershed, and began to refill this underground aquifer. Year after year, the water table rose until now the level is maintained at about eighty-five feet, where they began deep well pumping years ago. Whatever water is pumped out during dry season irrigation is replaced by winter rains when irrigation ceases.

Chall: How is this recharging done?

WCL: In San Dimas we used two methods. Our first was by spreading the water over a large, level, gravelly basin below Big Dalton dam, to settle out silt and let clear water sink and percolate by gravity underground, without evaporation losses, into the San Dimas basin.

Our second step was the regulation of storm runoff into the San Dimas reservoir, which was for flood control only and had to be kept empty to take care of emergency storms. So these waters were released into the Puddingstone reservoir by gravity for de-silting. From here, waters were poured directly back into the depleted wells, ready for being pumped out for irrigation during the next dry season.

It was this experience that led me to advise the Israelis how to pour back winter flood waters into their wells or to sink it and thus replenish over-pumped irrigation wells during summer months. Some wells were being threatened near the sea by invasion of salt waters from the Mediterranean.

Fire of 1960

WCL: Besides all the construction of trails, roads, dams, buildings and installations I mentioned before, we built a combined swimming pool and emergency water reservoir. Incidentally, in the terrible fire of 1960 when our watersheds all burned over, this reserve water reservoir and the brave men who stayed on to hold back the fire after being told to flee for their lives, saved all our fine buildings from destruction. A man named "Scotty" was the hero. For years he had kept his pump in order for just this emergency and it was in perfect condition.

Using the C.C.C.

Chall: How did you find men to do this enormous amount of construction going on at Tan Bark Flat headquarters and in the watershed?

WCL: Well, we were in a desperate depression. The government was eager to have all agencies put men to work. To accelerate this, the government had organized the Civilian Conservation Corps, or C.C.C. Camps, composed of tens of thousands of boys who had been forced to quit school and who were unable to find work. They left home in great numbers, mainly to keep from being a burden on their parents, and they roamed the highways and bummed rides on railroads.

We requested from the government, and received, two camps of two hundred boys each, and with these four hundred young men swarming all over the place, we really began to accomplish things. The government furnished technical supervisors to direct the C.C.C. boys.

Chall: Your scientific setup and resulting data, which was designed to run over a period of fifty years, have been described and published, but how about the men who worked with you?

Colleagues in San Dimas

WCL: Although San Dimas is in southern California, our general headquarters were in Berkeley at the Forest Experiment Station in Gianinni Hall on the campus. We had excellent relations and cooperation from headquarters with Ed Kotok as Director. There was a fine esprit de corps among the entire working organization.

My engineers were of the best: John S. Cotton later became a famous consulting engineer; Dov Krimgold, a hydrologist, was later a consultant to the United Nations; Sundling was conscientious, dependable and hard working; Hamilton did a fine job in charge of meteorological measurements; and Percy Rowe did a fine job in measuring stream flow and ground water. Earnest Coleman was a brilliant man, with his doctorate in watershed management, Storey was our expert soils man, and W. Garska our capable geologist.

Then I had excellent engineers from Purdue University who were overseers of the C.C.C. boys. I remember how highly skilled some of these country boys from Kentucky were in rock drilling. They had their own local methods but they were very efficient.

WCL: The architect-carpenter, Williams, whom I first called in and who gave floor plans of buildings suitable for our needs, was the overall boss carpenter with whom all associations were pleasant.

Don Sinclair was my local director for the San Dimas Center for erosion and streamflow studies. He was steady, hard-working and very cooperative and loyal. So you can see we all had a good time working together on a project of this magnitude.

Chall: Were all your men interested in the purpose of the over-all project, or mainly devoted to their individual responsibilities?

WCL: If they were not interested in the work, they did not last long. We all realized that southern California was alarmed about her increasing population and the prospect of limited water supplies. To import water from the Colorado or from the north was more expensive and of inferior quality to rainwaters from the watersheds of southern California.

For some years, I had come to realize that water, as a product of the mountains, was the state's most valuable crop, that it was more valuable to California than timber, important as that is, and that for southern California, local water supplies were more valuable than gold. It was our job to find out how maximum supplies of this most precious of all minerals could be caught, held, and stored to be used beneficially, so that not a drop would flow away and waste in the ocean.

We also wanted to know whether the yield would be greater from the steep mountain slopes when covered with vegetation or burned bare, so that rainwater would flow off as from a roof, without transpiration losses from vegetation. This battle of "to burn or not to burn" was raging back and forth with heated discussions. I am sure that all my men had my over-all objectives in mind and they worked hard to establish the scientific truths called for in this program. We all recognized we were pioneering in new discoveries.

Edward Kotok

Chall: Dr. Lowdermilk, we have done an oral history with Mr. Kotok. Since you worked with him in the early stages of his career, could you tell me how you would evaluate him as a worker in the Forest Service?

WCL: Ed Kotok was the recognized specialist on forest fires and their control in the United States. He was a hard worker, a good

WCL: organizer and, while I would not say he was a scholar, he was a very intelligent man. He gave his men considerable freedom to go ahead and develop their own projects. He never hampered me in going ahead with my projects as I envisioned them.

However, among the leaders of various divisions in the Experiment Stations, there seemed to be a general feeling that Kotok took the credit for works done by Experiment Station workers and did not give his men due credit individually. But this was not overly important.

The Depression

Chall: Apparently, the depression helped you to do big things at San Dimas besides relieving unemployment. But how were people generally affected?

WCL: Almost everyone was thrown for a loop. Immediately after the crash, all salaries throughout the United States Government were cut fifteen percent. Budgets were geared to former incomes and now payments could not be met. This caused businesses as well as individuals to tumble into bankruptcy. Taxes could not be paid--fine properties were sold just for tax delinquency. For one terrifying time, banks were closed. No money was to be had except by those who had cash in their bank deposit boxes.

Consternation overwhelmed the people. How could this happen to a rich nation? People of wealth were suddenly poor people. As an example, Mrs. Bowles, who was donating Bowles Hall to the University, had borrowed cash from the bank, using stocks as security. Suddenly the value of her stocks dropped to almost nothing. The bank demanded cash repayment of the loan above the value of her stocks. That wiped her out completely, and the University, to whom she was donating the beautiful large building, had to come to her rescue, finish the building and take care of her besides.

Some of our friends in Berkeley had similar experiences. They lost the value of their stocks. They were indebted to the bank for loans received on stocks as security and lost their homes besides.

Chall: Were people stunned when money was not available? How could they live?

WCL: Well, you could hardly call it living. I knew numbers of capable, college-trained men who walked the streets ringing doorbells, willing and offering to work for twenty-five cents an hour, so as to take home a little food for their families. There was a desperate clamor to sell apples, or anything, on street corners to make a few cents. People used up all their reserve savings. Those who still had jobs cheerfully accepted cuts in salaries so as to continue at work.

Chall: Apparently you all took very seriously the responsibility of putting unemployed men to work?

WCL: Yes indeed. When I began the soil erosion work first in Arizona in 1934, we had to do rush jobs on inadequate plans. I remember sitting up in bed, sick with flu and a high fever, phoning to every hardware store in Phoenix, to buy shovels, picks, wheelbarrows, quantities of wire and steel posts to make check-dams and the like, so as to put sixteen hundred men to work Monday morning at Safford, thirty miles away; and this was Friday. If I failed, sixteen hundred men and their families would be heartsick. But I did not fail.

We all felt the heavy responsibility to put men to work regardless of personal difficulties. I put a capable man by the name of Flemming, an irrigation engineer, in charge, assisted by five men from the state engineer's office, and sent them with their transits on ahead to Stafford to make plans and stake out work for the sixteen hundred men for Monday morning. We were ready for them!

Building the Family Home

Chall: Why have you and Mrs. Lowdermilk, who have lived in many countries, always considered Berkeley your permanent home?

WCL: There's a story back of the reason. When I was here studying for my doctor's degree, I wrote my wife that I felt Berkeley was more like my home town than any place I had ever lived, and that I wanted to live and die in Berkeley.

We had been rudely kicked out of China by Russian-trained Chinese Communists, and we needed a feeling of stability and of establishing ourselves. My wife is a go-getter and nothing is impossible to her if she sets out with determination to do it. When she arrived from Pasadena, there were still some beautiful

WCL: view lots. She set her heart on the finest of all--a view lot just five blocks north of the campus known as "The Look-out Point."

We had been wiped out by the Communists, my salary had been cut fifteen percent during the depression and now we had two small children. We had nothing to start on but faith, hope and confidence that somehow we could realize our dream home in Berkeley.

I drew the floor plans, my wife won over some relatives to loan us money with no security but our word. She ordered shipped from China, rugs and carved chests and tables to sell and thus use to advantage the Chinese money Chiang Kai-shek had paid us in part for our losses in the Nanking Incident.

This enabled us to buy the lot directly from the owner without real estate fees. The Acacia Life Insurance gave us the last house building loan in the Bay Region during the depression, before they shut down on all loans as other companies had already done.

We secured a very fine architect and contractor combined, Walter Broderick, who was anxious to keep his men employed, to build the house for us at cost plus six percent. He was honest and worked for our advantage, and before long, we had our dream home in Berkeley with glorious views of almost the entire Bay. Except for depression prices and wages, we never could have built this home--and it is not for sale.

Chall: How long did you live in this home before going to Washington?

WCL: That's the sad part of it. We only had a year or so to enjoy it. Then I left, but my wife and two little ones stayed on for another year because at that time, we thought the Washington position might be only temporary and an emergency measure. Then we rented the house and went to Washington for fifteen years; and then more years under the United Nations and Food and Agricultural Organization and as a consultant to other nations.

But this home was our morale builder, and we always hoped that sooner or later, we would return to Berkeley, our home town, to live in our dream home. Now finally, we are enjoying "the last of life for which the first was made."

Appointment to the Soil Erosion Service

Chall: How did your appointment to the Soil Erosion Service come about?

WCL: Actually it was the result of a chance meeting with Rexford Tugwell. He was then Undersecretary of Agriculture, and although he was not an agriculturalist, he was a keen student of all aspects of industrial and economic development. He recognized the menace of soil erosion to our nation's economy and became a strong advocate of using unemployed manpower to carry out projects on a large scale throughout the country.

Meeting Rexford Tugwell

Chall: How did you meet Dr. Tugwell?

WCL: In an interesting way. My good friend, Knowles Ryerson, was introducing legumes, shrubs and grasses into the United States from other countries and testing them out at Plant Introduction Gardens, one of them at Chico, California.

Ever since my China days, I had wished there might be an international setup with plant introduction gardens in South Africa, China and the United States, to cooperate on sharing legumes, especially those suitable for healing erosion gullies and soils damaged by sheet erosion or wind erosion. I had worked out this International Exchange Program and was ready to set it up as a project in 1933 when I met Tugwell.

Ryerson telegraphed me that Dr. Tugwell would visit the Chico station on Sunday and asked if I would join them. I put in my pocket the working plan of this project. I showed it to Dr. Tugwell and he asked if I had another copy. I said, "Yes, take this one."

Chall: Did you have much time with Dr. Tugwell?

WCL: Yes, for he wanted to see my Berkeley and San Dimas projects, so I had several days. We discussed the whole problem of soil erosion and what could be done about it. We discussed my China experiences and my conclusions that uncontrolled soil erosion on sloping lands is as disastrous to a civilization as an adverse change of climate, and my conclusion that it was not an adverse change of climate that had brought on the decline of northwest China, but that it was due to the destruction caused by men and erosion. I explained that it was in China I coined

WCL: the expression "man-made deserts" and the term "accelerated erosion," which I explained was a rapid man-induced erosion as against the geologic norm of erosion which goes on no faster than soil is formed. He was keenly interested.

Tugwell Sends Lowdermilk to Washington

Chall: You and Dr. Tugwell seemed to have much in common. Were you able to continue your friendship?

WCL: Well, this brief time I spent with Rexford Tugwell caused a turning point in my life. I was told that the last day we spent together, President Roosevelt called Tugwell on the telephone to discuss the appointment of Mr. Bennett for the Chief of the new Soil Erosion Service in process of formation. Dr. Tugwell replied to Roosevelt that he would agree only if this man Lowdermilk, with whom he had just spent several days, was appointed as Associate Chief.

So it was in this way that I, a westerner, unknown to Washington circles, was called to leave my San Dimas project immediately, and go to Washington to become a national leader in soil and water conservation. This was in September, 1933.

Chall: So this is how you came to give up your work which was advancing successfully and your new home in Berkeley. How did you feel about this change in your life?

WCL: Actually I felt quite overwhelmed and humble. I hated to give up my work in California, but to me it was a great challenge to go where national policies were being formulated and have a part in working out programs and policies for safeguarding our soil and water resources on a national basis.

My experiences with famines in China made me realize how a civilization can be undermined by the destructive forces of erosion by wind and by water, and this menace, with its threats, was well advanced in our own country. I wanted to contribute what I could to save our remaining good lands.

Chall: Were you able to close up your work quickly?

WCL: First, I had to go to my director, Ed Kotok, and report to him. Apparently he was not happy to make my transfer; but there was little he could say or do, for the request had come from Washington. I reported on the status of my works in erosion stream-flow projects in Region Five. I felt that each man had his special work well in hand and could go ahead with little

WCL: interruption.

At this time it was thought that this was an emergency call east, and that I was on loan from the Forest Service Experiment Station for a limited period. For this new work was financed by emergency funds that had been voted for the President and were released by him when and where they were most needed. All seemed to indicate that this was an emergency and temporary arrangement.

Reunions at San Dimas

Chall: On your many inspection trips around the country for the Soil Conservation Service, did you go back some times to see how your San Dimas project was progressing?

WCL: Yes indeed. We had always been a happy family there and all my men were eager to show me what they had been doing and have me look over the new data. There was one such reunion I shall never forget. I had notified the San Dimas staff that my wife and I would be there on a certain day. What a surprise they gave us.

The other men--engineers, specialists in various fields, Don Sinclair, the director, and Dr. Robert Knapp and Dr. Vito Vanoni from the Cal Tech Lab--that were cooperating with us, prepared a big picnic dinner in the staff headquarters. They had baked an enormous twenty-six-pound turkey and stacked the plates beside it. All the men seemed horrified at the thought of carving it. But I rather like to carve turkey, and I astonished the group by saying that I would be happy to do it and rose, took off my coat, brandished the carving knife and sharpener together and set to work. Soon plates of dressing and turkey were being passed down each side of the long table. The fine esprit de corps of those early years was most enjoyable.

All through the years, I have kept up my association with the Forest Service, and after retirement, with the various Soil Conservation projects. The friendship among most of the personnel has been cordial. It is sad now to find so many of them slipping away from us, leaving a lonely feeling.

VIII THE YEARS IN WASHINGTON, 1933-1947

[Written questions and answers]

Part I The Soil Erosion Service, 1933-1935

Arrival in Washington

Chall: Did your family go east with you at this time?

WCL: No. I left my wife and two small children alone in our new Berkeley home, packed a couple of suitcases and spent five nights and four days on the train. (Very different from the five-hour journey now by jet.) I remember I did not allow myself to visit with strangers, but used this time to meditate on possibilities ahead. For here was the opportunity of an Age, to get something constructive done--with long range benefits for my own country.

I arrived in Washington and installed myself at the Cosmos Club which was to be my home for many months, and then walked over to the Winder Building a few blocks away to report to Hugh Bennett. He had already gathered around himself in this new Soil Erosion Service his old cronies from the Bureau of Soils with whom he had worked for years. It was understandable that he would be cool to the arrival of practically an unknown westerner who had been appointed as Associate Chief without consultation with him. He did not offer to shake hands.

Chall: Was this the first time that you had met Bennett?

WCL: No, for shortly after my return from China to the United States, a meeting was called in Washington, D.C., on the subject of soil erosion. Professor Charles Shaw, of the University of California, who was on my doctorate committee and with whom I had many discussions on my work in China, urged me to send in a paper.

I sent in my summary, but did not have time to prepare the entire paper. So Bennett knew something of my work and when he came west, I had him to my home to lunch. Charles Shaw and I took him to see some striking examples of gully cutouts of alluvial valley floors in the vicinity of Lebek in southern California.

WCL: In this field conference, Bennett said little, but called on me to describe my findings in the enormous expanse of gully erosion in the wind-laid loess lands of northwest China, which is the most stupendous development of accelerated or man-induced soil erosion in the world. I insisted that we must measure, experimentally, the damages done by this "accelerated erosion."

I told Bennett we must establish the scientific basis for this control of storm runoff and of soil erosion, as I had been doing in China and had carried on in the transfer of my erosion studies from China to California. This contact was several years prior to my call to Washington.

Activity at Headquarters

Chall: What were your headquarters in Washington like then?

WCL: They were in the Winder Building, which was an old brick building, painted white. We began with one entire floor of ten rooms, but soon expanded to two floors. All was confusion and life was hectic. We had little furniture at first and had to use boxes for tables and desks and sometimes for chairs, as we gradually accumulated furniture. Workmen were carrying desks, equipment, boxes, putting up shelves and the like, in the midst of our attempts to do our work.

Adding to this confusion, there was a constant stream of visitors who had heard of the new Erosion Service being organized. Some came to apply for jobs while others wanted to tell us what they thought we ought to do.

Our clerical help was green except for a few older secretaries, so it was necessary to create a "pool" to which we applied for a girl to take dictation. Most had recently graduated from business college and had little experience. It was unsatisfactory to have a different girl for each dictation, so we were each appointed personal secretaries.

I shall never forget my first one. She was a young thing from North Carolina with a slow Southern drawl, and had probably never done a day's work in her life. Her inability to spell far exceeded her excessive drawl. When I dictated letters and she brought them to me to sign, there was no similarity between the letter dictated and the letter she created. We apparently were not meant for each other and I sent her back to the pool.

Chall: This new Erosion Service was in the Department of the Interior?

WCL: Yes. One of the first things I did was to get acquainted with the Department of Interior staff so that our operations would be carried out in accordance with their procedures. Most of the subordinates treated us as an emergency organization and reflected it in their services. But Secretary Ickes was especially interested in us and wanted to develop our work as rapidly as possible, for we understood that it was his ambition to create a Department of Conservation of Natural Resources.

I would like to say here that from the first, I was opposed to the name "Soil Erosion Service," as if we were an organization to assist erosion, whereas our entire purpose was to control it and to conserve soils. From the first, I advocated that our name be changed to "Soil Conservation Service," which was later done.

Hiring Personnel

Chall: With such a rapidly growing organization, how did you find men to fill all the various positions?

WCL: Well, generally men came to us to apply, for you remember that we were in a depression and many technical men were also out of work. We had no personnel officer so I took on the duties of this branch of service to meet the emergency period. But as soon as I found a man capable of doing this kind of work, we recommended his appointment, for all of these special appointments had to be made by Ickes. Most technical applicants were turned over to me for interviewing.

One of my special duties was to think out and to set various projects going, and then find a man capable of carrying on such duties. We then recommended his appointment and turned over these responsibilities to the appointee.

Chall: Tell us about how you went about this part of your new work?

Sedimentation Study

WCL: For instance, one of the men who applied was a man named Henry

WCL: M. Eakin, of the Army Corps of Engineers, who had made studies in river sediments. He was capable, thorough and a hard worker. I had been concerned with the rapid filling of our reservoirs with sediments, for my experiences in China, where I saw the silting of irrigation works and the Yellow River channel, made me realize that erosion was capable of progressively destroying the water storage capacity of reservoirs until they were useless. In fact, this had already taken place in our country, especially in our southern states.

I personally took up with Ickes the appointment of Eakin. I explained to him our great need to measure the amount of silt in reservoirs, to estimate the life span of reservoirs at their present rates of filling, and the amounts of sediments captured behind dams. I suggested to Mr. Ickes that we needed a "corpus delicti," to account for the body of the erosion going on so rapidly and to a great extent across our country.

Secretary Ickes approved this special study and allocated funds so that I was able to give Eakin the position he had dreamed about for years. Eakin gathered together a fine staff and did a magnificent survey. His bulletin on sedimentation of reservoirs became our authority for the country. Among other things, he developed a "wear flume" to determine how rapidly sediments would wear down to smaller particles.

Eakin was so happy in his work and he worked so relentlessly that he died of a heart attack. This was a big blow to our organization, but he had already contributed much new scientific data.

Chall: Were there other such works that you set up and for which you found the men to do the job?

Aerial Mapping

WCL: Yes. I am sure I was among the first to undertake aerial mapping for land-use studies. As you remember, I used army planes to make my surveys over the mountains of southern California watersheds to locate San Dimas from among twenty-two possible sites. That was a small undertaking, but it gave me confidence that this method would be the quickest and the cheapest to do the extensive mapping of large areas of 200,000 to 500,000 acres that we wanted to use for demonstration projects in various parts of the country.

This task was turned over to me. I found that the Fairchild Aerial Survey Company set very high standards for their

WCL: work which they had been doing for mining companies. I knew Mr. Elial, who was at heart a research scientist, and very able. He specialized in making topographical maps from aerial photographs. I saw the accuracy of their work in a second running of a contour line with only minute variations.

I determined that Fairchild should do this important mapping for us, and though we had to ask for bids, other companies had to come up to Fairchild's high standards in order for their work to be accepted by us. It was this large-scale serial mapping of the Soil Erosion Service at that time that gave rise to a number of reliable companies in this line of work.

A task of this magnitude, of course, required a special appropriation. We had to justify the heavy expenditures required to Ickes' finance officer. If he agreed, he would recommend to Ickes that he ask Roosevelt for a lump sum from emergency funds.

Chall: Did Ickes' budget officer agree to this new type of heavy expenditure?

WCL: Not at first, and for a time I feared he was going to turn me down. Then I said, "Just think what it would mean to have a photographic map of these badly eroded areas today as they were fifty years ago. Just think what it will mean fifty years from now for the government to know by photographic maps the condition of our lands today. Think what it will mean to have aerial topographic maps of Lake Mead, which is just now beginning to fill, and be able to determine the rate and amount of sediments that are accumulating in Lake Mead behind Hoover Dam."

After this, there was no further discussion, and he agreed to request Ickes to include this expenditure for aerial photographic maps when he asked President Roosevelt for another allocation of emergency funds. Money was soon made available.

Chall: This sounds like a tremendous undertaking. Did you try to develop this along with your other work?

WCL: No, for it has always been my purpose to set up projects and then find the right man for the job to carry on. In this case, it was a fine, ambitious young man named Charles Collier. I encouraged Charles to help develop a photogrammetic section of the service to prepare enlarged photographic prints for field mapping. This section was also called on to make mosaic maps of drainage basins which were being set up as demonstration projects of integrated soil and water conservation while under cropping.

The aerial photographs were taken to a scale of two and

WCL: one-half inches to the mile. These were used for mosaic maps, whereas the prints for field maps were enlarged usually to a scale of twelve inches to a mile. On such maps we were able to locate ourselves within ten feet on the ground. They were used as field maps by our soil scientists.

To provide maps of this accuracy by former surveying methods would have required years of work and at prohibitive costs, and we had no time to waste in our work for controlling wind, water and soil erosion.

Field Work

Chall: Could you always carry out these projects from your Washington office, or did you make trips to investigate new projects?

WCL: Of course during the early organization days, I had to be in Washington for there was much pressure in our work. But soon there were demands to look into projects in other parts of the country.

Navajo Indian Reservation

WCL: One of my first trips was to the Navajo Indian reservation in Arizona and New Mexico. When the Indian wars were over, the Navajo population of about five thousand was placed on a reservation of inhospitable lands. Grazing was good in rainy seasons. Generally, squaw corn, planted several seeds to the hole and widely spaced, provided mature corn.

But living for the Navajos and their herds was hard at best. As populations increased, it was necessary to increase their herds. These in turn overgrazed the land and erosion set in and gouged deep gullies through the few alluvial valleys. This lowered the water table and dried up the grass.

No one paid much attention to the Indians. They were governed from Washington by a political appointee as Commissioner for Indian Affairs.

Then a drought came. I was called out to the reservation to look over the situation and see what could be done. The

WCL: former five thousand population had increased to fifty thousand. Their herds had increased accordingly. There was no grass, the herds were dying and the Indians were starving. They had no place to go and they were not allowed to leave the reservation. The overgrazed lands were riddled with gullies. Outside help was desperately needed.

At this time, Mr. Collier, Sr. was Commissioner of the Bureau of Indian Affairs. He had ordered the Indians to kill off many of their herds. The Indians were angered and would not allow him on the reservation. He was under attack from many quarters and was glad to have the new Soil Erosion Service take immediate action in controlling erosion and rejuvenating the depleted Indian lands, on an experimental area at Mexican Springs. This diverted the attention and anger of the Indians from him to the constructive work the Indians knew was being done for their benefit.

Chall: How did you go about starting this work?

WCL: I had known Hugh Calkins as a Forest Service officer. He was acquainted with this southwestern region and was well liked and tactful. We made a survey of the entire area. We stayed overnight at the most remote Indian village of Cayenta, 165 miles in a straight line to Flagstaff. This was said to have the poorest communications of any locality in the United States furtherest from a post office. Only a few white traders ever went there. But I wanted to have a picture of the entire reservation. The roads were so rough, I sprained my hip by continual bumps. Hugh Calkins agreed to take over the Navajo project.

In this survey, I had visited the cliff dwellings in Chaco Canyon and had seen check dams for water spreading that were built by these Indian cliff dwellers several centuries ago. These interested me very much. I have always tried to find native solutions to problems as a basis on which to build modern technology.

I was fortunate to find a young Indian who could speak English. He was glad to work for us and I appointed him "Straw Boss." Together we inspected the ancient check dams and evidences of water spreading that had been built by his ancestors. He was delighted at my praise of them and their works. I told him he was to use this method along with suggested modern techniques, and put his fellow tribesmen to work on the land for money.

This work progressed rapidly and showed results. The rain waters were held back and spread over the valley floors instead of rushing off, carrying away soil from their fields.

The project was so big and so urgent that along with the

WCL: Indians, we asked for several C.C.C. camps. All they did, day in and day out, was to build dams in gullies, large and small. On one of my inspection trips later, I was amused to see the humor that our American boys are able to muster, no matter how dreary the surroundings. In front of the main building of one camp, I laughed to see in bold print on a board attached to an electric pole, the couplet:

"Say we to the gullies, we'll dam you.
Say the gullies to us, we'll be damned if you do."

By the method of catching rain waters behind check dams and dams across the gullies, and spreading these waters over valley floors, the grass came back three and four feet high. The yields of squaw corn were fabulous--I believe something like seventy bushels to the acre. The Indians were delighted. Hugh Calkins and his staff did a wonderful job on this Mexican Springs experimental area.

But these Indian reservation lands were ill-suited to sustain the Indian population explosion. Health conditions remained very bad. We rejoice with them that both oil and uranium have been found on their tribal lands, and the Navajos are getting rich and are now trying to work for the good of all the population with their tribal wealth.

Chall: It must have been very gratifying to demonstrate to the Navajos how they could bring back their lands into production. Did you have other such projects?

Gila River: The San Simon Wash and the Cattlemen

WCL: Yes, and simultaneously along with the Navajo work. Just as the new Soil Erosion Service was being organized in the Winder Building, our first location, the delegation from Arizona, Senator Carl Hayden, Senator Henry Ashurst and Congresswoman Mrs. Isabella Greenway, came to ask us for help. Floods on the Gila River were causing destruction of beautiful fertile alluvial lands that grew two bales of cotton to the acre, which was much more than was harvested in the east. They wanted dams to control such floods.

Senator Hayden had known my father. He remembered that I had taken the 1910 census in Cochise County, Arizona, so it was natural that he would bring the delegation to my office.

On my next inspection trip out to the Navajo pilot project at Mexican Springs, I went to inspect the Gila River problem. As is my custom, I wanted to see everything on the ground myself

WCL: and not make decisions on hearsay. I went to Safford, borrowed a car and began to make local contacts and also to make a rapid survey of the Gila River, its tributaries, its alluvial flat lands and its mountain drainages. I gave special attention to the origin and characteristics of the famous San Simon Wash.

Chall: What was the San Simon Wash?

WCL: This Wash is a great gully and a tributary of the Gila River. It is a startling example of accelerated or man-induced erosion that advanced rapidly like a malignant cancer down through the alluvial valley. When I saw it, the San Simon Wash was sixty miles long, ten to thirty feet deep and one to three thousand feet wide. This had lowered the water table, drained the valley dry and ruined farming and grazing on these former beautiful lands.

I went to the editor of the Safford News to see if back copies were available which would indicate the former condition of the valley. I found that at one time there had been no Wash, but grasses that were belly-high to a horse. When General Fremont's army passed through, they reported these grasses were so nutritious that they did not have to rest the horses every other day, because the horses had strength to haul daily.

Another paper had recorded how two farmers had plowed a furrow through the heavy grass to drain off flood waters that had begun to accumulate around the village of Solomonville. There was no Wash yet, but overgrazing higher up was causing more flood waters to rush off the slopes.

Another paper related that, though there was much runoff in early days, there was no Wash. It told of a man with a freight wagon who had left Bowie just as the flood waters started down the valley, and about the fact that the heavy grass cover made the waters spread out and move so slowly that the freight wagon arrived in Safford before the flood.

I found that after the defeat and capture of the Apache Chief, Geremino, in 1875, the settlers began to come in, and the government made a survey of the Gila River valley. I went to the Land Office and was able to get photostatic copies of the original notes of the surveyors.

I then hired surveyors and I chose four section lines across the Gila River valley which I proposed to re-survey. The notes written in 1875 reported the channel varied in width from sixty-six to one hundred feet. They reported high grass on either side. The channel was apparently very shallow.

My survey then showed that in fifty-nine years, the channel

WCL: had widened from the range of sixty-six to one hundred feet to from one thousand to three thousand feet; and in 1934 it was sixty miles long. No wonder the representatives of Arizona wanted drastic measures immediately to stop the growth of this malignant cancer spreading wider and longer through the valley.

Chall: With this factual picture of what had been happening, did you feel that something could be done?

WCL: Well, I had to tell the people of Safford valley that I would not recommend the construction of dams for control of flood waters, unless we could put the drainage area under management and control soil erosion on it. My remarks were received with skepticism. I asked for cattlemen using lands up on the drainages to make a trip with me to see and discuss areas of severe overgrazing and resulting erosion. One by one they began to recognize that what they were doing could not be continued.

But some of the men were holding out against my recommendations. Finally, a wizened, wind-tanned little man, who had said little all day, stood up in front of the cattlemen and said, "You boys know what he is talking about--we cannot run our cattle on this public domain outside our ranches. Our cattle, instead of getting fatter, are getting thinner. We are not making any money now and you know it. I am for going along with this man from Washington and get these lands under some sort of management that will build up the carrying capacity of the area."

Then Mr. Wilson, a cattleman, and I rode horseback and saw much that I could not otherwise have seen. He took me to Mr. Lathrop, who ran the most cattle in the area. Mr. Wilson crowded Mr. Lathrop into a corner until he finally agreed.

Now I had an agreement with the principle users of these lands to work out plans to restore the region as far as possible.

Chall: Now that the cattlemen had agreed for you to work out plans, how did you go about this work on Public Domain lands?

WCL: Of course, the first thing I did was to report to Senators Hayden and Ashurst and Congresswoman Greenway. My proposal was that we chould form a conservancy district which must be approved by Congress, for the Gila River flowed across lands of two states. Senator Ashurst, a cultured diplomat, was favorable to any measure we worked out but had no suggestions. Senator Carl Hayden, a brusque, quick-acting westerner, told me to go ahead and investigate how other conservancies had been established.

The Miami Conservancy in Ohio, I found, had been the most successful in limiting floods, and I followed their methods of condemning land to get areas necessary for installations. My

WCL: plans for a conservancy would give authority to us to act.

I proposed a bill and Senator Hayden, from his experience, included specifications to be applied to measures. We discussed how the Corps of Army Engineers already had authority to control floods on main streams and rivers in the United States. But our proposition was to propose measures to control floods of little waters on upper drainages of these rivers.

Early Work on Omnibus Flood Control Act of 1936

WCL: Senator Hayden asked me, "Why shouldn't we provide for control of this kind on lands at the headwaters of all the streams where Army Engineers have control of floods on the lower reaches?"

I said to Hayden, "If you can get such a provision passed, it will be one of the most constructive measures for this decade."

Hayden immediately took steps and got the support of President Roosevelt. Together, Senator Hayden and I worked on this bill, which gave me opportunities to use my past experiences in watershed management and flood control.

The final result was the Omnibus Flood Control Act, passed in 1936, which called for the Department of Agriculture to be responsible for treating the headwaters of rivers and streams on which the Army Corps of Engineers had dams, dikes, levees and flood control structures down below in lower reaches.

But the conservancy idea was dropped, for sponsors of the new Taylor Grazing Act, which had just been passed in 1934, felt that it would be a duplication.

Taylor Grazing Act

Chall: Why did they think so?

WCL: This Taylor Grazing Act defined the rights of ranchers for grazing, and administered the range, and collected fees for grazing of stock on lands of the Public Domain. This Act set

WCL: up grazing districts but did little to encourage scientific grazing as we would have done in the conservancy. Its sponsors felt that that portion of the Act that provided for flood control on the upper watersheds carried out the same function as would the conservancy, although I think there would have been certain advantages in the conservancy.

I am glad that now there are hundreds of watersheds treated all over the country. Whatever stops or greatly reduces the floods on little tributary valleys will stop most of the mud from getting into the great reservoirs and mainstreams and nothing else will do it. Now many times in heavy rain storms, no damage is done because this treatment of upper watersheds has brought about the control of otherwise dangerous little waters.

It was the Omnibus Flood Control Act of 1936 that Senator Hayden and I worked out that brought about control of the upper reaches of river valley tributaries, as well as flood control on the lower big streams. Hayden discussed this with Roosevelt who gave it his full support.

Attitudes of Cattlemen

Chall: Were you closely associated with this Taylor Grazing Act?

WCL: Yes, in one way, I was. For it was at this time that a lifetime friendship was formed with Farrington Carpenter, who was the first Chief of the Bureau of Grazing. He was a wealthy cattle rancher from Colorado. He was immensely popular and was known throughout the west and had large political backing. We both lived at the Cosmos Club at that time, and spent many hours together discussing grazing problems as well as flood and erosion problems in the west.

Carpenter also enjoyed telling me of his fights with Ickes and members of his staff. Carpenter was a very outspoken westerner and was fearless to say what he thought. Ickes and his staff felt that Carpenter did not show them the proper respect. When he would return from his trips to the west, he would come in and say, "Well, I've come back to the Big Boss in Big Tepee on the Potomac," and similar remarks. The more Ickes resented Carpenter's humor, the more Carpenter was stimulated to express his independence. He kowtowed to no one, even "the Big Boss in the Big Tepee on the Potomac."

Chall: If Farrington Carpenter, as Chief of the Bureau of Grazing, was so popular with the stockmen, then I presume he was able to persuade stockmen to abide by the restrictions of the Taylor Grazing

Chall: Act?

WCL: Well, probably no one in the United States could have done better than Carpenter. Yet he too had constant battles with stockmen who resisted being told what they could and could not do on Public Domain lands, and more so, on their own lands. Often Carpenter told me of such conflicts.

He told me once about a large meeting of cattlemen where most were bitter at being told what they could and could not do on grazing lands. He said that one cattleman took off his expensive gold watch and held it up and said, "This watch is mine. I bought it and paid for it, and what I do with it is no one's damn business. I can do with it as I damn please and no one is going to tell me what I can do with what is my own. If I want to destroy what I own and what is mine, I have a right to do it."

With that, the cattleman, with one furious stroke, smashed this expensive gold watch with full force onto the arm of his chair to prove his point. There doubtless were others who held the same opinion but were not so demonstrative about it.

Transfer of Soil Erosion Service to Department of Agriculture

Chall: Dr. Lowdermilk, What part did you have in the writing of the Soil Conservation Act of 1935?

WCL: At first, as you know, we were acting under an emergency relief bill. But before long, it began to appear that the soil conservation program under the Soil Erosion Service was not temporary but would become permanent. Secretary Ickes called on his lawyer to draw up a bill which would outline the functions of a new Soil Erosion Service for the Department of Interior. I was called in for discussions on the new bill.

In the meantime, I was obsessed with the need for farsighted, coordinated planning along all the lines into which the Soil Erosion Service was branching out; for by this time we were working in soil science, agronomy, farm pastures, range management, forestry, wild life management, and agricultural engineering. Our work with the farmers was becoming very popular, but as popularity grew, hostility grew, for it seemed to the bureaus of the Department of Agriculture that we were setting up a little Department of Agriculture in the Department of Interior. They did not like it at all and said so.

WCL: For some reason, we heard nothing further from Ickes' lawyer about the new bill. But nightly I would say to my wife, "We must make this law big enough and broad enough and farsighted enough, so that seventy-five or one hundred years from now, the government will be able to do whatever is necessary to control flood waters and erosion, and safeguard our country's soils and waters."

I was always free to discuss with Senator Hayden whatever I was thinking or doing. He was always most helpful. So I continued to work on what I thought would be needed in a permanent Soil Conservation Act.

Suddenly I got wind that the bill that we had discussed with Ickes' lawyer was to be pushed through, putting our Soil Erosion Service permanently in the Department of Interior.

But I had always felt that it would be better to be in the Department of Agriculture. In this, I was in disagreement with Bennett, for he was well established in Interior with many friends and henchmen, while in the Department of Agriculture he had antagonized some bureaus and they were exceedingly hostile to him. So I could not discuss my ideas with Bennett.

During the night, I formulated a plan. I did not want to go direct to Rexford Tugwell, for that would be too obvious. So at breakfast time, I phoned a trusted friend, Earl Bressman, in the inner circles of the Department of Agriculture and asked him to pick me up in his car on a certain corner, so that I could ride to work with him.

I then told him what appeared to be in the works, and that unless the Department of Agriculture moved fast, the Soil Erosion Service would be established as a permanent bureau in the Department of the Interior. I then went to Senator Hayden and told him what I had done. The Senator knew from our many discussions that the bill I had been working on was comprehensive, looking to a sound soil and water conservation program with long-range objectives.

Tugwell and others acted fast. I do not know just how it was done. Ickes was out of town for three days. Tugwell got President Roosevelt to issue an order for the transfer of the Soil Erosion Service to the Department of Agriculture. Ickes was furious about it when notified, and he rushed back to Washington. But it was too late.

Passing the Soil Conservation Act

WCL: Senator Hayden arranged for the bill to be brought out for hearings. While the hearings were going on, Jed Johnson, a Congressman from Oklahoma and a member of the Appropriations Committee, left the room for a long distance call from Oklahoma. On his return to the hearings room, he told us that one of his strong constituents had called from Oklahoma City, saying that the high plains were blowing away, that dust and sand in great clouds were covering the streets of Oklahoma City several inches deep.

He had said, "Can't you do something about stopping wind erosion in our high plains?" Jed Johnson told him, "That's just what we are doing now--holding hearings on a bill. If it's enacted, it will do something about these dust storms, and water erosion as well."

When the bill came up for the vote, there was not one dissenting vote in either the House or the Senate against our Soil Conservation Act, so strong was sentiment for our work, and the very evident need to control and conserve our lands and our waters.

Thus the question of transfer of our organization was settled in this unanimous approval of the bill that established our Service as a permanent bureau in the Department of Agriculture. It was named the Soil Conservation Service as many of us had wanted all along.

Of course most were satisfied with this outcome, but we had rude shocks at the antagonism that had grown up against us from bureaus in the Department of Agriculture. This hostility continued despite the unanimous passage of the Act that had settled most issues as the bureaus in the Department of Agriculture had wanted all along. Even so, there was still strong sentiment in Agriculture to split up our Service and to distribute its parts into allied branches of existing bureaus.

Relations With Extension Service and Farm Bureau Federation

WCL: While our Soil Erosion Service was in the Department of Interior, we also had a running battle with the Farm Bureau Federation, which was a nation-wide organization and played a large part in

WCL: much of the hostility and opposition to us. The Federation worked very closely with the Extension Service of the Department of Agriculture. Good old M. L. Wilson, Chief of Agricultural Extension, kept himself aloof from bickerings, but many of his staff around the country were militant and hostile and have not buried the hatchet yet.

So these were the birth pains of the new Soil Conservation Service. The infant was lusty. The new Soil Conservation Service fought its battles not with the farmers or people around tje country; the battles were all inter-departmental and inter-agency. But in spite of all this, the new Service developed rapidly.

Part II The Soil Conservation Service, 1935-1938

Chall: Dr. Lowdermilk, when you were helping to write the Soil Conservation Act, were you thinking ahead to the districts?

Reasons for Districts in Soil Conservation Service

WCL: No, for this work is like a chess game; we make a move and then see what happens to direct us to make another move. Each step

WCL: leads to another step.

Chall: What was it that led you to decide on the formation of districts as your next move?

WCL: Two things: the Ben James' farm and a trip to our soil conservation projects at Tyler, Texas, where we had one of our C.C.C. camps. The boys were laying out and constructing broad base terraces on a farmer's land. The object was to give a sample and let him take part in construction of these terraces so that he could continue to construct them himself. We made it a strict rule or policy that we would not do all the terraces needed, but only enough to demonstrate to the farmer how to carry out these measures to safeguard his land from erosion.

I came to the C.C.C. camp and was discussing plans for going over the farm. The night before, there had been a heavy rainstorm. The farmer who owned the land, and on which we were doing the demonstration, came to our group and said to our man in charge, "Some of your terraces broke last night."

Our terracing crew had worked up until quitting time the night before and had had no time that evening to bring the channels up to standard as was our general practice. The finishing work was planned for the following day.

I said to the farmer, "Let's go see." Sure enough, at some of the low spots that had not been properly shaped up, there were breaks where water had collected in the terrace channels and had broken through.

The storm water was running down-slope and cutting another small gully. Then this farmer made the point that he was not responsible for these terraces because they were the work of our crew, and therefore he was not responsible.

The idea came to me very strongly that here this farmer assumed no responsibility for the proper construction of the terraces on his land. If anything went wrong, then our men were to be blamed and not the farmer. A lot of misunderstanding and trouble lay ahead if this became the accepted view.

I concluded we needed to develop responsibility for works done on the land. So we would need some kind of an arrangement whereby the farmer and the government would collaborate in the planning and construction of these measures to control storm waters and soil erosion. Something must be worked out to reach our objective for working together in the interests of the farmer as well as the government.

Ben James' Farm

Chall: You spoke of the Ben James' farm. What part did it have in formulating your idea of districts for collaboration of farmer and government?

WCL: It played an important part. I saw it while I was on this inspection trip in 1934, on the Duck Creek Demonstration Project in eastern Texas. Our field staff said they had a problem on the Ben James farm and asked me to advise them on how we should treat it. The Federal Land Bank some years before had loaned one thousand dollars on this farm. The representative of the bank had requested our Soil Conservation Service to fix it up.

So I went out to see the Ben James farm with the bank representative and our field staff. Here I saw a farm of 101.7 acres which had left on it about ten acres of topsoil. Besides serious sheet erosion, big gullies fifteen to twenty feet deep were eating headward up a fifteen percent slope.

As we looked into these gullies, I asked, "What is this farm worth now?" After some discussion, the sale value at that time was put at about five hundred dollars. Then I asked, "What has become of all the material excavated out of these gullies?" So we followed the gullies across Ben James' property line on to his neighbor's farm of bottom land. There we found part of Ben James' farm turned upside down with the sterile material of the gully bottoms spread out on top of a fan that extended over good bottom land and was choking up a clear stream.

Then I said, "Here is Ben James' farm, but what about Ben James?" "He is on relief," they said.

To the bank representative I said, "If you will foreclose on this mortgage and take it in as Federal land, we will fix it up for you. We will not make a farm of it--it is too far gone for that. But we will plant most of it up with trees and make a pasture out of the remainder."

A year later, I went back to see the Ben James farm. The bank did not want to foreclose, but Ben James had abandoned the farm and become a sharecropper on a large farm in the vicinity.

So here was our whole problem in a single farm, and this could be duplicated over and over again. Formerly, Ben James had played his part in the community, not a large part perhaps, but still a contributing part. But as erosion washed out the productivity of his farm, the land was seriously damaged and Ben James was in difficulty. This tragedy in the use of land concerned Ben James, his school district, his county, his state

WCL: and the federal government. For every taxpaying citizen in the United States could well be concerned in this farm of Ben James and others like it.

I pondered much on this problem. How could we set up a mechanism in which the farmer, the community, the state and federal government could carry out their respective responsibilities and at the same time, conserve the individual initiative of its people. This resource must be conserved and put to full use. For in no other way will principles of soil and water conservation be adapted and applied on each field varying from place to place, from time to time.

Such incidents as these I have mentioned revealed basic needs for collaboration between the farmer and his government. The interest of the farmer and the government come together in the soil which grows the food for the nation from generation to generation. For in the Soil Conservation Districts, we seek the integration of a three-fold purpose: to give play to individual initiative, within a framework of social objectives, arrived at by the democratic process.

It came to me that we might use the principle of irrigation and drainage districts, wherein farmers and the government work together to obtain an objective for the benefit of both farmer and government. I decided we would need Soil Conservation Districts to achieve our objective.

Developing the Districts

WCL: On my return to Washington, I placed before Bennett this idea and suggested that we employ a capable man who was well acquainted with the problem of working with farmers, especially in the Extension Service. This especially equipped man was not easy to find. I repeatedly said that I would be willing to pay the right man a larger salary than my own, for the success of the whole idea would depend on the work and vision of the man in charge of getting these districts established across the country. We finally appointed Dillon Myer for this job. He had been very successful in Ohio in the Agricultural Extension Service.

Of course, there were a number of local problems to be worked out. We discussed the idea of forming Soil Conservation Districts with our staff and that of the office of Secretary Wallace. It was agreed that we should draft a model law, called a "Standard Act," which would set up procedures for making possible the collaboration of the Department of Agriculture with

WCL: the Soil Conservation Districts as representatives of the farmers concerned.

Mr. Philip Glick, who was attorney for the Department of Agriculture, began work on a draft of this permissive legislation. After much consultation between Dillon Myer and our headquarters staff of the Soil Conservation Service, a "Standard Act" was finally formulated in 1936.

Chall: When were these Soil Conservation Districts established?

WCL: President Franklin D. Roosevelt called on Governors of states and suggested the desirability for states to pass enabling legislation to form Soil Conservation Districts according to the "Standard Act." In these newly formed districts, farmers were to have the responsibility and initiative for taking steps to conserve their lands from erosion wastage. Supervisors of districts were empowered to call on any agency, state or federal, to assist them in their task of saving their lands.

Some of the states adopted the Standard Act with few changes, but other states required considerable change before they would accept the legislation that would govern the formation and operation of Soil Conservation Districts within their borders.

Bennett knew the people of the south and had many of his own men down there, and he called on them to test out plans and procedures and they complied and were a great success from the start. This may have been due in part to the good work of Dr. T. S. Buie, our Regional Conservator of the southeast region, with headquarters in South Carolina.

Once the districts took hold, the idea spread rapidly over the United States; and in a comparatively short time, ninety percent of the farm lands were included in Soil Conservation Districts. The Soil Conservation Service program, now wedded so closely with local districts, has been instrumental in popularizing soil conservation rapidly. Districts, because they are farmer-organized and farmer-directed, invite the confidence and participation of farmers in both the planning and application of soil and water conservation work.

Success of Districts

WCL: Our Soil Conservation District program succeeded in the United States, because districts have been established on sound principles of putting to work the great resources of individual initiative and responsibility within a definite national objective

WCL: of promoting the general welfare.

Some features of the movement of Soil Conservation Districts may be of interest:

1. The districts are typically American, in that they provide a means of mutual action toward common objectives as determined by the majority.

2. They are independent and are not controlled by either state or federal influences. When requested, the federal government renders them aid. The districts exist for action.

3. The districts are autonomous organizations that are able to plan programs, obtain information, procure government and other services, and do many other things that the same farmers as individuals working alone would not be able to do.

4. These districts were a clearing house in the locality for carrying forward advanced agricultural programs and developments in general. They are in an authoritative position to make known to such professional workers as the county agent, soil conservation technician, forester, and highway engineer, the needs and desires of the local people.

Chall: It must have been gratifying to you to see the rapid success of these Soil Conservation Districts.

WCL: Yes. They justified our hopes and plans in a remarkable way. As our district supervisors increased in numbers and the districts spread throughout the country, supervisors formed organizations of state and national associations restricted to farmers of the nation. These associations became powerful spokesmen for the farmers who were independent of government control in running their districts.

This was a good thing, for at one time these Soil Conservation Districts were able to prevent the breakup of the Soil Conservation Service in an inter-departmental conflict, and to prevent the Agricultural Conservation Program from combining its political provisions with our technical services to farmers. These districts continue a tower of strength in our program of soil and water conservation.

Reasons for Regional Administration

Chall: We now know how the districts were formed, but why was the Soil Conservation Service based on regions rather than established political boundaries?

WCL: At the beginning of our Soil Erosion Service, Bennett followed his former practice of directing all operations from our Washington office. This practice may have been suited to a bureau that dealt with only a few people and with specialized services within narrow boundaries. But as our services spread rapidly over the country, even to Puerto Rico, our business became more complex, and answering mail became a tremendous job.

Bennett was determined to direct all our contacts from our Washington headquarters, especially with the south where he knew personally so many farmers and government field men. We were literally swamped with mail every day.

When Bennett became too burdened with his part, he would take off on a trip. He enjoyed making speeches and was an excellent publicist for our cause. This left me with all the mail as well as the development of our research organization which at that time I was endeavoring to set up. For research has always been my specialty in which I was keenly interested. I was overwhelmed with work. I determined that something had to be done.

Having been brought up in the Forest Service, so to speak, which had regionalized its operations as well as its research with very satisfactory results, I proposed to Bennett that we regionalize our Soil Conservation Service. Reluctantly, he agreed. I advised dividing the country into eleven regions which were later reduced to seven, and suggested that we appoint a regional conservator for each one, who would have charge of all activities in his respective region. These regional conservators would be responsible to us and we would deal through them. This would greatly reduce our load of details.

This was the place to train future directors, because problems would not be so numerous and would not cover as much area, but they would have the kinds of problems that, as chief of the Service, they would be required to handle. One of the objectives was to prepare for effective continuation of our services. Of course in the minds of some, that was not a good idea. These bureaucrats wanted to get control. We chose outstanding men who were well acquainted with their respective regions to take on these important positions.

WCL: Once the plan became known, we generally got favorable reactions. The system worked beautifully, lightened our load in Washington, and gave us an opportunity to give more time to development and improving our administration of the rapidly growing Service.

We had a few problems when Congressmen wanted to take up with our Washington office, various problems of their constituents. When we referred them to the regional conservator and said they would have to deal with him instead of us in the Washington office, some were indignant and caused some trouble. But this occasional friction was nothing compared to the load that was lifted from us in Washington headquarters.

Relations With A.A.A.

Chall: Did the Agricultural Adjustment Administration compete with the Soil Conservation Service in work for farmers?

WCL: On paper, yes; but on land, no. For we gave technical assistance to the farmers. The A.A.A. was a federal agency that sought to bring farm income into its proper relation to industrial income through payments to farmers for adoption of conservation land-use practices. This promoted the spread of conservation practices and also relieved farmers of the economic stress caused by crop surpluses and consequent low prices for farm products.

Schedules of payments were offered for reduction in acreage of soil-depleting crops, generally those cash crops of which there was a national surplus. In addition, payments were made for soil-building practices, such as the use of legumes and grass, and, to some extent, for terracing, and contour furrowing, and the application of fertilizers and crushed limestone.

Chall: How did the A.A.A. finance these expensive payments?

WCL: They financed their work by levying a tax on flour and grain mills, which would be sufficient to equalize the income for this purpose. This was one of President Roosevelt's first New Deal measures to help the farmers. It was inspired by Secretary Wallace.

Naturally the grain mills resented this tax on them and challenged this act. After the issue had been in the courts

WCL: for about three years, the Supreme Court ruled that the method of collecting this differential tax was unconstitutional, so this measure of collecting money to achieve a very important objective failed in its purpose.

Some other method had to be found at once or the A.A.A. would have to shut down their operations. They were all as blue as indigo. Some of the staff had gathered in Director Peek's office when a news reporter who made daily rounds in the Department of Agriculture, came in to ask how they felt about the Supreme Court's decision the day before. Director Peek replied that they were ruined and could not go on with their program.

Then the reporter said, "You have authority in the Soil Conservation Act, Public Law 46." Director Peek said, "Oh, no; there is no hope in that direction."

The reporter said, "Have you read the bill all through? If you have not, I advise you to do it--here, I have it in my pocket." And he handed it to Director Peek.

When Peek finished reading the Act, I was told that he said, "My God," and put both hands down on the keys to call staff members of the A.A.A. to his office. For he realized that this Soil Conservation Act was so broad in its scope that A.A.A. could continue to operate under its provisions. So they were able to carry on for a time.

Then they proposed another act to incorporate the two agencies of the A.A.A. and our Soil Conservation Service into a single organization. But this would have swallowed us and undermined the entire technical aspect of our Soil Conservation Service. Of course, we were against any such move and immediately marshalled our forces to resist any attempt at combining the two agencies, and it was not done.

The Soil Conservation and Domestic Allotment Act was, therefore, passed in 1936 to provide for continuance of A.A.A. payments to farmers.

Coordination of Specialists: The Farm Planner

Chall: Dr. Lowdermilk, your emphasis is always on the coordinated attack on land-use problems. How did you deal with the farmer?

WCL: From the first, we declared for and prescribed coordination of specialties of technical men concerned with services to our farmers. We had specialists in soil science, agronomy, farm pastures, farm forestry, wild life management, range management and agricultural engineering. At first, we would send out to a farmer who had asked for assistance, those specialists most needed for this area and this farm, who would work out together an integrated farm conservation plan.

But the farmer was usually overwhelmed by so many government men on his farm at a time, so we set up the position of farm planner, with exacting qualifications: he must be a technically trained expert in one of the above specialties; he must also have a good general knowledge of farming in the problem areas; he must have the ability to acquaint himself with the agriculture of the entire problem area in which he is working, and at the same time, learn the several solutions that had been worked out by top specialists who had already made a study of the area.

Chall: How had these solutions been established for use by the planner?

WCL: First, land-use capability surveys were made of problem areas; then the several specialists worked out a basic plan for treatment of each problem. So you see, this new profession of farm planner had to be capable of informing himself on what our coordinated staff had worked out.

Provision was also made for the farm planner, if he encountered a problem for which he had no satisfactory solution, to call specialists of the Consulting Board of the area to come and inspect and suggest solutions. In this way, the farmer was given the expert service of the best technicians we had.

Thus the farm planner became our "land doctor." He looked over the sick fields, diagnosed the problem and decided what treatment would be necessary for recovery. Sometimes several different treatments were called for on one farm.

The farm planner was trained to read his land-use capability map, which had been prepared by soil scientists to indicate what areas were suitable for cultivated crops, what measures were required to conserve the soils of fields under cultivation, and what areas should be allotted to cover crops, such as improved pasture and wood lots. He prescribed the planting up of gullied areas for gully control and for wild life refuges.

For simple engineering structures, the farm planner would prescribe standard treatments. But for more complex structures, for multi-purposes in drainage and irrigation, he would call in the engineering team.

Obtaining Cooperation of Farmers

Chall: When the majority of the farmers of an area voted to form a conservation district, did those who objected accept the decision of the majority and fall in line?

WCL: No, not always. There always were some who refused to follow along and were uncooperative. As one farmer said to me, "We do not need anyone from Washington to come here and tell us what to do on our farm. Me and my two sons have already wore out two farms and this one is about wore out."

Sure enough, the farmer and his sons had plowed up and down the slopes, and rain waters had riddled the fields with small gullies that were cutting deeper and deeper and had carried off his topsoils, so that he was largely farming sterile subsoil. Debris from his fields had been dumped on the farm lower down slope, while fine soils had been swept downstream to fill high-cost reservoirs with sediments.

This farmer who did not want to be told what to do started a vicious chain of damage, reaching far away. It was a case of "the sins of the fathers being visited onto the children even unto the third and fourth generations," as said by the prophet of old.

Chall: Then it was pretty much a question of general education for the nation to understand what soil erosion can do to the farmer as well as to his neighbors, his county, state and national well-being.

WCL: Yes, and I shall never forget a contest in a farm magazine that offered a prize for the best one-hundred-word description of a deserted farm house in a gullied field. The prize was won by an Indian, who wrote:

"Picture show white man crazy. Cut down trees; make big tepee. Plow hill; water wash. Wind blow soil; grass gone. Door and window gone; whole place gone. Money gone. Papoose gone; Squaw too. No Chuckaway; No pigs, No corn, No plow, No hay, No pony.----Indian no plow land. Keep grass; Buffalo eat grass; Indian eat buffalo. Hide make tepee; Make moccasin.

Indian no make terrace. No make dam--no give dam. All time eat. No hunt job. No hitch hike. No ask relief. No shoot pig. Great Spirit make grass. Indian no waste anything; Indian no work; White man crazy."

The Indian's use of land was good for his former native way of life, but would have to give way to intensive use of land for increasing populations; however, not by wasteful exploitation as the white man had done which destroyed the lands that fed him. We must be born again, out of an economy of wasteful exploitation into an economy of full use with conservation of earth's resources.

Ingenious Farmer: Sam Gowder

Chall: You have said that in China you found native farmers who had partially solved some of their land-use problems without help from scholars or technicians. Did you find this true among our farmers in the United States?

WCL: Yes. I always evaluate farmer practices and when I see that they have devised even partial solutions, I compliment them and build on what they have done. I use them to demonstrate to other farmers what they can do to improve their lands.

I was in northern Georgia one time, advising farmers to keep crop litter or mulch on sloping fields. A farmer remarked that his neighbor, Sam Gowder, had a strange practice. I asked to be taken to the Gowder farm. I found he was not using a turning plow that would expose the soils, but instead, a single-blade plow about four inches wide and twelve inches long which stirred the soil and encouraged rain percolation but left a layer of leaf litter and mulch on the surface. Here this uneducated hill farmer had thought out on his own a remarkable discovery.

I asked Sam Gowder how he happened to use this method. He said that when he was a young man, he was a farm laborer and saw how farmers 'round about in the hilly country were clearing forests, and cultivating sloping fields, and exposing soils to heavy rains until they were cultivating bright red subsoil

WCL: rather than gray brown topsoil.

When he decided to marry and start a home, he bought an inexpensive hill farm. He recognized there was no erosion under the mulch of forest woodlot that was covered with leaves and litter. His fields for cultivation had a slope of seventeen percent which is steep for continued annual cropping, so Sam Gowder decided to use this bull tongue plow and keep the crop litter or mulch on the ground.

I was delighted to see that he was still cultivating topsoil whereas the fields of his neighbors had all eroded down to the bright red subsoil of that area. As a result of this method, Sam Gowder grew more cotton per acre than his neighbors, and better corn than his neighbors; and he always kept two or more bales of cotton stored in his barn as a bank saving account, so that he always had money for fertilizers and farm machinery.

Sam Gowder and I sat down on the forest litter of the woodlot and I pulled apart the mulch to see its depth and the condition of the decomposing leaves. We examined the burrowing of little worms and other organisms that cause soils to retain capacity to absorb rains that fall on them. I asked him if he realized the functions of this forest litter and he said that he did; this was the reason why he was keeping litter at the surface of his cropland.

Sam Gowder became quite famous; many visitors came to see what he had done. I personally escorted some Chinese government officials who were concerned with improving agriculture in free China, to show them how we could often learn from uneducated farmers. I had found terraces built in north China by uneducated farmers.

Sam Gowder practiced soil conservation all right, but I guess I should not have taken my wife to see it; for whenever I praised him, my wife burst forth in indignation at his lack of conservation of human resources. His tired wife, who had not taken a day off in years that she could remember, had been told by her husband that she was to take the day off and visit with "that woman from Washington." Believe me, "that woman from Washington" (my wife) is still up in arms about Sam Gowder.

His house had been built twenty years before my visit in 1937, when they were married. In the ensuing twenty years, he had never put on the front steps. The only entrance was at the back door where there were no steps either, only two stones, uneven in height, which gave one an unexpected jolt. When my wife asked to go to the bathroom, she was told that there was none. Thinking this meant there was none in the house, my wife asked about the one in the yard. The answer was again that

WCL: there was none. Then my wife said, "But where do you go when you want to go?" The reply was, "We just go out into the woodlot among the bushes." Yet Mrs. Gowder had lived in this house for twenty years and brought up seven children!

Another objection that, to my wife, was unforgiveable was that the water supply came from a spring two hundred feet below in a steep canyon. All the household water was carried up this trail by Mrs. Gowder and her children. All the big washings were carried down to the spring where Mrs. Gowder washed and, on an outdoor fire, boiled her clothes. She hung the wash down there and then carried it back up the steep path to the house. This she had done for twenty years. Sam Gowder had never installed a pump to bring water into the house and conserve his tired wife's energy, although he had bought all the latest equipment for his farm.

The one concession my wife made to Sam Gowder was that he liked music and had bought an organ so the family and neighbors could enjoy Saturday and Sunday night sings together.

Demonstration Areas

Chall: Will you tell about the demonstration areas?

WCL: We found that farmers wanted to be shown how to conserve their soils and how to produce bigger crops. The answer to this was the demonstrations. They are remarkably effective in giving farmers an opportunity to examine, criticize and learn modern conservation farming methods.

In setting up a demonstration area, the first step was to obtain a base map of the entire project area. If one was not already available, one was made from aerial photographs, for all our work areas were photographed from the air. Contour maps were drawn from the aerial photographs and enlarged to a scale of about twelve inches to the mile. With such photographs, our technical people could locate themselves on the photographs within ten feet of their actual position.

A farm-by-farm survey was made, showing soil types, erosion conditions, slopes, current land use and any other important features. These were put directly on the base map. Then technicians were able to draw up individual farm plans for each farmer in the area. Every step was considered on the basis of need,

WCL: adaptability, economic feasibility and physical relationships with adjoining lands.

If the farmer decided to adopt the conservation plan finally worked out, he signed a cooperative working agreement with the federal government through the Soil Conservation Service. He agreed to follow the recommended land-use practices over a five year period and to contribute as much as possible of labor, power--animal or tractor--seed, and materials. The government agreed to lay out the work, draw up structural specifications, and provide what materials and labor the farmer was unable to supply; and when lands had to be taken out of cultivation, to furnish suitable plantings for the eroded lands.

These demonstration areas have proved most valuable in showing farmers how to conserve rainfall, improve soils, and increase farm income by modern methods of conservation farming.

Lowdermilk Appointed Chief of Research

Chall: When Rexford Tugwell called you from your hydrology work in California, you were appointed as Associate Chief of the Soil Erosion Service. Why was your title changed to Chief of Research?

WCL: I am at heart a research man. Once Bennett, in one of our departmental staff meetings, said that the Chief of the Bureau of Public Roads would not have an Associate Chief, implying that he did not like the idea either, and suggesting that I become Chief of Research. I did not object, for I was eager to get more research work done in our Soil Conservation Service, now that we were well established as a working organization.

Chall: How did you go about establishing a research program for the Soil Conservation Service?

Research Programs

WCL: First we took a survey of what the situation was and began to build up our program. I felt a program of integrated research

WCL: was essential to the success of a national program for soil and water conservation and correct land use. The problems involved were, and still are, almost endless; many of them are interrelated and cannot be solved independently. Defense of lands upstream may be necessary for the protection of a reservoir or of farm land downstream, on which the welfare of those living in the lower part of the valley may depend.

Plans for a comprehensive and coordinated national program of land use call for research in many specialized fields, require the collective efforts of many specialists, and must call into effective cooperation the agencies concerned with specific fields. The Soil Conservation research had to develop, in cooperation with state agricultural experimentstations, and other scientific and technical agencies, a forward-looking program of basic and applied research for various problem areas.

Erosion Experiment Stations

WCL: We had a beginning, you will recall, in the ten soil erosion stations that had been financed by the appropriation Congressman Buchanan (of Texas) had secured in 1930 from emergency funds set up by President Roosevelt. These were divided between the Bureau of Soil Surveys and the Forest Service, and had provided my funds for the San Dimas Hydrological Experiment Station. These ten stations were transferred to us when we became the Soil Conservation Service in the Department of Agriculture. In our first appropriations we got approval for funds to establish ten more such stations.

We had splendid cooperation from Jim Jardine, Director of Research in the Department of Agriculture, and from the Forest Service. The ten new stations for watershed studies were patterned somewhat after my original studies in San Dimas, but we also extended this type of investigation to agriculture and grasslands.

After conferring with the Forest Service and the Bureau of Land Management, we set up a network of hydrologic stations for problem areas where erosion and floods were critical factors in the use of land, both farm and grasslands. We proceeded systematically to find drainage basins, not too large and not too small, in important problem areas.

I appointed Dov Krimgold, a hard-working brilliant hydrologist, to locate such pilot areas. The first one was located in the Allegheny plateau, at Coshocton, Ohio, and Lloyd L. Harrold was made director. Such a fine job was done here that in spite

WCL: of all changes in administration through the years, this research station is still operating effectively. In Coshocton, we set up the most elaborate devices ever used in lysimeter studies. Dr. Krimgold also located sites for stations at Waco, Texas, and Hays, Kansas.

At Coweeta in North Carolina, Dr. Charles R. Hursh was authorized to establish another hydrologic station and to select his staff. He was especially favored with sufficient rainfall so that there was a return flow underground, and the hydrologic cycle could be more completely followed than at San Dimas where we had streams of intermittent flow. We had here one of the neatest and most interesting studies. Dr. Hursh adapted himself to the mountain people in a remarkable way and the entire project was most successful.

We located another station in Texas, not far from Waco. In this area, rains may come in very intense storms; and since the soil is shaley and less pervious than others, the storm runoff can reach very high stages. This was an interesting station and our data proved very valuable.

We wanted to find facts on the grain-growing lands of the great plains, and we established another station near Hays in Kansas. Here the problem was not excess water, but insufficient water.

One of our most important surveys was on the damage that had been done by wind and water erosion in the short time that we had occupied our pristine continent and wastefully used and misused our national resources. This was undertaken at Dalhart, Texas. This was a center for studies of wind erosion in the Dust Bowl.

In these twenty stations we could study various types of problems around the country. Thus research in the Soil Conservation Service was carried on in these experiment stations where we collected basic data and in the demonstration projects which gradually covered much of the country and which I discussed previously.

Puerto Rico

Chall: I would like to hear about your work in Puerto Rico where I understand you developed a bench terrace which they still call the "Lowdermilk terrace." Why did you go to Puerto Rico?

WCL: When I was Chief of Research, I had to go to Puerto Rico to see

WCL: what our agricultural research station was doing. This was one of the twenty. As usual, when I go to a new place, I like to tour the area to see what the critical problems are before making any suggestions as to what improvements might be made.

Puerto Rico is an overpopulated island with limited coastal plains and steep sloping fields on which the farmers grow food for rapidly increasing numbers. It is a tropical country and heavy rains fall on sloping lands. I found that erosion was the serious problem here. I decided that the solution would be bench terraces, similar to what the Chinese farmers had installed in northwest China. I planned, however, to put these in on the contour with scientific accuracy.

I found native farmers trying to build flat terraces with shovels and wheel barrows which was slow and uneconomic. Many farmers would not put forth this effort, so I suggested that farmers plant strips one foot wide on the contour, using the rapidly-growing, sturdy elephant grasses or guatamala grasses.

Then with each plowing, they would throw the earth outward against these grass strips so that the earth would lodge and be held on the contour. On the lower side of the grass strips, they were to plow away from it, and in this way, the land would flatten into cultivated bench terraces. Thus the slopes would be terraced without any additional operations, probably within three to four years.

The width of the terrace so developed was determined by the steepness of the slope and the location of the grass plantings. For years these were called "Lowdermilk terraces." I am told they have spread over the West Indies.

Sedimentation Studies

Chall: Did the study for measuring silt as it accumulated in Lake Mead reservoir come under your research department?

WCL: Yes, and it happened in a rather interesting way. Andy Lawson, Professor Emeritus of Geology at the University of California, read in the paper one morning in 1936 that Boulder Dam (begun in February, 1931 and completed in March, 1936), later called Hoover Dam, was finished and that the gates to the great by-pass tunnel had been shut so that the lake had begun to fill. Andy Lawson wrote to Secretary Ickes that he should have an accurate survey of the boundaries of the drainage area of the Colorado River and asked if such a topographic map had been made.

WCL: Secretary Ickes passed this letter on to me and asked me to see what could be done about this topographic map. I got together a few of our specialists and sent off a telegram to Fairchild Company, telling them of the project and asking them for help in setting up specifications for this aerial mapping. They complied immediately, and we called for bids by telegraph, for flying and photographing both the area that was to be covered with water and the drainages that flowed into Lake Mead.

In one week, this entire preparatory job was completed. We had called Fairchild, received specifications, asked for bids, accepted one from a reliable outfit and the planes were in the air carrying out their mission. Ickes was very pleased when I reported this to him.

Chall: Did this complete your research work on sedimentation in Lake Mead?

WCL: No, indeed. Our next step was to establish control points, both for the topographical survey and for the influence this great new body of water would have on the isostasy of the basin. The enormous weight of this new body of water would depress the earth's crust beneath it.

I personally knew Major William Bowie. He was Director of the Coast and Geodetic Survey and the leading authority in the United States on isostasy of the earth's crust. I requested Major Bowie to cooperate with us by allowing us to use his already surveyed stations as our control points for the topographic survey. Major Bowie was most cordial and offered to help in any way possible. His surveys to determine how much the earth's crust would be depressed by water backed up against Boulder Dam were done with the highest degree of accuracy. Thus we had excellent control points for our surveys.

This important and accurate topographical map of Lake Mead will enable scientists to know and keep track of the rate and amount of sediments being deposited in the lake as long as it exists.

Chall: Did you continue your studies on sedimentation begun in the Soil Erosion Service?

WCL: Yes, when at San Dimas, I had worked out a program of collaboration with Cal Tech at Pasadena. I had been able to supply emergency funds to Cal Tech to build a hydrologic laboratory, and this collaboration continued after I became Chief of Research. I enjoyed going back from time to time to see the excellence of their work, and they seemed equally eager for me to see and discuss their findings with them.

WCL: It was here that Dr. Bell demonstrated in models how muddy water behaves when entering a reservoir of clear water. Muddy water is a liquid of greater density than that of clear water and will underrun the clear water right up to the dam where it will deposit the silt. This begins to reduce the storage capacity of the reservoir and in time, would put it out of commission, something that has happened frequently in some of the reservoirs in our south and west.

Chall: Have scientists found solutions to this problem of silting?

WCL: No. In North Africa, I found that French engineers adopted the practice of running muddy water through the turbines, which we in the United States have not done yet. This is an important finding. The French thus spill out the muddy water at the dam and so maintain the full storage capacity of the reservoir. This muddy water continues on downstream, carrying its load of sediments in suspension, and does not pick up another load of sediments below the dam.

Our method in the United States has been to take off water for the turbines from gates in clear water. When this clear water has passed through the turbines, it has already deposited sediments behind the dam. The stream is then ready to begin work again and will pick up another capacity load of silt--depending on grade and velocity--and dig into the alluvial fill of the valley floor. This has been a common occurrence in our dams in the west. We now know that measures are required to settle out sediments and we have tried them at Parker Dam in southern California.

Relations With Other Organizations

Chall: In your research, did you establish any cooperative working arrangements with other institutions?

WCL: Yes, we set up cooperation with the experiment stations of the Land Grant colleges in all forty-eight states. We also had excellent relations with the scientific men of the nation. Dr. Isaiah Bowman, head of the National Research Council, and I had many luncheons together and his advice was always valuable. For years, I had a close association with Robert Millikan at Cal Tech, and with J. C. Merriam, President of Carnegie Institute in Washington.

WCL: Perhaps it was because of my standing with the National Research Council and the National Academy of Sciences, and others, that I was made President of the American Geophysical Union for three years, from 1941-1944.

We established a national committee to have the benefit of consultants in planning and conducting our research. The hydrolic engineers of the country were very much interested in these studies and gave us excellent consulting service. Some of them were R. E. Horton from New York, who was one of our brilliant consultants; L. K. Sherman of Chicago; H. Horner of St. Louis; and Ira Hatfield.

One reason for our success in these research stations was the complete devotion of the hard-working, capable staff toward our research objectives. As I made inspection trips from time to time, they took delight in showing me what they had done and in turn, receiving my congratulations.

Relations With T.V.A.

Chall: Did you work at all with the T.V.A.?

WCL: Yes. I was invited by David Lilienthal, who was Chairman of the T.V.A. Board, to come to the Tennessee Valley from time to time and advise the staff on certain soil and erosion problems they had encountered. On my first trip to evaluate their works on erosion control, I pointed out that for the money expended, they were getting inadequate results from their small check dams in gullied areas. They were not using the idea of mulch or litter from natural vegetation to increase the intake of rain by soil.

I emphasized the importance of using this method. I also urged them to take out of cultivation, sloping lands that were too steep for safe cultivation of crops. I also advised on the use of farm planning to integrate the uses of different kinds of land.

On one of my early trips, I asked to be flown over the Tennessee Valley to get the general picture. The pilot had an old plane which delivered an oily odor from the engine. The pilot, sitting in the seat in front of me, desired to be helpful and allow me better views of the ground, so he tipped the little plane sharply first in one direction, and then the other. I never had such a severe case of air sickness in my life, either before or since. First I heaved out one side and then a little

WCL: later, I heaved out the other side. All this was unknown to the pilot in the little open plane. It was a terrible experience.

I was called back from time to time to advise on specific questions that the T.V.A. staff brought up. David Lilienthal was always very interested in my findings, as was also their man in charge of agriculture. But the latter also enjoyed the help of a county agent who was of the old line Extension Service. While they sought my advice and were most cordial each time I came, they did not want the Soil Conservation Service to set up any demonstration projects in the Tennessee Valley. They did not want Bennett or his henchmen to have any part in the T.V.A., so Bennett became very hostile to them.

On a field trip in the drainage of the Knox River in the Tennessee Valley Authority, the man in charge of buying lands that would be flooded by the new dam, was reading off names of farmers whose lands were to be bought for a reservoir site. I noticed that all had Anglo-Saxon names. I mentioned this and was told that this area had been settled in early days by a migration of people from England who occupied this isolated mountainous area and stayed. These Knox River farmers spoke old English as in Shakespeare's time and were direct descendants of this early migration.

Also, I was interested in one particular old farmer who refused to sell his land, because he said that the fire in his fireplace had never been allowed to go out in more than one hundred years. He therefore stoutly refused to sell or move. Finally, the T.V.A. staff agreed to build a crib and place the entire fireplace in it with the fire going and move it to a new farm which the T.V.A. had helped him buy. The old man then was satisfied and the fire continued to burn cheerfully in his new home.

Shelterbelt Project

Chall: Dr. Lowdermilk, did you have anything to do with the Shelterbelt Project?

WCL: Yes. Shortly after I went to Washington in 1933, Raphael Zon asked me to be the director of his pet idea to put in shelterbelts as they had done in Russia where he had been thoroughly trained in scientific forestry. While I did not want to take the job as director, for I was busy starting the Soil Erosion

WCL: Service, I agreed to give them the benefit of any experience or knowledge I had on the subject.

People generally had the idea that all one had to do was to plant trees and they would grow anywhere. Roosevelt had announced a great Shelterbelt Project for the Great Plains. I at once raised the question about rainfall, in time and amounts, to know how far west moisture would be sufficient to grow trees. For I knew that much of the Great Plains area would not support trees throughout the year.

I proposed that a careful study be made to indicate the western-most limits favorable to growth of trees for the shelterbelt and sent this memorandum to Silcox, Chief of Forestry, and to Rexford Tugwell. This memorandum apparently reduced the first ambitious plans for the shelterbelt, for the actual plantings were carried out further to the east where rainfall generally was more plentiful, as I had suggested.

I advised that shelterbelt trees should be located on contours, so as to make use of broad-base terracing to collect and hold waters from melting snow and rain storms, and thereby supply greater moisture. I also prescribed that the drainage ditches of the highways through the Great Plains should be emptied into the channels of terraces to supply additional storm water to stimulate growth of shelter trees. Results were good in these plantings where extra moisture was given the trees, and the ground was kept clear of grasses to reduce competition with trees and grass for moisture.

The shelterbelts were planted within a strip of land about one hundred miles wide, stretching from North Dakota to Texas. Each belt of trees was five to ten rows wide with tall growing trees in the center, such as the Chinese elm, box elder, white ash and others; and with shorter trees, such as the Russian olive and shrubs and bushes, on both sides. The main secret of making trees grow in the shelterbelt zone is to plant them with roots long enough to reach moisture in dry weather.

As long as there was public works money to spend, the shelterbelt program progressed rapidly. Young trees were supplied by the government along with supervision in planting. But farmers were to do the field work and cultivate and care for the young trees and prevent damage from livestock.

The program lasted seven years during which time more than 200,000,000 trees were planted on some thirty thousand farms, making more than eighteen thousand miles of shelterbelt. Their success depended on farmers' care of the trees, and keeping fences mended and stock from damaging trees.

WCL: Ten years later, in a survey of the shelterbelt, it was found that only five percent of the plantings had been entirely removed, and eighteen percent were in poor condition because cattle had been allowed in; but the remainder were in fine condition. The farmers were well pleased and were planting more trees. In 1955 some two thousand miles more of shelterbelts were planted.

Use of Civilian Conservation Corps

Chall: I know that at this time in the Soil Conservation Service you were using large numbers of boys in C.C.C. camps. Can you tell me something more about them?

WCL: Yes. The bigger we grew, the more camps we used, until at one time, I know we had 110,000 C.C.C. boys working for us on our measures to save our soils and waters. The first camps I used, you remember, were at the San Dimas Forest Hydrological Experiment Station in 1933. We were then among the first to ask for and get two camps of two hundred boys each, or four hundred in all.

These men were mostly unskilled but were eager to work. This convinced me that these camps were a wonderful method to get work done rapidly and with a minimum of expense, and at the same time, keep men at work during the depression years. For ten years, from 1933 to 1943, we used all the camps we could get allotted to us.

This work played an outstanding role in the rehabilitation of teenagers during the depression when many were driven to dubious ways of existence. It gave me great satisfaction to follow the splendid effect of these camps on young men who, in great numbers, were leaving impoverished homes and taking to the road.

Chall: How was it decided which government agency should have camps assigned them?

WCL: That was one of the big problems. The many agencies of government, such as the Forest Service, Soil Conservation Service, the State and National Park Services, and Interior's Land Management Branch, and others that required a labor force, had to apply for C.C.C. camps. Applications were due at definite times. If camps were available, they were assigned by Mr. Robert Fechner, the "Big Boss."

WCL: All bureaus were clamoring for this cheap labor, so we found ourselves as a new bureau, competing with the old line bureaus. The Forest Service claimed they should have the most camps. Then I presented to Mr. Fechner the Soil Conservation Service viewpoint: that we were concerned with the present and future supplies of food and fibers, and also with the safeguarding of the lands which produce these vital essentials; that to succeed we had to control flood waters and resulting erosion on lands of the nation. I pled that the Soil Conservation Service was surely as vital, or more so, to the nation as forest trees or other lines of work, and that we should have first claim.

Fechner called in Christopher Granger of the Forest Service and asked me to come to his office and speak for the Soil Conservation Service, and while we argued, he listened. Apparently both Mr. Granger and I were convincing, for he did not want to make the final decision on the number of camps each could get. Instead, he said, "The President must decide."

Chall: What kinds of work did these C.C.C. boys do on the land?

Duties

WCL: We had them work on all types of projects across the country. They planted millions of trees where they were needed for checking eroding soils, in gullies and on overgrazed slopes; and they re-seeded thousands of acres of depleted grass lands in our southwest grazing lands. We had the C.C.C. boys build thousands of check dams, putting in earth, rocks and brush to catch the silt and stop the deepening and widening of washes and gullies.

They built hundreds of stock-watering ponds, to catch rain waters in ravines and gullies and thus hold it so that herds need not walk so far for available water. This enabled herds to graze much further out on the range. We also had the boys assist in building fish ponds and farm ponds. Many of the boys learned to drive tractors while others did the finishing hand work, such as spillways and the like.

When our Dust Bowl began to blow, we in the Soil Conservation Service realized the need for special dry-land grasses to re-plant those parts of the plains that should never have been plowed. We set up nurseries to grow seed of native western grasses on which buffalo herds had thrived before cattlemen and wheat farmers came. To get seeds for the first planting, we had to search along railroad rights of way. Our men invented a sort of carpet sweeper, or vacuum cleaner, to harvest the seed of these wild grasses and in this job of gathering seeds and re-seeding, we had

WCL: help from the C.C.C. boys.

The state colleges and experiment stations, incidentally, had not thought of doing this and were displeased to have the new bureau taking the initiative, but we continued these Soil Conservation nurseries until 1953 when they were taken away from us.

Our use of the C.C.C. camps was not confined just to work on government lands. Much work was done on private lands, for the tasks of controlling flood waters and stopping erosion were often far beyond the ability of individual farmers. Storm waters indiscriminately run wild across property lines and onto neighboring farms where they dump accumulated debris of sands, mud and sometimes stones, or start a gully eating upward into a neighbor's farm. Fertile fine topsoils are generally swept downstream to rivers, and fill reservoirs with sediments and prevent flood control works from functioning.

Management

Chall: How was the management of these camps carried out? It must have been a big responsibility.

WCL: The control, discipline and housekeeping of each camp required about ten percent or twenty young men for each camp of two hundred. The U.S. Army, with a Captain or a Major as Commanding Officer, was responsible for camp work and discipline. The remaining 180 boys were outside workers doing whatever tasks they were appointed to do.

The assignment of a camp carried with its authority a budget to pay for straw bosses to supervise the young men at their daily tasks. Bureaus or agencies to whom the camps were assigned provided specialists to teach and supervise the straw bosses.

They usually worked six hours a day. For this work, the young men received a wage, most of which was sent to their families, with a small amount paid to each recruit for pocket money.

It was good to see these city boys as well as country boys have opportunities to engage in wholesome outdoor constructive work on the lands of their own country. It was good to see how, with ample nourishing food and exercise, these young men filled out their bodies in good health and took pride in their work.

Flaw in Recruitment

Chall: I understand you felt there was one flaw in this wholesome undertaking of C.C.C. camps. What was it?

WCL: Yes, that is true, and I had several talks with Mr. Fechner, the Director, about it and we were in agreement. It was that young men, or their families, had to be on relief to be eligible to take part in this constructive program.

I thought it would have been good for all boys, rich and poor, city boys as well as boys from towns, to leave home communities and to travel and to know their country and get a "feel" for the land, and a pride in having a part in conserving natural resources as a heritage of our nation. Both Director Fechner and I felt it might be well to fix the minimum length of such national service, but not the maximum.

Chall: Were you able to change this admission requirement?

WCL: Unfortunately, we were not able to have this humiliating requirement of being on relief modified. As I remember, Director Fechner thought that the labor unions were afraid such camps--if all boys were included--might tend to lower wages for union labor or would reduce jobs for union men.

I felt strongly that a long-range point of view could have found a way to provide for camps as an outlet for all teenagers, where rich and poor together might devote themselves to works of conservation of natural resources of our country.

It was a big disappointment to me and many others when this mechanism, born of the great depression, was terminated in 1943. We used as many camps as we could get during the ten years they were in existence. Then the war called out able-bodied youth into military service. Now in 1968, we need at least summer camps for the tens of thousands of students who want vacation jobs. Few are to be had, and life for them starts out psychologically bad.

Basically, our social efficiency should be able to take advantage of the greater efficiencies of automation that releases manpower from lesser skills for the conservation of natural resources.

Extent of Erosion in U.S. in 1930's

Chall: When you first made your erosion and runoff studies in China, did you anticipate that they would become so important here in the United States?

WCL: Yes and no. But my scientific studies to measure rainfall, runoff and erosion convinced me that the wastage of the good earth by accelerated erosion (caused by man's destructive methods of using and misusing natural resources), would bring about national suicide in the United States faster than in other countries because of our high-powered machinery. We ripped up the earth faster than had ever been done elsewhere.

These exposed soils eroded with each dash of rain and set in motion a long chain of events, destructive to the land and to the people who live on the land. I returned feeling like a missionary who had come back to preach a new gospel--that of saving the soil and the rains that fell on it.

But of course I did not anticipate that I would be Chief of Research for the Soil Conservation Service and have a part in making policies directed at checking or stopping this destructive menace to our fair land. The monetary loss annually to the country is enormous and impossible to reckon in all its ramifications.

The top fertile soil averages about seven inches in depth. Once this soil leaves the field it is lost irretrievably. A thousand tons would be required to cover one acre to a depth of seven inches, even if it could be hauled back. Researchers in the soil conservation stations estimate that nature requires from three hundred to one thousand years to build an inch of topsoil, and when seven inches erodes in a few years, two thousand to seven thousand years of nature's work goes to waste.

Chall: How widespread was erosion in our country when the Soil Conservation Service first got appropriations to begin work to prevent the destructive work of erosion?

WCL: It was worse than had been imagined. Our survey indicated that at least fifty million acres had been destroyed for further cultivation by gullies. It would take years of work and expense just to check their growth and plant them up to trees. Furthermore, another 150 million acres of arable land was so eroded as to make farming difficult or unprofitable. About another 100 million acres was fast becoming infected with this disease of the land. This report was a great shock to our congressmen and startling information to our thinking people of the country.

WCL: Nature itself took this occasion to give a demonstration of the wind erosion that had damaged our great plains from Texas to North Dakota, because we had plowed up lands that never should have been plowed. When fine soils from exposed drought lands darkened the skies of the nation, the American people were aroused. The Soil Conservation Act of 1935 was passed without one dissenting vote in Congress, and enormous sums have since been spent to heal and to cure, when possible, the sick lands of the nation.

Life in Washington

Chall: Life in Washington in the early years of the New Deal appears to have been quite hectic. Were there compensations?

WCL: Yes indeed, there are many delightful events to remember. President and Mrs. Roosevelt set the tone for gracious hospitality. At this time, government was smaller and more intimate. Chiefs and assistant chiefs of bureaus were invited to the White House at least twice a year. In autumn, we attended a ball in the famous East Room where we danced while all former Presidents looked out at us from paintings around the wall; in spring, there was always a garden party on the White House lawn. Mrs. Roosevelt had smaller affairs or musicals to which my wife, along with other wives of government officials, was invited.

We shared gracious hospitality and friendships among leaders of various bureaus and with scientific people in the capitol. My wife and I remember evenings spent together with the M. L. Wilsons, the Howard Tolleys, Mr. and Mrs. Milton Eisenhower, Justice Brandeis of the Supreme Court, Dr. Herbert Putnam of the Library of Congress, Secretary and Mrs. Henry Wallace, Mr. and Mrs. Gilbert Grosvenor of the National Geographic.

It was in Washington I established my life-long friendship with Dr. Chaim Weizmann, who later became President of Israel, and with Albert Einstein, with whom I had a long and enjoyable friendship. I enjoyed the friendships of Clyde Marquis, President of the International Institute of Agriculture (Rome), Isaiah Bowman, with whom I had many profitable sessions, and Vannevar Bush of the Massachusetts Institute of Technology, and later, head of Carnegie Institute. Mr. and Mrs. Morris L. Cooke were close friends. He was head of Rural Electrification. I had close relationships with J. C. Merriam, head of the Carnegie Institute of Washington, C. Hart Merriam, first Chief of the Biological Survey, who was appointed by President Theodore Roosevelt, and

WCL: Al Black (Albert G.), Chief of the Bureau of Agricultural Economics, with whom I maintained a life-long friendship. There were many, many others whose friendships remain as happy memories of these Washington days.

Chall: Where did you live in Washington during the first two years before your family joined you?

Cosmos Club

WCL: One of the delightful features of these first two years was living at the Cosmos Club, across the street from the White House in the old mansion which had been Dolly Madison's home. This place not only was picturesque and full of historical reminders, but it was close to everything and within easy walking distance from our offices in the Winder Building, so that we could come back for lunches.

But there was another more important attraction about living at the Cosmos Club. This is the one club in the U.S. where the criterion for membership is not money or social standing, but is based solely on whether the member has achieved recognition for outstanding contributions to knowledge: in the sciences, in art and architecture, or as an author or historian. Each new member must be sponsored by several old members and meet the qualifications for membership.

So daily we had contact with the intellectual elite from around the world. We met in halls, library, sitting rooms and at meal times. We attended Monday night lectures and afterward had talk fests with beer and pretzels. Here important policies of government were often worked out. It was a stimulating place to live, and numerous life-long friendships were made here.

Appointment to Survey Old Lands in Europe and the Middle East

Chall: Just when your research work was in full swing, why did you leave the country and make a survey of land-use in Europe and the Middle East?

WCL: It seems that I am at heart a pioneer, and, as Kipling said in his poem, I cannot resist a new challenge to go and find what

WCL: lies "Out beyond the ranges." This challenge was brought up in one of our meetings with the Bureau of the Budget, where we were presenting requests for enormous sums for our work in the Soil Conservation Service.

Then one thoughtful member of the appropriations committee asked if we had made a study of old lands that had been occupied for two thousand years or more. Did we know, for example, if there had been problems of erosion and what had been done about them? He suggested that we might learn much that would benefit our own farmers and stockmen.

Secretary Wallace, who was sitting in on this meeting, said we had not made such a survey. Then the chairman of the committee suggested that when the work had settled down a bit more, it would be a good idea to make such a study.

It was known that I had made a study of the old lands that had cradled Chinese civilization in its infancy, and had coined the expression "man-made desert," as the result of man's long occupation there. The opinion seemed to be that I should go, especially to the old lands of the Roman Empire that had once been so prosperous but now lay in ruins. Was the present condition of these lands due to an adverse change of climate or had it been brought on by man's neglect to protect the lands from soil erosion?

Chall: It does seem that you get well established in doing one important job and then you are called to another one. Did you ever regret this trip abroad?

WCL: No, never once. For it was this survey of old lands that led me into international work and made the latter years of my life fruitful and satisfying.

Bennett was delighted. While he often said during the first years of the Soil Conservation Service, "I lean on Walter like a sapling to an oak tree," the Service was now well established, with capable men in all departments, and it could almost run by itself. Bennett was popular as a speaker; he was now Chief of the Service and coveted being called "The Father of Soil Conservation." Since we had built up the Service from its very beginnings, it was to his advantage, he thought, to have me out of the picture. But it worked out to my advantage, I'm sure.

Part III The Soil Conservation Service, 1939-1947

Return to Washington

Chall: How were you received at the Soil Conservation Service when you returned?

WCL: Of course the staff knew, and I knew, that Bennett had given my research work to Mark Nichols permanently, and perhaps some felt there would be a certain strain. But instead I surprised them all by appearing in high good humor. I had grown a very distinguished goatee and appeared at the office that first morning wearing a fine Arab Sheik's costume, complete in every detail, including the elaborate sheathed knife in the sash belt, the baggy trousers, head dress, and the usual string of amber beads, considered the "figgety beads," to fondle and play with while one talks.

The result was that all the office staff came by to greet me and comment on my changed appearance and to laugh heartily.

Chall: Did you still hold your same title of Assistant Chief of the Service?

WCL: Yes, and it was a busy time almost immediately. I had promised to write a full, detailed report but this could only be worked on between times. Plans had already been made for me to make extensive tours around the United States to make talks to our soil conservation regions and districts, field stations, agricultural colleges, schools and farmers, to give them the benefit of my findings and seek to arouse in them a sense of urgency about the need to take all steps to safeguard our lands from soil erosion. For as Nathan Shaler said, "Of all the sinful wasters of the earth's resources, the very worst are the American people." There were some immediate requests to attend to also.

Friendship With Justice Brandeis

Chall: I understand that Justice Brandeis of the Supreme Court was very anxious to see your report on Palestine.

At home on the University of Nanking campus with "Skip". 1924.

Fifteenth wedding anniversary, in Hollywood, where Mrs. Lowdermilk spoke at a luncheon in the Cocoanut Grove to raise money to aid refugee children -- Youth Aliyah. Mrs. Paul Muni, Chairman. August 15, 1937.

In backyard of Berkeley home following dinner party for Palestinian students. 1947.

In Sacramento, after receiving the Eleanor Roosevelt memorial award from Hadassah. May, 1967.

Correction:

Eighteenth wedding anniversary.....August 15, 1940.

WCL: Yes, even before my arrival, he had sent word through official channels that he wished to see my report. He had been very much concerned ever since the British issued the White Paper, saying there was no further economic absorptive capacity for Jews in Palestine and all immigration must cease. He told some friends, who later passed on the word to me, that "if Lowdermilk also said there was no further absorptive capacity for Jews in Palestine, he would have to give up his dream for which he had been working and planning."

As soon as a special folder of the report was completed, I took it over in person to Henry Wallace, then Secretary of Agriculture, to deliver to Justice Brandeis. The Secretary told me afterward that he thought he would glance at the first page and initial it and send it to the Justice, but he read the first page, and then continued to read until he finished the complete report of almost fifty typed pages, all in one sitting.

Then he took it over in person to Justice Brandeis and as he handed it to him, said, "This is the best argument for Zionism that I have ever read." He was pleased because they were reclaiming lands long unused and bringing them back into productivity.

Chall: Did Justice Brandeis discuss the report with you personally?

WCL: Yes. I believe it was the following Sunday that he had a very delightful reception for us and invited several other Justices of the Supreme Court as well as some newspaper men, and the discussions were very lively. The Justice overheard my wife telling some newsmen of the "human cargo" boats, and of the remarkable rescue of orphans from Europe and their rapid rehabilitation in Palestine, and asked her if she would speak to the Jewish women's organization called Hadassah. He said he felt that if they heard these stories from an outsider's viewpoint, they might believe what Hitler was doing to Jews and the tragedies that were happening to them.

My wife is a very out-going person and had been deeply stirred by the plight of the refugees and immediately accepted. A week later, Mrs. Brandeis introduced her to a large Washington Hadassah group; and this led to her speaking to fifteen hundred at the Mayflower Hotel two weeks later, at their annual donor dinner. There Mrs. Paul Muni, wife of the actor, heard her and asked her to speak to her group in Hollywood, where six hundred women were paying seven dollars per plate to raise funds for the rescue of the European Jewish orphans.

So Justice Brandeis was responsible for starting her on years of speaking and raising money for this humanitarian work, in which she felt or hoped that she was doing her best for "Christians to give the Jews a new deal." That was twenty-nine years ago, and

What Vice-President Wallace Has Said About Walter Clay Lowdermilk

"Some years ago, I called into the office of the Department of Agriculture a soil expert by the name of Dr. Lowdermilk. I said that I felt trouble closing in on the world, and I hoped he could go to certain lands overseas where there had been ancient civilizations, and discover as completely as possible, the evidence ... of the way in which soil, and therefore civilizations, had been destroyed.

"Dr. Lowdermilk took on the task. He returned from abroad and came to our office. The very first thing he gave me was a thirty to forty page document with photographs, the result of his observations in Palestine. Dr. Lowdermilk is not of Jewish descent but he had become the most complete Zionist convert anyone could ask for.

"In reading Dr. Lowdermilk's report I was convinced that the material foundations of Zion were very real and deep indeed. Some of us ... have sometimes wondered how deep in the soil Zionist enthusiasms were. Dr. Lowdermilk set this question at rest. As an agriculturist and soil expert, he was profoundly impressed with the scientific character of the work, and as a human being he was infinitely inspired by the human beings whom he met there on the land ....

"The Jewish people have been hungering for some kind of stability on the land for thousands of years -- on that ancient bit of land which Abraham paid for and which was abandoned for a time by Joseph and his brethren, but which was built up again, and is now being resettled for a third time -- resettled not by grace of government help, but through the funds, spirit and tradition of the Jewish people.

"And so I, a Gentile, close to this effort, regard the translation of this spirit into tangible reality as one of the most exciting undertakings in the world -- for it is a spirit which comes down from olden times, but is at the same time forward looking."

(Excerpt from an address by Vice-President Henry A. Wallace delivered on October 31, 1940.)

WCL: she is equally concerned and active today whenever occasion arises. During the present period of crisis in the Middle East, she has spoken about Israel to many organizations in the Bay Area--at least once a month, I think.

Chall: Apparently the Palestine experience and Justice Brandeis' introduction to Jewish audiences opened up an active new life for her. Did your contact with him also have a great influence on you?

WCL: A warm friendship existed between us until the time he died. I was always free to go to him for discussion or advice. I remember I discussed with him my growing idea of the "beneficial use of land": that those who made the best use of land had the right to use it beneficially, and those whose wrong uses destroyed the land, forfeited the right to land--much as the legal principle of beneficial use of water law came into being in southern California. The Justice said, "Yes, I believe it will come about in time, but you are fifty years ahead of your time in some of your thinking."

Speaking Tour Across the United States

Chall: Did you start out on your speaking tour immediately after your return to Washington?

WCL: As soon as possible. There was an enormous amount of correspondence needed to plan the tours in the various sections of the country. Also I had to work up the general lecture, which I entitled, "The Conquest of the Land Through 7,000 Years." I have been told that there were more requests for this publication than for any other Bulletin of the Department of Agriculture. I tried to give the talk largely with pictures, for as the Chinese say, "One picture is worth ten thousand words." I had plenty of pictures showing what soil erosion had done to lands and cities in northwest China and the Old Roman Empire.

I always closed with "the Eleventh Commandment," which was dramatized by showing rapidly moving slides describing each idea of "the Eleventh Commandment."

Chall: What all did you do on these tours in the United States?

WCL: They were terrifically strenuous. Each region or district wanted to show me all they had been doing, ask advice on their land problems, show me their successes and failures, have field and

WCL: office discussions, some of which were very technical. Then there was some entertainment in homes, and always a very large meeting that had been widely advertised where I spoke and showed slides. Everywhere there were newspaper and radio interviews.

One of these tours lasted seventy days, without one day of rest and relaxation. Another tour lasted sixty-five days, and another, more than forty days. Then there were shorter ones nearby in the east.

The hard part was that each group of men was fresh and rested when they met me, just arriving from another district; but I had to go the strenuous pace they had planned for the short time I was to be with them. Some of the wives told Mrs. Lowdermilk that their husbands had to go to bed for a day to rest up after conducting my activities for three or four days. Yet I had to keep going week after week, or at least I thought I did.

Our family doctor said I showed symptoms of total exhaustion and suggested I rest for three months; but there seemed too much pressure to stop, and I had always had the good health needed to make my body do what I wished it to do.

Heart Attack and Recuperation

Chall: Did you contemplate that this pace might lead to a heart attack?

WCL: No, but I knew what was happening on the night of July 17, 1941. My wife was able to get a doctor almost immediately, and I was taken to Mount Alta Veteran's Hospital in an ambulance. Then I had the nine weeks' rest which I had refused to take some months before. I had wonderful care and made a complete recovery. I accepted my limitations and acted accordingly.

I became for many Exhibit A, in recovery, and was able to help numerous other men to go ahead--with limitations at first--rather than give up to being an invalid. My recovery was rapid, and soon I was doing light work and planning to make a strenuous one-and-a-half-year trip to China which had been previously arranged.

Chall: What kind of "easy work" did you do?

WCL: Before the heart attack, I had been elected President of the American Geophysical Union, one of the largest, if not the largest, scientific organization in the earth's sciences in the United States. We felt there should be a larger membership. Since many scientists had never been invited to join, I suggested that we

WCL: write a letter explaining the advantages of being a member and inviting them to join. This letter we sent out to six thousand scientists, and to make it personal, I signed each letter. The response was most gratifying.

Then too, during this time I invented a "bomb sight" and gave it to Dr. Vannevar Bush who transmitted it to the military, who apparently thought enough of its possibilities that it was sent on to the field to be tested. However, just at that time the Norton bomb sight had been tested and proved to be successful and mine was dropped.

I began going to the office part time and then full time, and worked on my long report on the 1938-1939 trip across old lands,* and the maps and pictures that were to go with the report. However, although I wrote hundreds of pages, the complete report was never finished, first, because of the war, and later, because of reorganization in the Department of Agriculture. During the war, only activities pertaining to the war effort had first priorities. Increased production of food was considered the most urgent need.

But the material I had gathered on this trip was made use of in many ways: at technical and scientific meetings as well as in talking to farmer groups, to encourage them to continue to form Soil Conservation Districts and develop their conservation work. Our job was to urge farmers to conserve the soil at the same time they were under the war pressure for increased production.

I also wrote short articles, such as "The Flag is on the Plow," which was sent all over by the United States Foreign Agricultural Division. There was also demand to speak on our experiences in the Holy Land; for now Palestine was a hot issue, because the British White Paper cut off all Jewish immigration into the one place designated by the League of Nations as a "Jewish National Home," and it was still in effect.

Also at this time, I was often consulted by the State Department regarding help for China, who was now our ally in fighting the Japanese in the Pacific, for we were just recovering from the shock of Pearl Harbor. My five years' experience in China with the University of Nanking, and my expeditions throughout the areas which were now occupied by Japanese forces, enabled me to share some important information. Also, at this time I was under appointment to go to China.

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*A Survey of Land Use in Certain Countries of Europe and the Near East. A copy will be deposited in the Bancroft Library.

Writing "Palestine, Land of Promise"

Chall: How did it happen that during this busy time, you agreed to write a book on Palestine?

WCL: Well, when I returned from our long trip to Palestine in November, 1938, Justice Brandeis was very anxious that my long report should be printed by the Department of Agriculture as a bulletin. But that could not be done according to regulations because Palestine was a foreign country.

But as the situation of Jews under Hitler continued to worsen, and the slaughter of Jews accelerated, and the British White Paper continued to exclude Jews from their homeland given them by the League of Nations and all ports were closed to them, the situation was desperate.

Justice Brandeis and Dr. Emanuel Neumann, of the Zionist Emergency Organization, felt that if an authoritative book on Palestine were written by a non-Jew, showing how the economic absorptive capacity in Palestine could be increased for several million Jews by fully using the unique geographic features of the country as I had been advocating, it might be of much influence.

At first, we resisted the idea. I was too busy getting ready to go to China in September, 1942. Furthermore, we felt that there were many Jews much better informed on Palestine, and therefore more capable of writing such a book, than we were.

But Dr. Neumann knew of my wife's deep concern for the Jewish tragedies taking place in Europe and on the old human cargo boats floating the Mediterranean, so he approached her again. Finally, my wife argued that if this book would help, and if we could get it finished before September, it was our duty to do it. She said that we must forget the family vacation we had planned and bend all efforts to this supreme endeavor.

Washington summers are not conducive to strenuous work. But we had a large basement recreation room in which we set up the ping-pong table and laid out folders for different chapters that we decided must be written. My wife accepted this challenge as her supreme effort to help clear up a black page in human history. Day and night she read, took notes, gathered material on Palestine past and present; and gradually, material for each chapter grew.

In the meantime, I had to continue some work at the office; but I had much unused vacation time, and so I went to the office

WCL: only one day a week and devoted the other six days to the book. We both buried ourselves in our basement recreation room, keeping our bare feet cool on the waxed concrete floor. We gave up every other activity in order to complete the book before I had to leave for China. In the main, the manuscript was completed before I left on September 7, 1942.

Had I not left the country, the book would not have been published because of excessive war-time red tape. It was fortunate that I was away and that it was up to my wife to accomplish the impossible. How she maneuvered to get the book published by the time I returned from China is a unique story in itself. I'll have her add her own story to this chapter.

Publishing "Palestine, Land of Promise"

Mrs. L.: Well, as you know, it was war time and there were many restrictions and much red tape. If my husband had not been out of the country, the book would not have been published, for he would have had to go through channels for permission. This required the O.K. of the Soil Conservation Service, the O.K. of the Department of Agriculture, the O.K. of the State Department, and the O.K. of the Office of War Information. Any one of these offices could have stopped it.

The Soil Conservation Chief, Bennett, had flatly refused me permission to have it published. Also the State Department refused for fear that in telling of the fine work Palestine was doing in reclaiming the land, we might offend the Arabs and cause more trouble.

But I knew how hard my husband had worked on the book and that it was a constructive solution to Middle East problems in land and water conservation and settlement. Sometimes in the past, my husband had come out with forward-looking plans that he had not pushed, and later, others claimed his ideas and took the credit. I was determined that this must not happen this time.

I confess it did seem an impossible situation. But being a minister's daughter whose mother had great faith and whose motto was, "Nothing limits God but our own limited faith," I decided that if I could not do the impossible myself, the Lord could. So I prayed.

Mrs. L.: Each time I went down to my husband's office, someone would say to me, "They won't let you publish the book, they won't let you publish it." I demanded to know who "they" were. "Let me talk to them," I said. "Make an appointment for me here, at this office, this week."

Three days later, I arrived at the appointed hour. There came from the State Department a tall, distinguished man, of the Dean Acheson or Anthony Eden type, who was cordial, but with an attitude of: I can settle things with this woman in a hurry. He began with flattery. Then he told how he was a writer in the First World War in North Africa, but had published nothing so as not to offend the Arabs and cause trouble for our boys there; and he was sure I would not want to damage our war effort by disturbing the Arabs.

Of course, I maintained that the book would do no such thing, because it was a constructive project that would have benefited everyone.

We argued for an hour or more, and then in the conversation, I said, "But this book was not written for personal profit or the idea of making money, but of contributing something constructive for the Middle East."

Then he clapped his hands in apparent joy and said, "Oh, Mrs. Lowdermilk, that is just splendid. If this book was not done for personal profit, then the thing for you to do is to give the manuscript to us (the State Department) and when the war is over, we will have it and know what to do about it."

I replied, "Yes, and you would put it away in a pigeon hole and our hands would be tied. No, I will do nothing of the kind. This book was done under very great pressure before my husband left for China, because he hoped it would point a way to solve land and water and refugee problems for those fleeing Hitler."

Only after an hour and a half did he give up, but on leaving, he earnestly requested one promise of me--that I would tell no one of our meeting. I was flushed and about in tears, which was for me unusual. He assured me I might as well give up the idea of publication, for I could not receive the wartime O.K. of so many departments. It seemed a hopeless situation. But I had seen my mother work miracles by her faith, so I prayed.

My wartime effort, with my husband in China and our son in the army, was to use my big house to make a home for several fine girls who came to Washington from all over the country to do clerical work. Housing conditions were terrible.

By the way, the magazine, House Beautiful, sent down one

Mrs. L.: of their editors and a photographer to make a special feature of my home and my girls, with the hope that others in Washington might follow my example.

A few days after my State Department episode, a new and very beautiful Texas girl named Fay was sent to me. A few days later she was driven home in a red convertible. The next night also. I said, "Fay, who is your friend?

She replied, "He is my boss, George Barnes. He is first assistant to Elmer Davis who is head of the Office of War Information."

Immediately I knew that here was my answer. I told Fay to invite him to dinner. All was cordial. I gave considerable background of our travels and my husband's work in land and water conservation. He enjoyed a home-cooked meal, and I invited him for Sunday dinner.

This time, I told in detail of the book: of the plan for a Jordan Valley power and irrigation project--a T.V.A. for the Jordan--that would bring prosperity to both Arabs and Jews, in the combined Palestine under British Mandate, and enable the country to support several million more people.

Very innocently I told him my husband had to leave for China, sent by our State Department, and this constructive plan was left for me to have published. I asked, "Is there any way whereby the Office of War Information could give me an O.K. to get this book published without going through all the red tape of getting O.K.'s from other departments?"

He thought awhile, and then George Barnes said, "Yes, but first you must take out of the book any criticism of England." Even though England had cut off all Jewish immigration from the Jewish national home with the White Paper, I was to remove any criticism of one of our allies.

Then he said, "Put on the frontispiece: The author wishes to make clear that this book was written from the point of view of the land conservationist, whose life work has been to study the relation of peoples to their lands. The opinions expressed here are personal and unofficial. They do not necessarily represent the point of view of the U.S. Soil Conservation Service of which the author is Assistant Chief, or of any other government department."

The Office of War Information was the highest and final authority, and I had permission from them to publish the book. It was a miracle!

Mrs. L.: The Chief of the Soil Conservation Service phoned me in a rage and said, "I told you not to publish the book. You cannot do it."

I replied that I was given permission by the Office of War Information and told how to meet all the requirements of wartime. He demanded my instructions and had his secretary take them down. But now it was too late to do anything.

A few days later, a man from the State Department called me and said he thought I had understood that I was not to publish the book. I repeated my permission from the Office of War Information, and he too had nothing further to say.

My troubles were not quite over, for I found Harper & Brothers required a financial guarantee of four thousand copies. I never dreamed there would ultimately be several editions, so I asked Dr. Emanuel Neumann of the Zionist Emergency Organization to assume for me all publication responsibilities, in return for which they could take half the royalties, if there were any. This proved advantageous for all concerned. They used their royalties to send a free book to every leading person in the United Nations, every leading minister in our big city churches, and every Congressman and Senator.

We were told this had great influence, for when the British and Arabs claimed there was no further economic absorptive capacity in Palestine, there were always those who had read the book and could quote my husband's plan that would enable millions more to settle.

Chall: Mrs. Lowdermilk's story is certainly fascinating and enlightening, and shows tremendous perseverance against great odds. How was the book received in the United States?

WCL: Its reception surpassed all our expectations. The New York Sunday papers and the Washington papers and others throughout the country gave big spreads and book reviews. They provided details of the plans for a Jordan Valley Authority, sometimes in one or two full pages.

The first edition of the book was sold out at once. I do not remember how many editions there were, but I believe there were twelve or more. The book was also printed in England and was translated into German, French, Spanish, Hebrew, Yiddish, and Portugese. But in overseas printings, there were no royalties involved. By 1950, Harper's was completely sold out, and we ourselves bought the last few books they kept on file. We never have been able to find a secondhand book for sale, though we have tried.

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(OVER)

WCL: All the reviews were good. Jewish people of England reported that the book had given them a great lift and encouragement at a time of darkest gloom over the White Paper and the situation in Europe under Hitler.

I was told that when President Roosevelt died, the book, Palestine, Land of Promise, was found open on his desk and that he was about half through reading it.

We were grateful that we had made the supreme effort to get the book practically completed before I left for China, and that my wife was able to get it published by the time of my return.

Commendation Dinner

Chall: I understand that you were given a Commendation dinner in Washington, D.C. because of the book.

WCL: Yes, this was one of the highlights and honors of my long and, I hope, useful life. As I remember, it was May 24, 1944, and there were about three hundred guests at the dinner. These included many Congressmen, Senators, and other political figures in Washington, prominent clergy, business people, and scientific colleagues, for I was still President of the American Geophysical Union, and friends from the Soil Conservation Service, Forest Service and Department of Agriculture.

The program was carried on a nation-wide hookup by the National Broadcasting Company, and included speeches by Senator Robert Wagner, who was Chairman of the evening, by Senator Owen Brewster, and by Abel Wolman of Johns Hopkins University who was moderator. So many nice things were said about me that in my reply, I said that I felt like a pancake after the syrup had been poured on. It was a beautifully planned and carried out dinner and a cherished memory always.*

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*Transcript of speeches deposited with Lowdermilk papers in the Bancroft Library.

Various Activities, 1944-1947

Chall: I see your last period in the Soil Conservation Service, from your China return in 1944 to retirement in 1947, covered a wide variety of activities. What were some of these?

WCL: Yes, there were many field trips over the United States, in response to invitations to come and speak to various Soil Conservation regions and districts, and also invitations to speak in Canada. Then in Washington there was the big report on the 1938-1939 trip which I had always hoped to complete.

For a time, I was kept busy drawing up plans for the pilot projects in China, which my recent trip had convinced me were necessary. I was also called into consultations in watershed phases of the Soil Conservation Service Research.

Also at this time, my three-year term as President of the American Geophysical Union was ending. The membership had grown rapidly in response to the letters of invitation that we hac sent out to sc entists and that I had personally signed before leaving for China. Now I had my Presidential Address to write and give. I entitled it "Down to Earth," and dealt with the various earth sciences, especially those with bearing on my previous studies. This was a splendid affair. My Presidential Address, illustrated, was published and distributed widely over the country.

Anglo-American Commission of Inquiry on Palestine

WCL: Also during the period before I retired from the Department of Agriculture, I was asked to present to the Anglo-American Commission the possibilities of my Jordan Valley power and irrigation scheme. Daily the tragic plight of Jews under Hitler grew worse and worse and the one place allotted to the Jews as a national homeland by the League of Nations was shut and padlocked by the British Mandate's White Paper.

Pressure was brought to bear, and this Anglo-American Commission was established in December, 1945. Six Americans, appointed by President Truman, met with six Englishmen, appointed by their government. Hearings were held in Palestine, in England, and in Washington, D.C. There was a demand for the British to admit 100,000 Jewish refugees from Europe, but the British steadfastly refused. This was against their policy wherein some frankly declared that they felt "their interests lay with the Arabs and oil." To allow more Jews to come in to modernize the

WCL: country would, they believed, disturb British-Arab relations.

The British attempt to have members biased in their favor was not altogether successful. One of our American representatives, Bartley Crum, a San Francisco lawyer and one of the founders of the United Nations when it was organized in San Francisco, wrote a book entitled Behind the Silken Curtain, which revealed much of the inside political manipulations.

Judge Joseph Hutcheson, an American, was appointed one of the chairmen to alternate with the British-appointed Sir John Singleton.

When my turn came, Sir John was in the chair. I had maps, and portrayed vividly and earnestly the advantages that would come to Arabs and Jews alike if this project could be put in. I had gone over the entire project with John L. Savage, who was the designer and builder of both Grand Coulee and Hoover dams. The project had been engineered by a donation from the Esco Foundation. It was estimated to cost at that time 250 million dollars which could be paid off in fifty years at three percent interest.

C. S. Chapman, then Under-Secretary of the Department of Interior, said the United States would be delighted to have the chance to advance the money, for he said that generally we got little or no returns from such overseas advancements, but this would be a sure thing. But England refused this offer and ridiculed my proposals.

When John L. Savage was asked by a member of the Commission where he would invest 250 million dollars if he had it, he immediately replied, "I would invest it right here in this Jordan Valley Power and Irrigation Project in Palestine. It is entirely feasible and if we in the United States had such a unique geographical situation, we would have put in the project long ago."

But as I gave my talk before the Commission, Sir John never glanced my way, looked at the maps or listened. He acted bored and looked at the ceiling or played with papers on the table, showing no interest in this constructive proposal.

When I had finished, he made no comment whatever, but called on an unknown, nondescript American missionary from Jerusalem, who was not even a representative of any regular denomination. Now Sir John was all alertness. He leaned across the table to drink in every word of the low-voiced minister whom we could scarcely hear at all.

When he had finished, Sir John in a loud voice accentuated all important statements by repeating, "Did I understand you to

WCL: say that you felt the Jews were responsible for all the trouble with the Arabs in Palestine?" to which the minister replied, "Yes"; and so they went on with a number of questions and answers that were against the Jews. It was all very maddening. The Commission's proceedings were all published and somewhere I have a copy among my things.

The Commission did not succeed in getting the 100,000 refugees from Europe admitted into Palestine, but it had educational value; and the final result was that the United Nations finally investigated and declared that the British had failed in carrying out the Mandate and would have to leave Palestine. The result was that the State of Israel was proclaimed in 1948, although the Israelis had to fight five well-armed Arab nations before it could achieve its national status.

Chall: Apparently, your 1939 year in Palestine and the Middle East gave you a background for considerable activity in this political situation.

WCL: Yes, and my interest has never ceased in this remarkable Jewish reclamation of lands and waters in the Holy Land, which corrupt Turkish rule and Arab nomads and their herds had, through the centuries, turned into a man-made desert. This initial interest led me, after retirement from the Department of Agriculture, to work for about seven years in Israel, six of which were under appointment by the United Nations Food and Agriculture Organization. These years I consider the most interesting in a long life full of interesting experiences.

Decision to Retire

Chall: Why did you retire from the Soil Conservation Service on your sixtieth birthday? You were, I understand, in good health, and in spite of many trips out of the country, you were still Assistant Chief.

WCL: There were a number of reasons. It happened that my sixtieth birthday fell on July 1, which is the beginning of a fiscal year, and if one is to retire, that is the time to do it. Then too, I was spending considerable time in consultations and speaking on my Jordan Valley Power and Irrigation Project. I could see that my many overseas assignments had led people to speak of me as an international authority on land and water conservation, and that if I retired, there might be interesting international consulting

WCL: offers that would be more enjoyable than continuing in Washington.

Working for the government in Washington has many compensations. But life can be hectic and heartbreaking. There were often jealousies and a tendency for ambitious people to knife any fellow-competitor who stood in his way. This had been back of my heart attack in 1941, along with exhaustive overwork.

For a long time, Bennett had had an obsession to be called "The Father of Soil Conservation." I was his only competitor, though I had no desires along this line. I never wanted or sought top place, but only to have a challenging job to do and do it thoroughly and wholeheartedly. The budget had been cut, and ways had to be found to retrench. Bennett made an appointment to see me Monday morning, June 30. I never knew what he had in mind.

On Friday evening, June 27, my wife asked me if I thought I could go through another three years in Washington in order to retire at a better pension, without having another heart attack. I thought a moment and then said, "I don't think I could." Whereupon my wife said, in no-uncertain terms, "All right. Monday morning, June 30, at nine o'clock, you walk into Bennett's office and inform him that you have retired as of June 30, 1947."

So this is what I did. His expression was of startled relief. For the moment he was speechless. But the Soil Conservation Service was stunned. Bennett gave me an appreciative letter on retirement, and Clinton Anderson, Secretary of the Department of Agriculture gave me a written lifetime appointment as Collaborator, with the Department.

Chall: Did you ever have any regrets about your early retirement?

WCL: No, never once. It was one of the best things that ever happened to me. The next ten years were the richest and most satisfying of my entire life. The overseas assignments far exceeded all expectations. Sometimes the work was more strenuous than in Washington; but I had no heartaches, only tremendous satisfaction doing things that needed to be done in other countries to help people safeguard their lands from erosion and conserve their waters, so that they could grow more food and give a better life to their increasing populations.

Chall: Did you leave Washington immediately?

WCL: Yes. We returned to our lovely home in Berkeley, with its magnificent views of cities and water and Golden Gate, only five blocks from the University campus. We had been renting it for all the past fifteen years and we were happy to be home. We gave the entire place a "face-lifting" both inside and out: fresh paint and a modernized kitchen made the entire place seem like

WCL: new. The garden had overgrown, and while we were putting it into shape we had the feeling that we were cutting out a forest. We left only a giant redwood at the side and a large Cedrus deodar at the front. Just as all was in readiness for gracious living, the first appointment came for overseas work.

THE YEARS IN WASHINGTON, 1933-1947

[Taped questions and answers]

Part I The Soil Erosion Service and the Soil Conservation Service, 1933-1938

Knowledge of Erosion in 1933

Chall: When you began to work in Washington, the knowledge about soil erosion was still quite limited, was it not?

WCL: Very few people had any comprehension of what erosion was doing. In fact, it wasn't until some of us, and I was one of the few, began to measure erosion, that we had any conception of the quantity of eroded material that had come off of America's land.

And there were misconceptions, probably more misinformation than there was information. For instance, you had people in the early days in erosion work who would say, "What? Are you going to stop the erosion of the Grand Canyon?"

Chall: Oh.

WCL: They entirely misunderstood. This is what I call a geologic norm of erosion; and it goes on, varying of course with the conditions, the amount of rain and so on, but it goes on slowly. The valleys are excavated by the rivers but it takes a long time. There is time for the soil to accumulate on the slopes and differentiate into what we call an A-rise, or a B-rise, and what we call topsoil. And yet the river is excavating, but the formation of soil is a slow process. So the rate of excavation of the valley isn't very great.

But when you remove your vegetation and bare the land to the blasts of rain and the blasts of wind, then you induce another type, what I call an accelerated phase of erosion. And that's the erosion that we want to bring back to the geologic norm.

Chall: I see--man-made erosion, in a sense.

WCL: It was my analysis of just this thing that got me my job with Tugwell when he was out here looking us over. We had sessions with him, and I wanted to show him how we had to clear this concept of what we were trying to do, to have it really clear-cut in our minds. He was a man who was very intelligent; you didn't have to tell him twice. Then he insisted that I be Associate Chief of the Soil Erosion Service. Well, here we were, a new science, a new movement, and it spread over the country quickly.

Controversies Among Specialists

Bennett vs. Kellogg: The Extent of Erosion

Chall: I want to ask you about the differences between the figures of Hugh Bennett and those of Charles Kellogg, with respect to the amount of real damage there had been to the soil because of erosion.* Mr. Kellogg, it seems, estimated that 160 million acres were relatively undamaged and presumably could be farmed safely by present practices. Bennett, in the Soil Conservation Service, estimated that only 114 million acres were undamaged and presumably could be farmed safely with present practices. Was this a long-standing controversy, did it have much meaning then?

WCL: Back of Kellogg was the fact that he was chief of the Soil Survey, following Marbut. [Curtis F.] Marbut was a magnificent scientist. Kellogg was a brilliant young man who was Marbut's choice for the Soil Survey. This was before the depression, and before this program for developing soil conservation work on a big scale.

Bennett disregarded Kellogg and set up a Land Use Capability classification of land which involved a soil survey and also indicated what kind of measures were needed to control erosion if the land was cleared and cultivated. Bennett wanted to differentiate what we were doing from what Kellogg was doing. Kellogg had appropriations for soil surveys which did not allow for a very big staff.

But we must recognize that this was a depression, and the

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*Charles M. Hardin, The Politics of Agriculture (Glencoe, Illinois: The Free Press, 1952), p. 16.

FARMERS OF 40 CENTURIES SPEAK TO THE FARMERS OF AMERICA

by

Mrs. W. C. Lowdermilk
Wife of the Vice-Director, Soil Erosion Service
U. S. Department of the Interior

National Broadcasting Co., Farm and Home Hour
Station WMAL, 712 - 11th St., N. W., Washington
March 22, 1935
Time: 12.35 P. M.

Doubtless many of my radio audience think of China in terms of famines, floods and low standards of living. The 1933 Census gives China a population of 492,000,000 people. Almost a half billion, sprawled half way across Asia, where they have lived since the dawn of history. Almost 350 million are rural peoples. In this long period of land use, the destructive forces of land wastage, which have helped reduce China to her present economic condition, despite some measure of soil protection, are working much more rapidly on our farms in America.

China's first settlers found, as did our pioneers, a land comparable in size to the United States and equally well endowed with forested mountains, rich valleys and other natural resources. China dates the periods of her "Golden Age" from 200 B. C. to 1200 A. D. when there was abundance for all and every one was honest. Then why this poverty and decline. One evidence greets the traveler on the ocean, a hundred miles before land is sighted, in the form of a great yellow pathway coming out of the mouth of the Yangtse River as it pours forth the rich silt laden waters from the farm and mountain lands of central China. The Yellow Sea is so named because for centuries the Yellow River has dumped billions of tons of soil from the loess lands and denuded watersheds of north China,

Mrs. Lowdermilk wrote and read two scripts which were designed to arouse an interest in and an understanding about soil erosion in the United States.

WCL: big job was to put men to work. Some of us, and I happened to be in that early group, were measuring, and recognizing that soil erosion was not only a national, but a world-wide problem. The difference in attitude on the part of the Soil Survey and Bennett's direction of the soil conservation work caused a sort of running battle for some time. I remember we had many conferences and both were arguing all the time I was in the Service. Kellogg, for example, insisted on the scientific accuracy of his approach to the problem.

I once said to Milton Eisenhower, "Kellogg should be over in our Service, because the Soil Survey is basic to our program in evaluating the problem of soil erosion and what needs to be done." I told him I could handle Kellogg, that we got on very well. But some of the other bureaus were afraid this would give the Soil Conservation Service too much power in the Department of Agriculture.

Chall: More than it already had?

WCL: Kellogg and his staff were good soil surveyors.

Chall: Was it a difference then in the basic assumptions of how you classified soil that made Kellogg's figures different from yours?

WCL: Of course, there was a tendency there on the part of Kellogg's people to discount the statements that Bennett made about the seriousness of the problem. But I approached this issue, independent of these two points of view, and I found, especially in those areas where the land was gullying, it was as bad or worse than we estimated.

Kellogg would accuse us of exaggerating the seriousness of erosion. But I was intent on taking the longer range view. In my presidential address at the American Geophysical Union, Down to Earth,* I specify that this damage by erosion had gone on for so long throughout the world, that in many places the soil had been washed off to bedrock.

Chall: You have pictures of it.

WCL: Yes, pictures and measurements of it. In a way, my approach more or less checked with Bennett's, rather than with Kellogg's.

*Lowdermilk, Walter Clay, Down to Earth, Presidential Address, American Geophysical Union, "Transactions," 1944, pp. 195-213.

Silt Problems in Reservoirs

WCL: In some cases the long-range problems hadn't been accounted for. For instance, it was our Service and a dear old man by the name of Henry Eakin, to whom I gave the job of running sediment surveys in the reservoirs of the United States. During the period of the Soil Erosion Service, he came to me to apply for a job, and when I found he was interested in sediments of rivers, I said to Ickes, "Here's a man we want. We have accused this erosion of damaging our land, but now, in the legal sense, we have to account for the body, the corpus delicti." [laughter] If so much has been eroded, where is it?

When I presented Eakin's appointment to Ickes for approval, I said that we had been complaining about all this erosion and now with Eakin's appointment, we would have a good chance to check its severity. We made Eakin responsible for the survey of the condition of reservoirs and the degree to which they were filled with sediments. We got the history of the reservoir, when the dam was built and its original capacity. Before we appointed Eakin, there were very few cases where any resurveys had been made.

We published Eakin's bulletin. It was most authoritative and revealed startling results. This resurvey of the reservoirs of the United States enabled us to measure the amount of sediments captured behind important dams of the country. This was the first time we had an accurate measure of quantities of sediments.

In many, many parts of the country, especially where reservoirs impounded by dams had been in operation fifty years or more, many of these reservoirs were silted up to the crest of the spillway and were out of commission. Some of these had been used for the production of hydropower in the southern states where soil erosion had been accelerated due to unwise cultivation, without conservation measures, during the past century.

Chall: I see. This suggested what will happen to more recently constructed reservoirs.

WCL: Exactly. Now we had a factual story to present to Congress. We were able to say that this damage was really serious and very alarming.

Reasons for Sedimentation Studies

[Written by Dr. Lowdermilk for insertion here]

While sediments collected in reservoirs behind dams gave us important and significant information on work of rivers in eroding banks, transport and deposition of materials that had been eroded from a catchment area, yet these sediments did not account for all the eroded material in a river basin. We must recognize that work of streams and rivers sort these materials into suspended loads and bed loads.

Suspended loads are made up of fine soil particles that are evident in muddiness of storm runoff and streamflow. Such fine materials are carried downstream in one trip. They may be deposited in eddies of streams in high stages and be eroded in bank cuts again and again, and be transported for shorter or longer reaches of a stream.

It is comparatively simple to estimate the amounts of the fine soils transported by streams by sampling of streamflow for determining relative amounts of fine sediments. In hydrologic studies it is common practice to do just this to forecast the life of a reservoir.

Measuring of bed load is another matter. Bed load of river sediments is made up of gravels and coarse to fine sands that are transported only comparatively short distances downstream. The coarser the gravels and pebbles, the shorter are the trips made by bed load materials. Measurements of bed load materials are difficult to make in open streams.

But our branch of sedimentation under the direction of Henry Eakin and with the consultation of Hans Albert Einstein (son of Einstein the Great) designed and set up installations on an important river of the Piedmont in South Carolina.

Eakin found that much could be learned from the sizes and shoaling action of river sediments captured in reservoirs that impounded the flow of streams.

We had planned to make surveys of such shoaling action of streams, of deposits of sediments in stream channels and in reservoirs, and of amounts of soils eroded from sloping fields under different types of land uses. These studies were designed to establish indicators of the amounts of soils eroded, degree of sorting, and amounts deposited in stream channels and reservoirs.

Such fundamental studies would have given us essential data on the extent and degree of land wastage under more and more intensive agriculture. Such information was needed for long-range plans of developments. These investigations were dropped prematurely or abandoned, as appropriations were being decreased after rigors of the great Depression diminished.

Soils Men--Interpreting Erosion

Chall: Well, let's discuss your attitude as a forester and geologist going into the Soil Erosion Service. I think that the Service was dominated by soils men. How did you fit in?

WCL: I think generally we were in agreement with what we found. There had, in the past, been differences of opinion even among soils men themselves as to the meaning of erosion. Bennett had his ideas of erosion, based on erosion of the soil profile. Marbut, Chief of the Soils Survey who retired in 1935, had a principal interest in classification of soils in accordance with the principles and discoveries of Russian soil scientists, while I came in as a geologist, looking at processes of planation of landscapes.

I created the term "geologic norm of erosion," as would occur in the state of nature. I also created the term "accelerated erosion," where man and his agencies exposed the land to the dash of rain and blasts of wind, and this bared soil eroded faster than geologic erosion which goes on no faster than new soil is formed; and so accelerated erosion rapidly destroys the top soil and with it the productivity of the land.

Whitney and Marbut

WCL: Marbut and Kellogg were surveying soils that had been eroded off the land to subsoil. Whitney [Milton] laid down the rule that if you find a soil profile that is eroded down to subsoil, you survey it as that.

But Bennett said, "No. If this is a remnant of a profile, you must give recognition of what has happened to the land.

But Whitney never did agree to that. In his surveys of soils, he recorded facts that he had observed and made no attempt to interpret what had happened to the soil. So he would not map the interpretation of what had happened to the soil.

Chall: How long did Whitney stay in the Department?

WCL: Whitney stayed on until he retired and was succeeded by Marbut. Later, Marbut chose Kellogg to succeed him when he retired.

Marbut was a great man. When we were in Oxford prior to the International Soils Science Congress, I urged Marbut not to go on to take the trip across Russia to Manchuria as was planned.

WCL: But he was adamant that he must go. Unfortunately while on the long train trip across Siberia, he took pneumonia and died. This was a great loss and we were all saddened.

Marbut and I both took part in the International Soil Science Congress in Oxford, England, where I gave my paper on soil erosion that surveyed our situation here in America, a new country. It was translated into several different languages.

Chall: Yes, I think I have read that.

WCL: This was also the time when the Russians had their opportunity to explain their new theories on the formation of soils. Marbut had been so interested in what the Russians were doing that he got up very early every morning to study Russian so he could read their books on soils. This was an epoch-making International Soils Science Congress. However, it was Marbut who dominated the sessions at the Congress.

Demonstration of Erosion

WCL: Bennett recognized that a soil profile can be so damaged that it isn't like the original soil. I also believed this and often had occasion to demonstrate this fact. For instance, we had some agricultural people from China. I had been to China and could speak some Chinese. I took this delegation into South Carolina to see our work. I took them up on a rounded ridge which had never been plowed. It had oak trees and tulip poplars. It was a native, natural primeval forest.

I had a spade along and I dug down through the litter to the decomposed leaves below the fresh leaves. Then we dug further and came to the zone where the earthworms and little organisms and insects bore through. It's a very porous medium. I call this the decomposition zone. When heavy rains fall on this decompositional zone between the top of the litter and the mineral soil below, water flows out clear. The surface soil was a gray-brown color. We dug down fourteen inches and came to bright red soil.

I said, "Compare this with the field out there. The fields that have been cultivated and eroded are red, like this red sub-soil here."

And here where we sat under the trees was fourteen inches of topsoil, but you see, the fourteen inches of topsoil out there in the field had eroded off. This was a realistic demonstration of what had happened to these formerly good farm lands.

Problems of Recording Erosion

Chall: I suppose the examples of erosion might not always be so clear cut.

WCL: When a survey is made after soil is lost, they record what they find at that time. But this does not include what was there before, nor show what has been lost. I found this true, especially in our aerial photographs which we enlarged for maps for farmers.

Carroll, of Carrollton, was a lawyer in New York who had a farm on lands that had been granted to Lord Baltimore in Maryland. He wanted to start a Soil Conservation district in his region and asked me to talk with the farmers, in the hope they would organize a district.

He had a map of the farm that had been made from a survey about a hundred years before. It showed some portions of a field where there were no streams, bushes or trees, just smooth fields. We compared this with two aerial photographs, one made some time before, and one more recently when the fields were being planned for conservation.

In the middle of the former, there were apparently gullies that had cut across this once-smooth field, and here an occasional bush had grown in the gulley, which one could see in the aerial photograph. And then in the last photograph, this whole big field that was formerly smooth, was cut up by several gullies, and trees had grown tall in these.

Chall: I see. You would have thought that's the way the land had always been?

WCL: Yes. This kind of evidence can be passed over without recognizing the soil loss that has taken place in a field. One may have a certain number of acres at one time; but as time goes on, gradually those acres were lost for cultivation, so that the final field is less than the original area. But this tragic fact isn't shown in the records. So the cultivatable lands of the earth are being diminished in the face of the urgent demands of an increasing population.

Foresters: Changing Concepts

Chall: Now I'd like to find out from you about this activity in 1934, when you and eleven other prominent foresters, including Zon,

Chall: Silcox, Pinchot, and Clapp, petitioned the American Society of Foresters, complaining that the Journal did not represent the broad social ideals of the founders of the Society.

WCL: Where did you find this reference?

Chall: It's in the Journal of Forestry of October, 1934.

WCL: Raphael Zon was the ferment back of this, for he had a high degree of social responsibility. He resented that lumbermen exploited the forests with no thought of renewal of a forest stand. The petition was published along with answers written by Edward Reed and Emanuel Fritz.

Chall: You twelve were dubbed the "Unholy Apostles."

WCL: Of course, I went along with foresters who were concerned with the development of our resources for multiple uses and restoration of the forest stand. Here is where philosophies encountered one another with violent reactions. It was a stage in the normal course of the exploitation of a pristine, newly-occupied country.

What it really comes down to is whether to treat forests only for timber and ignore other values that may bring benefits. And this applies also in our control of waters and reservoirs. We now do not think of building a dam to store water unless we evaluate the multiple uses that may be made of the stored water and also include the social objective. If we turned over all our forests and waters to private initiative entirely, they would not include these multiple benefits and would say, "Private Property. Keep out."

Chall: And this was one of your attitudes during this period?

WCL: Yes. To develop the resources for multiple use, for maximum realization and maximum values for our people, has been what I have pounded away on for half a century. A forester, to be true to his profession, must be a kind of socialist to safeguard these multiple uses for the people.

Lumbermen now are becoming much more intelligent in this matter. They recognize that they can't take the attitude, even on their land, of saying, "Everybody keep off. We're going to block this off from any access." Now even lumbermen say they will open up their forests to camping, so you see, we are making progress.

Plant Men vs. Engineers

WCL: For instance, there was a time in our conservation movement when the plant branch and engineering branch were at loggerheads, because the plant people said that engineers do not stop erosion, only plants stop erosion. The engineers measured erosion at the end of water outlets. Of course erosion that had gone on plus and minus up in the drainage did not all come down to the outlet. So a portion of it was not measured. These two branches got awfully heated up over this, primarily because they had separate budgets and had a fight between their budgets.

Integration and Coordination of Specialists

Chall: Even though there were controversies among and between specialists, the desire in both Erosion and Conservation Services was to integrate specialties, was it not?

WCL: Yes. Our biggest trouble was with this coordinated attack. We recognized that we must integrate the specialties of a number of fields of interest in order to get the solutions that we needed.

For instance, a very able plant breeder would want to develop a strain of wheat resistant to rust, that would be a very high yielder, so he might turn the seed over to a farmer whose wheat field was eroding. He did not discuss with the farmer about erosion because that wasn't his specialty. He served the farmer only in his narrow interest.

We said this isn't good enough. We must integrate, and then adjustment must be developed on the basis of the characteristics of the land and what it needs to make it fully productive. We had to have soils men and agronomists and pasture men. And then for the west, with these open range lands, we had to have a range management man, which is a separate specialty from that of farm pastures. We also needed foresters for woodlots.

Woodlots

Chall: Can you give me some examples of how you coordinated these specialties?

CH file

STAFF MEETING
September 25, 1934.

(Essence of discussion; this is not a verbatim transcription)

PRESENT: LOWDERMILK, CARRIER, STEPHENSON, CHAMBERS, JOTTER, WINSTON, FULLER, and LINDLEY.

LOWDERMILK: You have, I think, this memorandum, which is an attempt to set up some of the objectives of the Soil Erosion Service and getting the machinery to work. We ought to keep in mind that our organization was established for a definite purpose. The principle thing is to keep in mind what our purpose is so that we can do the job. One of the essential features -- Bennett's master stroke -- is bringing together of specialists to do all that is necessary to do on that tract of land, something that is new in government. I was talking to a man from India today, a scientist on soil and grazing problems. Such difficulties are not confined to this country alone. But this is entirely unique in our Government and the lack of this objective has brought about ineffectiveness in this field of work. There has been a lack of coordinationthat is obvious in the agricultural experiment stations. Our job is to obviate those difficulties. That must be the guiding star of our organization so that we can get a composite solution of our problems. There is another feature about dealing with scientific men. A man has authority of two kinds: (1) authority of hisposition, which is an organization affair, and (2) as a specialist. He speaks with authority on that field. That is one of the aspects which separate us from an ordinary business organization. It is also one we do not want to stifle. There we get constructive ideas toward the solution of problems confronting us. In all our regional projects the Regional Director has a staff of specialists and he coordinates those specialists. That is his particular job, to see that all of them focus their attention on the work at hand, and that no one specialty is emphasized over the others. That is one of the most difficult things we have to do. In many projects it is working very nicely. When we come up to our Washington office we have not quite that same thing here. Some of the Chiefs of Branches have not been functioning. That is one of the things we have called this meeting for. We want to get ideas from everyone. There is possibly different ways of doing it: (1) To make responsible to the Director essentially two persons, the Chief of Operations and Chief of Technical Division, each one to coordinate work in his field; (2) Have a number of branches responsible directly to the Director, with an Administrative Assistant who transmits the material and keeps the material going to the Chiefs of Branches and see that the material gets to them, see that matters of business should be acted on, and if two or more should know about it, see that they do know about it. One of the principal things is that the Chiefs of Branches have not been functioning, and another thing is to get them to.

CARRIER: In what way have they not been functioning? Why are they falling down?

LOWDERMILK: A great deal is because the matters for their attention have not been going to them. They have been going to Bennett and swamping him. The thing is to get the matters to them without burdening Bennett.

CARRIER: He has been letting it come there without passing it out and has been trying to handle it himself.

WCL: Yes. For example, we were the ones that showed the farmers of the south especially, that they had in their woodlots a very valuable resource. Because ordinarily the gyppo, or small-scale logger, would come around and say, "Don't you want to cut your woodlot?" And the farmer knew nothing about forestry, or about his species or their characteristics, and he would say, "Yes," and they would agree to a price. And then this gyppo would come in and cut down everything.

I hired John Preston, a very good man and an excellent forester; he was my Chief of Silviculture when I was in Missoula. We offered him this job and he accepted it.

So the foresters, under Preston, went out to the farmers and said, "Look here, you are wasting this resource. If you will mark the trees that are to be cut, and not turn the entire woodlot over to the gyppo but save this job until wintertime when you have nothing else to do, then you can cut the trees that are marked. You will leave a young stand to continue to grow and protect those small trees, so that they're not destroyed. You can haul your timber crop (in the south, it was for pulp wood, about eight feet long) so all that money that you would ordinarily pay out, you actually earn--as an income."

Of course, we had our professional foresters to teach the farmers the principles of marking and cutting, and how to maintain the stand in a satisfactory condition for reproduction. Then in probably ten years, farmers would have another cutting from the younger and smaller trees. This went over big with the farmers.

Then we'd plant up the gullies with black locust trees for rapid erosion control and fence posts, and pine trees for pulp wood. It wasn't more than about fifteen years until the pines were big enough to harvest for pulp wood, so the farmers began to get earnings and make money out of these gullied areas that formerly were absolutely wasting away. The farmers liked this too.

On this has been built up a big pulp industry in the southern states that depends on trees and logs from these reclaimed areas that were formerly cut up with deep gullies and ravines.

Chall: Well, that was a very good outcome. Was this integration of forestry with soil conservation a new concept?

WCL: Soil conservation was usually thought of in terms of agronomy and field crops. There was quite a group of agronomists who didn't consider forestry as a part of the cropping of land and paid little attention to it. But I came to this soil conservation

WCL: field as a geologist and a forester; my interest was in the forest and also in soil conservation. They must be integrated into the landscape as we develop the resources as a whole.

Gullies

WCL: But now, another need for integration--for instance, in these planted-up gullies we had wildlife. Why would the Erosion Service be interested in wildlife? In these gullies, after we had planted Lespodisa and other plants that produce seeds which game, especially quail, live on, game came in and rapidly increased in numbers, providing game for hunters.

Later our farm ponds became part of the farm enterprise. The farmer had a pond with a tank as a safeguard against fire, but he also had a place where the family could go boating and, when he stocked it with fish, enjoy fishing. This farm pond added to the variety of food, the income and pleasures of the farm.

Farm Ponds

Chall: It would take a rather large farm, wouldn't it, to be able to plant up gullies and also have a pond big enough for recreation? Were these large farms you were working on?

WCL: No, these farms in the southern and southeastern states were sixty, eighty or a hundred acres. Even the Ben James farm was a hundred and one acres.

Chall: You weren't able to put ponds on all of these were you?

WCL: Oh yes, a pond won't take but a quarter or half an acre. Probably an acre would be a good-sized farm pond--that would be 209 feet on each of four sides.

Chall: These ponds were for water in case of fire, and they were also for boating and fish, and for supplemental irrigation in dry spells. I've seen some of the recent literature on farm ponds, and I didn't realize that so many had been made.

WCL: I personally get satisfaction from having helped develop certain things. When I made my land-use survey in '38, I heard of the region of Les Domes in France, where the farmers used a rotation of crops and fish. The country was gently rolling with depressions

WCL: and little hills that served as boundaries. French farmers diked them off, down a streamway, into fields that were like ponds. Part of the year they were used as fish ponds, where carp was grown on a three-year rotation.

The farmers flooded this area and stocked it with fish, and kept them for a two-year period. They started with fingerlings. And in the meantime, an organism grew on straws of the flooded stubble, and the fish lived on those organisms to a great extent. Then the farmers emptied the pond, and harvested and marketed their crop of fish. I have some fine pictures of this being done.

After the farmers had harvested the fish crop, they sowed grain. The soil had been partially fertilized by the fish, but they added more fertilizer to have a good crop. It might be wheat, rye or barley. Then after the grain crop was harvested, the stubble was left; then the field was again flooded and the process was repeated. French farmers found they could grow more value and poundage from fish than during the rotation period of grains, to feed livestock on the same area.

I reported this and wrote it up in detail as one of the findings I made on my trip to Europe, because I realized how this could apply very well in the eastern and central parts of the United States, where there was rainfall enough. Generally, we have about forty to fifty inches of rain, which is more than that in central Europe. As a result of my study and report, we developed in our Soil Conservation Service the designing of farm ponds, and the farmers liked it.

I remember an interesting example about a farm pond and the problems of soil erosion. A farm planner had worked out a pond for a farmer and had brought in the drainage from fields above it into the pond. After this pond had been going some time, the farmer complained and asked for one of our biologist fish specialists, who were on call at state headquarters.

The farmer said his fish were dying. Our specialist looked the situation over and saw fish floating dead in the water. Then he said, "Do you know why your fish are dead?" "No." "Well," he said, "they've starved to death." "How could that be?" the farmer asked.

The specialist replied, "Did you look at the water in the pond? It's muddy. The sunlight can't get through."

Now these fish were a type that live on organic growth. The muddy water prevented sunlight from activating growth of food plants for these fish, and so they had starved to death.

WCL: Then he asked this farmer, "Do you realize why your water is muddy? Look up there. This water comes from a plowed field, and the runoff is bringing mud down into your pond. As long as you have that, you can't produce any fish."

Our specialist said, "You've got to stop the erosion on your upper field." The farmer said, "I'll do that immediately so I won't lose another fish." [laughter] Now this is one of the cases where this indirect means was more effective than telling him directly what to do.

Getting Cooperation of the Farmer

Philosophy Regarding Cooperation With the Farmer

Chall: I have wanted to ask you about the effectiveness of this indirect approach. Did it always work, or were there times when farmers did not respond?

WCL: Ordinarily, they responded well. Our work was rewarding. If we were successful in solving a problem for a farmer to save his fish, one had great satisfaction. When a farmer saw something was to his self-interest, ninety-nine times out of a hundred he would act in a logical way.

For instance, in this question of erosion into the pond, when the farmer saw what killed his fish, he was keen to do what was necessary.

Our biggest problem was to get this type of high-quality service to farmers who wanted it. There was always a demand for more than our limited staff could deliver. We were refused a bigger staff because already we had become the largest bureau in the Department of Agriculture. They were afraid of us [laughter], afraid we would incorporate them.

Chall: What if you came across farmers who were illiterate, or very poorly schooled, would they cooperate with you? Or would they answer, as one you mentioned did, "Me and my two sons have already wore out three farms, and this one is about wore out. We don't need anyone from Washington to tell us how to farm."

WCL: If you find this hostile attitude, it's generally somebody who has suffered some loss, or indignity, or failed, or broken down.

WCL: He has lost his sense of values, if he had them.

Chall: Then you did find some who would not cooperate?

WCL: Rarely, but we were so busy responding to those who were asking us for help that we let these few go by.

You see, when one begins to deal with God's good earth in this way, one is dealing with holy processes that have determined the earth; and our survival depends on how well we understand and interpret and apply them.

I always tried to get our men to think of this interpretation. I said, "You have two responsibilities: you have a responsibility to the farmer to be practical so that what he does is beneficial and profitable to him; but you also have another obligation, and that's to your country, to safeguard the soil and water resources so succeeding generations may have productive lands, instead of sterile fields, gullied by soil erosion."

A few farmers seemed not interested in this long-range viewpoint but only interested in what is profitable now. I said to my men, "You have to feel this two-fold responsibility down deep." I think in this approach I had considerable influence throughout the Service. But I also identify myself with the farmer--all over the world.

Chall: And you tried to get your soil conservation experts who went into the field to work with the farmers to feel this same need to develop rapport with the farmer?

WCL: Absolutely. And to make the farmer realize that his is the foundation occupation that makes possible our division of labor in a modern society. It isn't until the farmer produces more than he needs for himself and family that others are released to do something else besides grow food.

It was in Egypt where I first realized this. Long, long ago, there was a genius of a farmer who hitched an ox to a hoe and invented the plow and for the first time applied power in agriculture. This enabled the farmer to produce more food than he needed for himself, and thereby released others to do something else. That's the foundation of our modern civilization.

Many economists may not accept this simplification, but farmers will.

I say to farmers, "It is <u>you</u> people we depend on for food, not only for today, but food for tomorrow and all future generations."

Soil Conservation Districts Designed to Achieve Cooperation

WCL: I used to say many times that our program was three-fold: It was to give play to individual initiative, within a framework of social objectives, arrived at by the democratic process.

Chall: That's a very important philosophy. You felt that you were achieving this in your creation of the Soil Conservation districts?

WCL: Oh yes. Our Soil Conservation districts kept on growing until practically all the land in farms in the United States was in Soil Conservation districts.

Chall: Had you any way of checking to know how well they were carrying out their conservation districts?

WCL: Well, you see, we put the responsibility and the authority into the hands of farmers, and we only worked for them as they called on us. The majority of farmers asked for admission into Soil Conservation districts, and had a part in locating the boundaries of where these districts would be, and of determining the program. There were some farmers, it's true, who did not seem to have pride in being a good farmer. This is where we give play to individual initiative. A program can be no better than the farmers are.

One thing about which I feel very badly is that being a farmer is losing its attraction as we build up big commercial farms in large acreages with powered implements, and family farms are crowded out. So the hope for farm families in the future is not good. But now we have these Soil Conservation districts where it's the farmers' own show, and out of which they get tremendous satisfaction. They also have a fine family life and produce sturdy young people that won't be drop-outs--at least, we hope not.

I fear we are industrializing farms to such a point that we're losing that type of influence and education for our youth, which I think is important. When we apply to the University for help in the yard, we always ask for a farmer boy, for they are accustomed to do chores and are not afraid of manual labor.

Hiring the Social Psychologist

Chall: I understand you, or the Department of Agriculture, hired a psychologist to try to understand the social pressures in the South, to help you in your dealings with some recalcitrant farmers.

WCL: This was done by the Department of Agriculture, but the services of this specialist were made available to the bureaus who asked for it. I think it was the Forest Service that primarily started this, because the woods of the southern states presented a very serious problem in fire control.

Every spring it was customary for the farmers to set the woods on fire. I've flown over these areas and found the country just covered with trees that had been killed by fires and then rotted off or blown down. Of course, this occurred over a number of years, but timber stands were thin and production low. We got the southern states to pass laws that made it a criminal offense to set woods on fire, but that did not stop the fires.

Farmers had the attitude that they must burn the woods each spring so that grass would grow and they would have pasture. Studies were made of pastures where fires had been kept out which proved that there was more grass when there were no fires. It was hidden behind the dry grass, but the cows could find it.

We sent a psychologist to the region to find what leadership it was that induced farmers to set the woods on fire every spring.

Chall: Where was he from, one of the colleges?

WCL: Yes, I think he was from Pennsylvania University. This psychologist went down south and studied the situation quite some time and came back and reported. One of his findings was that in these southern communities, there is usually a grandpappy, an old man to whom the younger people looked for pronouncements. So it was the psychologist's theory that the grandpappy gave the word that the woods should be burned. This more or less diagnosed the situation, but it did not stop the fires. We called this the Cult of the Grandpappy.

The Soil Conservation Service was more effective in stopping the burning because we showed the farmer how he could get an income from trees in his woodlot, as I already explained to you. Then of course, as grandpappies began to die off, these new ideas came in and more or less replaced him.

The Soil Conservation Service and the Extension Service

Chall: There was continual controversy between the Soil Conservation

Chall: Service and the Extension Service regarding methods of working with farmers. Can you explain reasons for this?

Background of the Controversy

WCL: The original plan for dealing with farmers had been worked out by the Farm Bureau Federation that became the Extension Service. The Farm Bureau was powerful and represented the movement for county agents, who were agents of the Extension Service in each county. These county agents were supported by the Farm Bureau Federation so the Federation looked upon the county agent also as their representative in dealing with farmers. This put them in a strong position.

When we came in with our soil conservation program, in which our technical assistance to the farmer was in the form of engineering measures and works, the Extension Service looked upon our technicians from the Soil Conservation Service as invading their domain and competing with their county agents, in a service to the farmer.

Many of us in the Soil Conservation Service looked upon our service as highly technical and therefore as something that was beyond what the county agent was doing for the farmer, which was primarily advisory. He gave farmers information, prices and trends and types of fertilizers and strains of crops that had been developed by the plant breeders to try out in different places, but they did not give farmers technical assistance and there was much opposition to us.

Examples of Difficulties

WCL: This opposition came to the fore in the Tennessee Valley Authority. The T.V.A. agricultural specialist had lived with this idea of the county agent being their representative to work with the farmer. He favored that idea and was hostile to any program such as the Soil Conservation Service would propose, whether in demonstration projects or in the use of the farm planner in the fields. This kind of situation developed in many parts of the country.

However, there were other instances where the county agent and our farm planner got on very well. When the farm planner asked the county agent to call for meetings with farmers and then to represent the farmers, they found ways to cooperate. The fact was, there was so much work to be done on farm lands anyway, it

WCL: helped when they could work together on some projects. Our technical men, our engineers, could not just tell farmers to put in contour terraces because these had to be staked out with transits or engineering levels, to make sure that work was accurately done.

Chall: Could the county agents do that?

WCL: Most of these county agents were not trained engineers. They were actually an informational, educational institution, but not technical men. There was the situation where states took a stand against the soil conservation work unit leaders or farm planners. And one of those was California.

Chall: Do you know why they took this stand?

WCL: It was primarily due to Crocheron, who was a very able man and who had developed one of the finest agriculture extension staffs in the whole United States. He had what he called "specialists." For instance, he had a specialist who was an engineer. They used agricultural engineers more or less like we did. If there was an engineering job, they sent an engineer out to do it.

They had specialists in different crops, who would go out and consult with farmers in the field and work out programs with farmers.

Chall: Were they also concerned in California with erosion at the time?

WCL: Oh yes, all were aware of erosion, but they didn't do much beyond so-called standard practices for controlling soil erosion.

Now this controversy would settle down and everything would go along nicely for a while and then it would flare up here and there. Instead of finding a way to work together, some young fellow would magnify the differences and take a stand on something controversial and the problem would flare up again. Then always in the background was O'Neal [Edward], a big-wig of the Farm Bureau Federation, who was trying to engineer the situation so as to bring the county agent and his Extension Service to take the place of the Soil Conservation Service.

Chall: It was a power struggle.

WCL: Well, let us say there was a certain element of that in it. There was also this other element of the type of service that the farmer was entitled to. Here, I think, we differed in our methods.

Lowdermilk's Three Lines of Defense Against Erosion

WCL: I worked out what I called "three lines of defense" against soil erosion and soil depletion. The first line of defense was soil management, which would consist in the cultivation of soil, the fertilization of soil, the rotation of crops and such. This soil management would seek to keep the soil in a state of crumb structure, and go as far as one wanted in soil management. This was the first line of defense.

This was a type of information that agronomists and other people would want, and it would be sufficient in those regions where rainfall was gentle, misty, and where the slope of land was gentle or was nearly flat. If soil was managed to get the most out of it, the land would take care of gentle rains and require no other measures. But remember, this is something that should be done for any soil.

Now the second line of defense is required when this soil management of the first line of defense is not sufficient to cause the soil to absorb all the rain that falls. Intensive showers or prolonged rains were beyond the water-holding capacity of this managed soil, and so you'd have unabsorbed rain waters on the land and the water would flow. The steeper the slope, the faster the water would run off and the more cutting power it would have to cause excessive erosion.

This kind of situation required the measure of contour plowing. Now this second line of defense included strip cropping, which, as you know, is done partially or on exact level contours because this measure must absorb most of the runoff of gentle rains.

Chall: The strip holds the water?

WCL: Yes. We alternate what we call close-growing vegetation, grains or pasture or forage plants, as contrasted to cultivated crops like corn and cotton.

Now the third line of defense is called in where rainfall from time to time comes in very heavy downpours. These are rains that may occur once in ten years in probability, so the land must be prepared to take care of considerable amounts of unabsorbed water. So we have a measure called broad base terracing. These terraces have to be very carefully, very accurately laid out, for, as I tell my boys, "Running water never forgives a mistake. The good Lord may forgive us our sins, but this running water in a field won't forgive a mistake or an oversight."

WCL: And therefore, in this field work, dealing with water, we must be accurate. A lot of the excellence, or lack of excellence, in conservation work is just at this point and depends on whether work is done accurately. Technicians must recognize that they are doing professional work and that whenever they make a mistake, or leave something undone because of an oversight, they are contributing to damage to the land, and therefore are not really entitled to professional rating.

Chall: I believe you called these men soil doctors?

WCL: Yes, they must be doctors for the land. I call them land doctors. They have more things to know than does a doctor, because what the land doctor has to know involves many more variables than the doctor dealing with a sick person.

In this third line of defense that includes terracing, the earth is thrown up with graders to make a low ridge with a shallow channel above so that the channel will capture unabsorbed waters and take them around the slope. The slope of the terrace depends on a number of things. We must consider the catchment area from which unabsorbed water will flow.

That's why we have to know about rainfall and its intensity and what is the infiltration capacity of soils under various treatment, so we can design measures for different rainstorms and as much storm water as must be taken care of. This calls for the broad base terrace or ridge.

In a sense, these are not terraces. In South Africa they call them contour ridges. But if we accept these as terms then we know what we're talking about. Our language has either to apply new meanings to existing words, or to coin terms that will say what we're talking about.

Now the shallow channel, which is part of the terrace, leads the water around to a natural drainage way. This water has to be disposed of; otherwise, it runs across the field out of control. Water always takes the straightest down course and begins to cut and tear the field to pieces. So we have designed terrace outlets to dispose of this water, that take this surface water to a natural drainage way so that the water is carried away at low velocity, doing the minimum of damage and carrying away the minimum of soil.

Controversy Between Engineers and Agronomists

WCL: Here is an area where there was a lot of controversy between

WCL: the engineers and the agronomists. The agronomists thought that we could control this erosion problem primarily with vegetative means. If one could grow close-growing crops that cover the ground, and build up a litter or mulch over the soil, this would take care of excess storm runoff that the soil had been unable to absorb during rains. But it is a different situation with cultivated crops, for the land is bare and storm waters drop straight into the soil and churn it up.

When you ladies wash sand off vegetables, it is due to rain splash. We have some fascinating studies on rain splash. It breaks the soil crumbs apart, and splashes soil to and fro. When raindrops strike these crumbs, they break into fine particles and that causes water to be muddy.

I might say it another way: the particles in suspension in this muddy water are filtered out from the soil surface just like they are filtered out on filter paper in a chemical lab. It's the same phenomenon. And those particles filtered out at the surface of the soil tend to seal up the soil and reduce the rate of intake. The infiltration rate is determined by whether land is bared and cultivated, or protected by a cover of vegetation.

Chall: Were you an engineer or an agronomist in this controversy?

WCL: Of course, I'm an engineer first in basic layout, but our treatment of the land must include integration of both engineering and vegetative cover.

I analyzed the situation differently from Bennett, who was on the agronomist side. I said the engineering layout must be done first with accuracy and with instruments adequate for this sort of thing, and it must be done before all else on the field. Only after the basic contour layout is made, then all these other measures can be considered and applied.

When one is called on to go out to a farm and do erosion control work, the engineering basic contour layout must be done first before the vegetative control measures are put in. Then only are the agronomists called into the picture.

I think the agronomist people did not pay much attention to my analysis, but I am sure that this method is more accurate and more realistic in applying conservation measures and permits more effective results in conserving soils.

Research in Soil Conservation Service

Chall: When you were in charge of research in the Soil Conservation Service, did you test out the relative effectiveness of these measures in soil and water conservation?

WCL: Yes, we had at least twenty or more experiment stations. I installed what we called runoff and erosion studies on plots. I put these also in forest lands as well as agricultural lands. I worked out an agreement with our foresters so that we would adapt this type of watershed study to farm areas. One of the best finished projects of this kind was out at Coshocton, Ohio.

Experiment Station: Coshocton, Ohio

Chall: Were you responsible for the one at Coshocton?

WCL: Oh yes. I had Dr. Krimgold locate an area that would be representative of the northern Appalachian Mountain region. He was a good hydrologist and did a very thorough job on this location and layout. He outlined watersheds that could be identified readily over what we call the Allegheny plateau that included Ohio. We were interested in the Ohio River because it floods frequently. And then there was also an army flood control project on the Muskingum River.

Chall: What experimental work did you carry out at Coshocton?

WCL: In this Coshocton area, we set up ways and means of measuring runoff and erosion, the storage of water, and amounts of rainfall, the amounts that percolated into the soil; and we collected the amount that went through the soil to recharge ground water. And here is one of my pet ideas. We set up weighing lysimeters.

They were seven feet wide by fourteen feet long and eight feet deep. We cut back into the mountain a block of that size and put it on a concrete platform which had two leading tubes to divert the drainage water that ran through it, so as to measure it. Here is a report done by one of my men, Mr. Lloyd Harrold, director of Coshocton watershed project.

Chall: What's this report called?

WCL: "Evaluation of Agricultural Hydrology by Monolith Lysimeters, 1956-62."

Chall: I guess you had already retired at this time?

WCL: Yes, I know, but I started it.

Chall: I see. So this was to run a long time?

WCL: Yes, these were to run fifty years or more. I used the figure of fifty years because we wanted to cover as long a time as possible and measure a variety of natural conditions. Of course a hundred years would be better. In many cases where installations like this are mechanically well done so they don't break down, there's no reason why tests shouldn't run a hundred years, to test rain that comes in various combinations.

And we have developed what we call the design storm, which repeats very distinctive or important storms that have occurred in the past. Then we have the records of each, when it started, how long it lasted, and the amount of rain, and the different pulsations of showers, the varying intensities and so on.

We wanted to be dealing with the realistic phenomena that actually take place on the land, so we developed this design storm on the basis of what has already happened. In this way we can be more certain of extremes in the amounts of water which we must handle.

We realize that we are farming this land on the assumption that rainfall will be within certain limits, but we want also to include and understand these unusual storms that cause damaging and destructive floods.

For instance, in '64 we had a big flood in the redwoods. When analyzed, the amount of rain that fell wasn't so unusual, although flood stages rose high in places.

But there's no good reason why the damage should have been what it was, except for the fact that homo sapiens come in and want to occupy the flood plain because it's flatter and therefore easier to build highways and construct buildings. People do not stop to realize that this is a flood plain that is built up of sediments from former floods.

Sooner or later the flood plain will be flooded again, causing destruction of life and property. A river demands its right to its own flood plain.

Well, these good people occupied the flood plain and built houses, barns, and at the sawmill, piled their lumber, because as far as they knew, it hadn't flooded before.

Then this unusual storm comes along. Much of the flood

WCL: stage height was due not to excessive amounts of rain, but to the bulking of flood waters with all sorts of debris: trees, brush, and logs. This debris was lifted and floated all around in the flood waters. And then at the railway and highway bridges, this debris piled up. These bridges were designed to hold up weights and were not designed against side thrusts. So bridges were pushed over and transportation and communication were interrupted. People had to rely on little Piper Cubs and some helicopters.

Chall: So you were trying to find ways to prevent this kind of thing from happening. At least one of your experiments in the Ohio area was designed to prevent damage from floods?

WCL: We wanted to get a measure of the phenomena that we had good reason to expect would happen from time to time. If we know what we are to expect, then we are in a better position to prepare for it.

Guthrie, Oklahoma

Chall: What were some of your other studies designed to show?

WCL: In Guthrie, Oklahoma, we tested the differences in runoff and erosion under varying kinds of farming conditions. We laid the land of the experiment station out in plots of one-hundredths of an acre each, which is about ten feet by one hundred feet. Around each installation were rain gauges to measure the amount and intensities of rain. These plots were treated in different ways: one plot was left in fallow, one was kept in continuous cultivation of cotton, while another was kept in grass for pasture.

On some plots we practiced crop rotation--wheat, sweet clover and cotton. We kept the virgin, uncut woods intact and kept open woods with Bermuda grass on the sod which was the condition of large areas of the region, so as to study rainfall and runoff. We had some plots of fine sandy loam and other plots on seven and a half percent slope that was too steep for cultivation except with certain measures for water and erosion control.

The average rainfall was about thirty-three inches a year. At the bottom of our plots there were pits to catch the runoff and eroded material. We let these settle and then drained off the water which was then practically clear. Then the mud was sampled to determine the relative amount of soil that had been washed off the land.

WCL: For instance, results of one period showed that when land was fallow--that is, cultivated and bare--27.5% of rain that fell on that plot ran off immediately. This means that twenty-seven percent was ineffective rain. The amount of water for crops on this soil is reduced by over a quarter.

From this rather small area of fallow land, this rain that ran off carried with it what would amount to 20.3 tons per year of soil. This makes the long-range meaning of these experiments realistic: our computations showed that at this rate of soil erosion, the seven inches of topsoil would be eroded away in sixty years.

Then where cotton was planted continuously, the experiments showed a loss of 14.3% of rainfall, with the runoff carrying away 24.3 tons of soil. At this rate the topsoil would be eroded within fifty years. In the life of a nation, this is a very short time.

When wheat, sweet clover and cotton were planted in rotation, the rain loss was 11.6%, and only 5.5 tons of soil are eroded away. To erode seven inches of topsoil with this rotation would take 222 years.

Chall: That loss does not seem so disastrous.

WCL: Yes, but soil conservationists don't accept 222 years. Consider our results in grass pastures, where the amount of runoff was 1.2%, and the amount of soil loss only .032 of a ton. At this rate, it would take 38,900 years to erode seven inches of soil. In the primeval forests with undisturbed litter, the runoff was practically nil. It would require 87,100 years to erode seven inches of topsoil.

Chall: These are interesting comparisons.

WCL: Yes, and in open woods with Bermuda sod--a type of grass we hate to find in our city lawns, but which is a mainstay in Oklahoma for sodded waterways--the runoff is barely .00001. It would take 643,000 years to remove the topsoil.

We must ask the question: what is a permanent agriculture? How long can we use the land to grow food crops for our country? We know by accurate measurements that under certain planting conditions we are actually eroding soil faster than it is being formed. Our soil conservation people should impress this upon our farmers. Our national resources are not to be used up by a few generations, but must be maintained as a rightful inheritance by all succeeding generations.

Aerial Surveys and Land Classification

Chall: I wanted to ask you about your initiation of air surveys. This, I understand, you first undertook during the days of the Soil Erosion Service. Did you classify the lands into one, two, three, four, etc., as did the A.A.A.?

WCL: Our classification was more exact and detailed than that. We had our aerial photographs enlarged to twelve inches to the mile. With this enlargement of well-done photography, we could locate ourselves within ten feet on the ground. This saved us no end of expense and time, because we had to work fast as the number of demonstration projects increased.

Maps were needed in a hurry. We could give the farmer an accurate map of his farm and show where his corner was, so he could locate himself and say, "I'm on this field," or "This is the gulley area." He could locate his entire farm.

We developed what we called the land-use capability survey. We had some battles over this before Kellogg was brought over into our Service, for he had a soil survey independent of us.

Chall: Did he join you finally?

WCL: Yes. This was something I wanted done from the first. Charles Kellogg was an able man. Long after I left, he retired and took some kind of an international job.

Chall: Did you use this land-use capability survey in the Soil Conservation districts to help the farmers?

WCL: This was a basic part of our service to farmers and all users of land; our technicians and farm planners had to have these accurate maps. We classified land, for example, on the basis of slope: we had A, B, C, D slopes. A-slope would be relatively flat, and B-slope a little steeper; then C-slopes and D-slopes were designated according to steepness of slope for orchards or pastures.

Then on the new surveys, we made recommendations--for instance, that a meadow be formed, or that a fish pond be placed in another location. We suggested best uses for each type of land on the farm.

Administration of Research

Chall: After your appointment as Chief of Research, were you able to plan what you felt was necessary and get it done? Who did you have to consult before you could get funds and general approval for research projects like the ones in Ohio and Oklahoma and those in North Carolina and Texas you wrote about?

Financing

WCL: The Soil Conservation work started at the time when President Roosevelt and Congress were trying to give employment to large numbers of unemployed. We were then in the Department of Interior as an emergency basis. Our money was not appropriated by Congress, but was allotted by the President out of the emergency funds as a relief measure. We made requests to Ickes, and then he requested Roosevelt to supply our needs from the emergency funds that Congress appropriated and made available for relief of unemployment.

Chall: At first, then, you had to convince only Ickes himself.

WCL: Yes. These emergency funds were made use of to finance many types of works. Some were large-scale public works that had been long in planning and had to meet exacting requirements. These often had not reached the stage of construction. In such cases, other relief projects were brought forward for consideration that could be initiated with less preparation and men were put to work with less red tape.

Our Soil Conservation projects could be got underway in short order because of preparatory work done by the ten (1930) Soil Erosion stations; for directors of these stations had been instructed to survey conditions of surrounding country as problem areas and to propose setting up large demonstration projects.

Chall: When you went into the Department of Agriculture on a more permanent basis, how did you get money and approval for projects?

WCL: When the Soil Conservation Act was passed by the Congress without an adverse vote in the House or in the Senate, our old Soil Erosion Service, as an emergency organization in the Department of the Interior, was transferred to the Department of Agriculture and was set up as a permanent bureau of the Department.

Our work was then reported to the Department of Agriculture and included in the President's budget. We had to appear before

WCL: the Appropriations Committees of the House and of the Senate, to give an accounting of emergency funds that we had spent, and also to report our plans for the coming fiscal year and to set forth the funds that we had estimated as necessary to do the projected works. This budget included the branch of Research.

Organizing

Chall: As Chief of Research, how did you administer the program?

WCL: When the Erosion Service was transferred as a permanent bureau into the Department of Agriculture, we already had going a considerable program of research.

This research program came out of what had been done before in the ten Soil Erosion stations that had been established from the first appropriations by Congress. Then there were my hydrologic studies at San Dimas, the Tan Bark Flat experimental area, North Fork, and the installations in Strawberry Canyon. Also at Cal Tech in Pasadena, we were collaborating with Dr. Robert Knapp and Dr. Vito Vannoni, in hydraulic studies, especially in the erosional phenomena of sediments into reservoirs. During our time in the Department of Interior, we had strengthened our research and were collaborating with a number of agencies.

Now we had to formulate our larger program. We incorporated our research done under the emergency program into research on a long-range basis. We planned to call in outstanding scientists with national and international standing to make use of the best that science had to offer.

Bennett looked upon research as a small activity under his friends with whom he had long been associated. But I realized we now had the opportunity to plan and develop a comprehensive and far-reaching program of research and develop an able and competent staff to carry it out.

It was not until I could act with authority as the Chairman of the Basic Data Committee on President Truman's Water Policy Commission that we were able to formulate a comprehensive program and policy in establishing facts that were necessary for such an achievement.

We did both original basic research, and also our researchers were responding to a need for information in the field to meet the needs of our farmers.

Of course, I wanted to be sure that all basic research

WCL: should be given an opportunity. For instance, if a researcher had a line of work that might bring new discoveries, I gave him opportunity to follow it until he established some new fact or new principles. But if this research involved too much, we would then turn it over to some organization that was doing basic research, for our primary objective was applied research.

When farmers have problems they can't analyze, we had our operations man and our research specialist to sit down and draft a program. And then I, as Director of Research, had the power to approve the program. I did not delay our programs.

Techniques of Administration

WCL: I frequently went out to see my field men. I'd call a general session and have them report to me on what they were doing. I would say, "Now what is the line of work we need to have done? What certain factors are unknowns in this situation that we want to evaluate?" We might discuss how we could get results or find solutions in this or that direction. But always I would suggest that when you study the problem, you may find a better way. If they could find a better way, they were given credit for it.

Project directors around the country always said they were glad to have me come because I stimulated the staff by this type of administrative management. We had marvelous teams of young fellows, and what's more, young fellows with ability wanted to get into this kind of work, where their originality would be appreciated.

Chall: Do you have any ideas or theories about why you were able to work in this way? Some administrators in your position might have gone out and told people what to do, without allowing them to provide some of their own ideas.

WCL: Then you get a lot of dullards.

Chall: Perhaps. But why did you have this particular technique?

WCL: Well, because I too was always interested in the problems they were working on. One needs to have the thrill of being on the frontier of knowledge. Then one can make use of the individual initiative of these eager and talented young men, and you may have some exciting, unexpected results.

Omnibus Flood Control Act of 1936

Chall: You have written so completely of the many activities leading up to the writing and passage of the 1936 Omnibus Flood Control Act, that we needn't tape that story. But I would like to know more about how the many new concepts of the Act were brought into being on the streams and rivers.

WCL: The Forest Service was brought in because they had responsibility on headwaters; and the Soil Conservation Service and the army engineers were brought in, and they worked out in committees or commissions for each river basin what each agency would be responsible for. In that way, they were supposed to insure there would be no untreated areas.

And then, of course, our attention was drawn off to war matters. The government bureaus and the Bureau of the Budget didn't encourage us to do anything on this. It wasn't until the end of the war that we really turned our attention again to the authority that had been lying idle, so to speak, for a time. So there was a delay in carrying out the provisions of the Act.

Arthur C. Ringland Analyzes the Administration of the Act

Chall: We have done an oral history of Arthur C. Ringland. He has talked about the time when he served as Chairman of the Flood Control Coordinating Committee (1937-1940). I'd like to tell you some of what he said about the early administration of the 1936 Act, and ask you to comment on his ideas.

He thought that the Act was "one of the most far-reaching legislative enactments in conservation history," but he deplored the fact that the Department of Agriculture, having command of the resources, had not command of their use. He felt that the character of the organization set up to administer the provisions of the Act made it impossible to bring about action.

The Commission, he claimed, brought together a number of experts from various bureaus who were to formulate policies and establish procedures for collaboration, but there was no provision for decisions. As Chairman, he said, he could not act in an executive capacity.

In his report to Milton Eisenhower, in 1940, he recommended that some way be found to fix responsibility and delegate authority to carry out policy.

WCL: Senator Hayden and I worked hard to make this Act the most far-reaching in conservation history. But Ringland was right; they should have given him the executive authority to carry out projects. I think that coordinating committees should be advisory, to serve as consultants only, leaving a director as an executive officer who can use his board as consultants in making decisions and pronouncements, but be free to make executive decisions. This is a sound principle in the modern democratic process. Responsibility must be assigned.

Conflict With the Corps of Engineers

Chall: I understand that early in the history of soil conservation activity, Mr. Bennett, Mr. Wilson, and Secretary Wallace didn't want to have anything to do with watershed development as such. They felt the Corps of Engineers might just as well do it. Could you give me some of your ideas about what was behind the continuing controversy between the Soil Conservation Service and the Corps of Engineers on these problems of floods?

WCL: The Corps of Engineers had been set up in the early days of our country as responsible for flood control. In those days, they were concerned about the protection of developments in alluvial valleys of rivers with large streams. The usual practice was to build dikes or levees, like on the Mississippi, where works started out with flood control first, to protect New Orleans. Then the engineers began to do upstream works. The Corps of Engineers were most influential because they had a stand-in with Congress.

Chall: Almost as powerful, or more so, than the Soil Conservation Service? [laughter]

WCL: At first they were more powerful. They were very skillful; but later on, the Soil Conservation Service, backed by farmers organized into Soil Conservation districts, came along. That's where our power came from.

The Corps of Engineers assumed they were the primary agency responsible for flood control, and they didn't want to give up that position. And their principle methods of flood control in early days were to build levees or dikes.

But upstream, river valleys were narrower and it was not possible to contain so much water in these small river valleys.

WCL: The flood stages would rise faster. So they included with the levees or dikes flood storage reservoirs.

Now the Miami, Ohio Flood Control Project in itself was a detention type of flood control where the dams were made but were never closed. The opening of the dam was restricted to a certain size that would permit only a given amount of water to flow through. If storm water came down beyond that amount, the opening would be too small and water would back up as temporary storage until rains stopped. Then the water that was backed up would eventually flow away through drainages into the main river. So you have automatic control.

Chall: This Miami project has proven effective, has it not?

WCL: Yes, it has been very effective, but it was a single-purpose project in flood control.

Multi-purpose Projects

WCL: We wanted multi-purpose structures and urged this on the Army Engineer Corps. One of the first big multi-purpose projects was on the Muskingum River Conservancy District, in Ohio.

Chall: I see. That's been a forerunner, a leader . . . .

WCL: Yes. There were, I think, twelve dams built, and twelve flood control reservoirs. The principle object was to detain the water. This was something that the engineers hadn't planned. They soon found that with twelve reservoirs feeding into the mainstream, the water had to be guided through, because if all reservoirs emptied at the same time, a flood stage would develop on the main channel of the river. So this emptying of the reservoirs had to be scheduled so they wouldn't conflict with each other. First one would empty and others would follow, so that flood stage height would not be excessive.

A man by the name of Bryce Browning with whom I got on beautifully was a conservationist from Ohio. He had been a prime mover in getting this flood control project for the Corps of Engineers on the Muskingum River.

Chall: Was he a private individual or a government employee?

WCL: He was a member of the Chamber of Commerce of a small town in Ohio, but most important, he was president of the conservation district on which all this was done. He and I were working on the idea to get communal or village forests established in this

WCL: area, such as I was acquainted with in France and Germany especially.

Chall: Who would be responsible, or own, the communal forest?

WCL: This was a time when people were out of work, and we wanted these to be set up for towns and villages.

Chall: This was in the late '40's after the war?

WCL: Yes, this was after the war when there was still this problem of unemployment. This would put people to work and create resources.

Then Bryce Browning said, "Now, we don't want all these reservoirs to be entirely emptied. We want a conservation pool [that was their term], which would back up some water against a low dam and never be emptied." This small amount of water would scarcely effect flood control, but there would always be some water in the reservoir for recreation purposes. He got the Corps of Engineers to set up conservation pools in about ten of the fourteen reservoirs.

Chall: Were the pools just for recreation?

WCL: Yes, for recreation--fishing, boating and picnicking. Many big manufacturing people in Ohio bought up land beside these pools and formed recreational places for their employees. Bryce Browning was responsible for getting them to do this. He managed these pools successfully and derived considerable revenue from recreation facilities.

This is one of the outstanding successes in the country. These recreation pools provided all expenses for the Conservation District, except for flood control dams and big construction work that the army carried out. Bryce Browning was the genius behind this. Now this principle of multiple-use is so well established that even the Corps of Engineers accept it.

Communal Forests

Chall: Your idea about communal forests sounds intriguing. Could you explain what you envisioned here?

WCL: It was in the Muskingam drainage that former rich lands had been damaged by erosion of top soils. Much of this land had been abandoned for cultivating crops. A thin brushy cover was growing up, producing little of value to land owners of the district. It

WCL: was then that I proposed to Bryce Browning that his Conservation District should buy up these badly eroded areas and should establish community forests to be protected and managed for growing timber that would also furnish revenue for the Conservation District, besides recreational uses. Here multiple uses of such areas would create many sources of use, revenue and jobs.

Memorable Relationships

Chall: I'd like to talk with you about some of the major figures you

Chall: knew while you lived and worked in Washington. First, what did you think of Henry Wallace?

Henry Wallace

WCL: I considered Wallace an excellent scientist. He was knowledgeable and had a wide grasp of subjects on which he was working, especially on hybrid corn and poultry. He was also working on certain flowers and had me locate for him in South Central Africa, the native wild gladiola on which he wanted to develop hybrid species. I located some--the bulb was very deep in the ground; I remember we dug and dug--and shipped them to him.

He was very successful and famous for his developments of many kinds of hybrids. Henry Wallace was an industrious man and a very good farmer. I always had very pleasant relations with him which continued up until the time of his death.

In dealing with personnel--one of my friends, Knowles Ryerson, felt Wallace was unfair to him. At that time, Wallace seemed to be influenced by the philosophy of a mystic in Manchuria.

Chall: Was he mystical about his feeling toward the land?

WCL: I'm not so sure about that. We were interested in the introduction of various kinds of plants and legumes to help control erosion. We especially wanted crested wheat grass, which is related to our wheat plant, and produces a very heavy crop of seed, and is very hardy. It grows beautifully in our northwestern United States.

Our grass nurseries wanted to grow seed in quantity. Many farmers in the early days planted crested wheat grass on badly eroded land and got enough income from the crop of seeds to enable them to fertilize their land and improve it.

Chall: What did you do with the crested wheat grass? Was it used as wheat, as a food?

WCL: It was feed for livestock. Birds especially liked the seed. It was a very hardy plant that could grow on poor soils and did not require much moisture. Our soil conservation work gave much attention to building up pastures with crested wheat and legumes, for pasturing livestock. At the same time, this cover reduced, or stopped, soil erosion.

Wallace and our Service developed a program in Central Asia

WCL: to gather seeds of crested wheat and legumes from that region, and introduce them in our plant introduction gardens.

Chall: I see. And when was this being done?

WCL: Well, the new plant industries had been doing that for many years. David Fairchild, the great plant explorer who wrote The World is my Garden, introduced many forage plants--alfalfa, and also rhododendrons from the Himalayas. But no one had done it for the purpose of securing plants and seeds to control erosion. It was through my interest in plants to control erosion that I got acquainted with Tugwell.

Knowles Ryerson had got his crew and his field staff prepared and ready to make this trip into Russia, in Asia, for crested wheat seeds. Wallace interfered and wanted to turn this project over to this mystic friend who was in Manchuria. So Knowles Ryerson finally lost his job. He couldn't go along, trying to mix scientific enterprise with men who had little or no scientific knowledge, as this so-called mystic.

I heard much of Ryerson's problems in this unhappy affair. But this is the only case that I know about Wallace having difficulty with personnel. He was always very good to me, and was interested in the broad field of conservation of resources in which his ideas were very sound. He seemed like a deeply religious man.

Chall: Did you become involved in politics of the Department when there was hope that Mr. Wallace would be nominated by the Democratic party to be President of the United States?

WCL: No, I wasn't mixing up with politics. [laughter]

Chall: You were out of the Department when Mr. Wallace was nominated for President by the Progressive party. Did you remain a friend of Mr. Wallace during this period?

WCL: Yes, though we had few contacts with him. I went to hear one of his speeches. Newspapers made him out as a dangerous character. He gave a talk from a barge on the Potomac near the Memorial Bridge where concerts are held. The speech he made was a very good one. There were none of these wild statements he was accused of. I felt he had been very unfairly treated by the press.

Chall: So you felt that Wallace was sincere in that period, concerned about his country and international relations?

WCL: Yes. But once a man gets into the hands of the news media, they can break him if they are against him.

Harold Ickes

Chall: Let's talk about Mr. Ickes. You were in Mr. Ickes' Department for a while?

WCL: Oh yes. He was a very important man in Washington at the period during the Depression. He was responsible for the Public Works Agency. He was a good administrator. But he was also ambitious politically.

Chall: Now he had a plan to bring all activities of conservation--which included the Erosion and Forest Services, and others--into the Department of Interior, and to call it the Department of Conservation. How did you feel about this?

Reaction to Department of Conservation

WCL: We did not favor this.

At that time, I worked a great deal with J. C. Merriam, President of the Carnegie Institute in Washington. He was very interested in our development and our scientific work in land-use studies and in measuring erosion. He said to me that mine was a rare circumstance--for a man to make a scientific study as I had done, and then live long enough to see the results of his experimentations carried out in practice.

I got interested in erosion in China and began measuring it. My doctorate on that is one of the contributions to science in this field. Then the Roosevelt era in conservation of our lands and waters had enabled me to have money to go ahead in a big way and do something about it. So I had in one life-span these two phases of scientific work that usually are separated by different personnel and by different time intervals. We had very many discussions together.

J. C. Merriam was the highest paid scientific administrator in the United States. He raised with me the question about a Department of Conservation. I said to Merriam, "Why don't you call it a Department of Good Intentions?' [laughter]

This apparently impressed him and in a later discussion he made use of that expression. But he dropped the idea of a special Department of Conservation.

At first, the Department of Interior had little else to do except the control of the Public Domain, and there it began to

WCL: measure waters as the Geologic Survey. The proposal for the transfer of the Forest Service into the Department of Interior was not a new thing but rather, a periodic thing. Some favored the transfer, but always resistance arose each time this was mentioned.

At first the Geologic Survey was a small organization, but as time went on, they became much more important. Through them, the Department of Interior began to do some very fundamental things in measurement, especially of our water resources. Out of this came the Bureau of Reclamation, which relied so much on scientific data for water measurements, the amount of the flow of streams, and the possibilities for storage of intermittent flows of water in reservoirs for irrigation, power, navigation and recreation.

So agencies concerned with forests and water were already in the Department of the Interior. And forests and floods had been associated for quite a number of years, even before the agricultural people. The foresters had been ahead of the agronomists for a long time on this question of the conservation of natural resources especially. They were the first to recognize the menace of erosion before even our soils men.

Chall: Why were you so strongly opposed to the Soil Erosion Service remaining in the Department of the Interior?

WCL: We were in the Department of the Interior at the time, and people in the Department of Agriculture said, "They're setting up a new department of agriculture over in Interior!!"

Chall: Yes, but from your written material (pages 148-149), I have the feeling that you thought your long-range approach might not be acceptable to Ickes. Was it this, or the fact of duplication with the Department of Agriculture?

WCL: I felt we would have more effective coordination of our works in agriculture if our soil conservation were carried out in the Department of Agriculture.

When we were transferred to Agriculture, do you think our colleagues received us with open arms? What a rude shock we got! They thought our soil conservation group was getting too strong. True, we were developing rapidly and spreading out our projects through the nation. They had a grouch against us.

M. L. Wilson

Chall: Can you tell me about M. L. Wilson? The two of you must have

Chall: known each other during these working days in Washington.

WCL: Yes, we knew each other intimately. M. L. Wilson was director of the Agricultural Extension Service. Many of his men in the field were hostile to our men and works of the Soil Conservation Service; so officially, we were cool but off the record we were friendly. We were frequently invited to their home and they, to ours. Bennett and Wilson were less friendly and cool to each other. Wilson was quite intellectual. Some thought that at times he was impractical, but that was not my opinion.

Isaiah Bowman

Chall: I want you to tell me something about Isaiah Bowman because you've mentioned him from time to time in your material.

WCL: Isaiah Bowman was a very alert and fine-looking man, vigorous, with a good sense of humor, but at the same time he had a great mind. He was one of our foremost geographers of the world, who did much to develop the field, or science, of geographic knowledge.

He was director of the Society of Geographers, the technical branch of geography, not the National Geographic. He was a serious student of geography, like Carl Sauer. He had a great influence in the development of thinking on the relationship of man to the earth, and the interacting factors involved. Also, he was president of the National Research Council for a number of years.

I frequently met him for lunch at the Cosmos Club and had many conferences on our program of research when he was president of the National Research Council. We were then developing a research program for the Soil Conservation Service. Dr. Bowman was an inspiration. I always found him tremendously helpful.

He had a very nice office in the National Academy of Science building on Constitution Avenue. Whenever I wanted to discuss a problem with him, he would arrange a time for us to leisurely discuss various aspects of the use of land by mankind and long-range thinking on many matters. I consider Isaiah Bowman had a big part in helping us formulate scientific objectives. He was a very valuable counsellor. It was a great experience to be associated with a man like this.

Isaiah Bowman told me a story that I've used many times. He said that the situation sometimes is very much like a man who was on his way to Cincinnati and got lost in the hills of eastern Ohio. He came upon a hill farmer and asked about the road to

WCL: Cincinnati. The hill farmer said, "Well, stranger, you take this road and follow it for a few miles and then you come to a fork in the road. You take the left-hand fork and follow that for a few miles and you come to another fork in the road and then you take the right-hand fork until you come to another fork in the road and you take the. . . . Look here, stranger, if I was you and if I was going to Cincinnati I would not start from here." [laughter]

I used this story in my talks to farmers on conservation. We can't go back and start over again. We have to go on from here, take the condition of the land as it is and make the most of what lies ahead.

The Library of Congress: Dr. Herbert Putnam

WCL: Dr. Herbert Putnam, librarian of the Library of Congress, is another important association of my Washington days. He had a private dining room and kitchen in the Library of Congress. Each Friday noon he invited guests--scholars from the United States and foreign countries--to gather around a large round table, where double-thick lamb chops were beautifully prepared and served. Conversations were generally very stimulating.

Dr. Putnam liked to tell about the collaboration of the Library with the Soil Conservation Service. He was very interested in my experiences in China. He had gathered together hundreds of thousands of books on China, so that this is the largest library of Chinese books in the world, I understand. Our mutual interest in China and collecting Chinese books made us fast friends. He gave me a permanent invitation to any and all Friday luncheons I could attend.

Use of Gazetteers

WCL: Putnam turned over to me a study room in the Library of Congress. I had an American man by the name of Dean Wickes, who had been a missionary. He could read Chinese fluently and did research for me here on China. He and I wrote a history of the development of the irrigation project of King Ho, which was published in The Scientific Monthly [September, 1942].

Our own agricultural people, Swingell and a number of others, Fairchild, brought over citrus plants from China. They consulted these Chinese works. Then some of our missionary people to China were scholars in Chinese and knew the classics. There was much

WCL: interest, and still is, in this enormous collection of books on China. For instance, I bought a two hundred volume set of Gazetteers of county records for the Library of Congress from Sianfu.

Chall: How did you get them over to the Library of Congress?

WCL: I mailed them direct before all our things were lost at the time of the Nanking Incident. These Gazetteers were paperback and could be mailed in parcels.

Chall: Did you collect them from different counties?

WCL: My policy wherever I went on these expeditions was to buy up local Gazetteers. I sometimes got duplicates for our library at Nanking. They mailed the two hundred Gazetteers for me to the Library of Congress.

Chall: That was farsighted of you.

WCL: Harry Clemens was the librarian at the University of Nanking. He too was very keen on building up these old Chinese records.

Chall: So when you got to Washington you were able to begin work on some of your Gazetteers.

WCL: Yes, with Dean Wickes.

China, as Background for Conservation

WCL: When we were developing our soil conservation work, you remember that Franklin Roosevelt showed a picture which Theodore Roosevelt had used to stimulate the creation of national forests out of the Public Domain. This picture showed a Chinese painting of an ancient town (the date was shown on the painting). Years later, Bailey Willis, the great geologist, at Leland Stanford University--another good friend of mine--made a survey of the province of Shansi. He saw the same area as was in the painting. It was eroded, forests were gone, and the hills were cut with big gullies. With productivity gone, the people had largely died off from malnutrition or migrated.

Bailey Willis took a picture of this. Stones were washed down and piled up on the alluvial farmland. Its productivity as a place for mankind was practically destroyed. Franklin Roosevelt used this picture to influence and to educate congressmen for our work on soil conservation.

Chall: He used "before" and "after" pictures?

WCL: Yes, that's right. A part of our impetus to control erosion is founded, much as my own is founded, in China and what had happened to its lands there. We have F. H. King's book, Farmers of Forty Centuries, one of the earlier books on China in which he was dealing with the alluvial flat lands, not with the slopes, so that the problem of erosion hardly entered into it except bank cutting. In other words, our interest to control soil erosion in America has been influenced to a great extent by what some students including myself found in China, and the misuse of land there.

Chall: So the salary of Mr. Wickes working on the Gazetteers was paid by the Soil Conservation Service?

WCL: Yes. Putnam encouraged me, and he was delighted to have the library used and this Chinese Oriental collection made use of. Dean Wickes and I did much writing from these research studies in the library and several of them were published. We got into the war and that upset about everything. But Wickes worked with me several years before he died.

Milton Eisenhower

Chall: You mentioned Milton Eisenhower many times. I thought we could get a little sketch of him because he must have been a good friend of yours, certainly a colleague.

WCL: We were very friendly for a while, then somehow we lost touch. They came to dinner at our home and had us to dinner with them. He turned against Bennett, and that seemed to make him rather hostile to me. He was not a trained scientist in agriculture, but had come up through the ranks of information. He had a very clever way of informing himself on subjects he knew little about. He would find two men who were of different opinions and manage to get them together in his office in a conference.

He would start with some provocative statement or question. Then these two men with divergent views would argue and reveal a lot of information that many times was more up-to-date or new, and gave Eisenhower new ideas, new developments. He used this clever device to keep himself up-to-date. I soon saw through this trick. He wasn't interested in what I was saying except as it gave him a better understanding of what was going on in the department.

Milton Eisenhower was never undersecretary. He was

WCL: involved in information and became the chief of information in the Department of Agriculture, and later was made coordinator of land-use policies. He saw the Department was deficient or lacking in a positive land program. He got himself appointed as land-use coordinator in the Department of Agriculture because he was very interested and there was really no one to contest him. Wallace was willing for him to go ahead. Even Bennett didn't contest him very much. I think I contested him more than anybody else.

Chall: Was he a capable, intelligent person?

WCL: Yes indeed, very intelligent. His principal fault as far as I was concerned was that he was playing out on the margin with insufficient knowledge of standing questions. He was able to do a lot of things simply because we lacked leaders who were well trained or would contest his points of view.

It's a thankless job to get out onto the battle lines, so to speak, where controversies are developing, people have differences of opinion and challenge each other. Which is all to the good, in a sense, but it isn't always a happy situation. One has to have a personality that will stand up to it and Milton Eisenhower had it.

As his brother, Dwight Eisenhower, came on the political scene, Milton became more political-minded. But the country didn't take to him as to his brother. He did not play a big part politically.

At first he was the president of the Manhattan University of Agriculture. He went to Kansas as president of the University, then to Pennsylvania, and later to Johns Hopkins University. How he got to be president there I never understood. He's nothing like the stature of Isaiah Bowman.

Chall: Maybe there aren't too many of that stature.

WCL: No. Isaiah Bowman was a truly great man.

Chall: Perhaps by the time Milton Eisenhower was there, he had become a very good administrator.

WCL: Yes, he always was a very good one.

Louis Bromfield

Chall: What about Louis Bromfield? He, along with Morris Cooke and

Chall: Russell Lord and others, were devoted to the concept of proper use of land. Did you know him?

WCL: I knew Bromfield very well. He was a novelist who wrote some best-sellers on conservation of land in the early days. His interests were primarily rural, and he sponsored the cause of farmers during the depression. He wrote articles and books. Pleasant Valley and The Farm were best sellers. I even found them on bookshelves in Africa.

Bromfield was one of the organizers of Friends of the Land Magazine, to which most of us were subscribers. This monthly magazine was edited by Russell Lord and illustrated beautifully and graphically by Kate Lord. During this period of recovery from the depression, it emphasized rural values. Writers from England and America contributed to this progressive magazine. Louis and Kate Lord made his magazine a great success. During my year of travels in Africa, sponsored by Carnegie Corporation and the British Colonial governments, I wrote a regular column monthly, entitled "Foreign Correspondence."

Bromfield, at the same time, was reaching great numbers of people not only through his best-selling books but personally--he was tremendously popular. People thronged to his Pleasant Valley to see his farm, even though they had read the book. On his farm, he used a huge hayrack drawn by a tractor, in which he took the crowds around the farm on a tour, personally conducted by himself. He explained the various measures of soil and water conservation by progressive farmers, and was a big advertiser for the Soil Conservation Service. This was a personal gesture of public service to popularize conservation work.

When I was on my field trips in the area, he frequently invited me to stay at his farm, which was always a stimulating experience and a treat. After dinner, we would sit before a big fire in the living room fireplace. There is one unforgettable memory of these evenings. Bromfield had a number of large boxer dogs. When he sat down for the evening, immediately all these huge dogs rushed in and stretched out on the floor around him in front of the fire. I never saw so much dog meat at one time, and I was quite intrigued.

Part II The Soil Conservation Service, 1939-1947

Changes in Research Program

Chall: I want to talk to you about your final years in the Department after you returned from your land-use survey abroad, because as far as the Soil Conservation Service was concerned, these were years fraught with problems.

WCL: There was a reorganization of research in the Department of Agriculture. Our research was part of the Soil Conservation Service, but later research was taken away from us, primarily because Bennett had not supported it with the appropriations committee. The Department of Agriculture placed our research in the research agency of the Department, with headquarters thirty miles out at Beltsville, in Maryland. Their problems did not come out of the application of work, which, as I have told you, has always been my theory of applied research.

This change in sending the research agency to Beltsville made it no longer within the Soil Conservation Service. It was supposed to be a master division of the Department of Agriculture. This upset all our programs of integrated research that arose out of questions in the field.

Chall: This took place, I presume, when Nichols was in charge of research. Was Nichols as interested in research as you were?

WCL: No, Nichols was not really a research man. The literature carried very little that he had done. When he was in Alabama, he developed research in tillage, that is, types of plows, and draft necessary to plow different kinds of soils; but aside from that, he seems to have done very little.

Chall: If this was Nichols' background, it would indicate, I suppose, that Bennett was not interested in your kind of research.

Relations With Bennett

WCL: No, and one of the reasons perhaps was that I called in for consultation some of our leading scientists, because I said that we were dealing with geologic processes. We recognize and study them from that point of view: that erosion is a part of the planation of the earth's surface.

This appealed to Robert A. Millikan, president of Cal Tech. He came and made a statement before our appropriations committee hearings; and Isaiah Bowman, the great geographer and president of Johns Hopkins, was keenly interested in all I was doing while developing the research program. I always felt free to go to the National Academy and talk things over with him.

This is the kind of atmosphere in which we were developing our research. These outstanding scientists saw how our research fitted in with theirs, and theirs with ours, thus strengthening the whole attack upon these problems.

Chall: This may have been too much for Bennett, who really wasn't trained as a scientist as you had been, and perhaps resented your contacts with these scientists.

WCL: Yes, I presume so. He felt an assistant chief in charge of research should not have the prestige of these associations.

Chall: I have here two quotations I wish you would comment on. I consider it rather interesting, in light of what we've been discussing.

The first one is, "Bennett's success was spectacular, but his methods were abrasive."*

The second one is, "Like most forceful leaders, he was ambitious; numerous persons then felt, and have since, that many of Bennett's maneuvers were dictated largely by a desire to enhance his personal position. However, there has never been any serious denial of his devotion to the cause of soil conservation."**

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*Robert Morgan, Governing Soil Conservation, Resources for the Future (Baltimore: Johns Hopkins Press, 1966), p. 4.

**R. Burnell Held and Marion Clawson, Soil Conservation in Perspective, Resources for the Future (Baltimore: Johns Hopkins Press, 1965), p. 43.

Chall: How do you feel about those two opinions?

WCL: Bennett wasn't very diplomatic. He'd ride roughshod. He liked to be in a position where he could put on the screws and force people into position. That was one thing I wouldn't stand for.

He couldn't bear competition in this matter of erosion. He wanted to be the man who spoke with authority on it, and anyone who had other ideas was not tolerated. His soil conservation office developed into a place for informational publicity. Bennett was a master publicist.

For instance, in 1934 we were going over to the Cosmos Club for lunch. We walked out together from the Department of Agriculture and the sky was overcast. I was suspicious and began to rub my teeth together. I recognized dust, such as I'd experienced in northwest China, when the loess soil is blown up into the upper air.

I said, "Hugh, do you know what this is?" He didn't know. I said, "You can't see the Washington Monument. Do you know what causes it?" "No," he said.

"It's dust," I said. "It's blowing up dust from some area in the southwest United States, because the wind is blowing northeast."

Immediately he got this story off to the press. He telephoned out to our men in Texas. They reported dust blowing so thick they had to turn auto lights on in the daytime, because dust blotted out the sun. This was the type of thing Hugh was very quick at doing. He got results too.

Chall: Yes, he certainly did. He got a major appropriation out of that dust storm.

WCL: He was very jealous of the idea of being called the father of soil conservation. That's where I think our trouble arose. One of the reasons was that in applying my research, I had worked out the Jordan Valley Power and Irrigation scheme in Palestine. This aroused interest in many circles and gave me both national and international recognition. My name was often in the New York Times, and in letters and editorials in most papers around the country. This was hard for Bennett to take.

Later, I went to China on a second trip in 1942, and I came back with a movie film which the National Geographic edited for me. I gave an illustrated lecture for them at the regular Friday night National Geographic lecture series, to about four thousand people in Constitution Hall in Washington, D.C. I also wrote an article for them which was the leading article in the July,

WCL: 1945, National Geographic Magazine, entitled, "China Fights Erosion With U.S. Aid."

It was rather amusing that Bennett asked to have it arranged for him too to give a lecture at the National Geographic Friday night program, but it was refused after they tried him out.

After my retirement, various countries in Africa asked for me to come as a consultant to them. This added to my international reputation, so Bennett decided he wanted some overseas trips too. But he was not too enthusiastic afterward, for he was fearful of plane travel, high altitudes and strange peoples.

I was amused when Bennett said to one of our Soil Conservation Service men, "I can't have Lowdermilk, an Assistant Chief of the Service, called Doctor Lowdermilk and I, as Chief, being called Mister."

He then directed this colleague, I was told, to go to his Alma Mater and have them give him an Honorary Degree, which was done. Henceforth, he was always Dr. Bennett. I was glad that he could get without effort what was a long hard pull for most of us.

Chall: His feelings about you vacillated, from the very beginning when he didn't want to shake your hand on the day you first came into the Department.

WCL: That wasn't a very pleasant situation, but I didn't pay any attention to it. I began to work very hard in our rapidly enlarging Erosion Service and numerous times in those strenuous first years, he more than once said, "I lean on Walter as a sapling on an oak tree." This was a period of harmony. Only after the Service was developed and running well did he feel I was a competitor that must be eliminated so he would stand out as the father of soil conservation.

But the thing that pretty much capped the climax was the big testimonial dinner for me, with a nation-wide radio hook-up and speeches by several senators. There was an audience of some three hundred. Senator Wagner of New York was chairman, and some of the foremost leaders of Congress, and many leading Washingtonians that included Bennett, were invited. My wife said that she looked over his way a few times and he was white with rage. He got up and left before it was over, and never mentioned the honors to me or the dinner.

Chall: It must be hard to feel so jealous of a colleague.

WCL: It's unfortunate that some people are of such a nature that they cannot see their fellows receive rewards.

UNITED STATES DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

Washington 25, D. C.
June 27, 1947

Dr. Walter C. Lowdermilk
1520 "H" Street, Northwest
Cosmos Club
Washington, D. C.

Dear Dr. Lowdermilk:

It gives me a great deal of pleasure to transmit to you the certificate of the Secretary of Agriculture designating you a Collaborator in the Department in order that you may remain a part of the official family after your retirement on July 1, 1947. I congratulate you for this recognition of your outstanding service and accomplishment in the Department.

It is well known that you have established an international reputation as an authority on major phases of soil erosion, soil and water conservation, and flood control. We are all aware of your valuable contributions to Federal and other agencies endeavoring to use this information properly, and we are especially proud of your contributions to the soil conservation program.

The Soil Conservation Service is grateful that you have consented to remain in the official Departmental family after your retirement from active duty, and it is my most sincere personal hope that you will never permit retirement to dim your active interest and participation in the national soil conservation program. The entire staff of the Service joins with me in wishing you good health and happiness in the years to come.

I want to add a brief reference to your classic research on the function of forest litter, particularly its relation to infiltration of storm waters: In my opinion, this work of yours resulted in one of the most fundamental discoveries in the field of soil conservation science, as well as in the field of forestry.

Sincerely,

Hugh H. Bennett

Chief

DEPARTMENT OF AGRICULTURE
WASHINGTON

June 27, 1947.

Dr. Walter C. Lowdermilk
1520 "H" Street, N. W.
Cosmos Club
Washington, D. C.

Dear Dr. Lowdermilk:

Upon your retirement from active duty June 30, I wish to express on behalf of the Department our sincere appreciation of your contributions to the Soil and Water Conservation, and Land Use activities of the Department and for the advice and counsel you have rendered to the many other organizations and individuals seeking help in preserving the soil. The Department is proud of the international reputation you have won in this important field of work and I know you take just pleasure in both the immediate value of your outstanding achievements and in the long range importance of your accomplishments.

I am happy to have you remain a member of the official family of the Department of Agriculture. Your services in the years to come as a Collaborator will be of inestimable value to the Department.

Sincerely yours,

Secretary

WCL: When, on my sixtieth birthday, July 1, 1947, I suddenly announced to Bennett that I was retiring as of now, he was startled but greatly relieved to thus be rid of me, I am sure; for then he became very cordial and wrote me a letter of commendation [hands letter across desk]. Notice that he expressed appreciation of my scientific work, mentioning forestry too.

Also, here is a letter from Clinton Anderson, Secretary of Agriculture. Apparently, my sudden action in retiring startled the Department, and Secretary Anderson went a long way there to show that the Department was back of me and appreciated my work, in spite of Bennett's efforts to minimize my scientific standing among top scientists.

Chall: Can you remember that about this time, Secretary Anderson was attempting once again a reorganization of the Department of Agriculture? He was trying to develop more controls over the Soil Conservation Service and to integrate it better into the Department. In this case, as in others, the Soil Conservation Service had a bill representing its position, and had, of course, its own sponsors in the Congress.

WCL: Well, you see, this was where the Soil Conservation districts came in. Bennett used them. He called on them to support him, using them as a political power.

Chall: This has been understood by people who are now writing about soil conservation. Whether Bennett had ever realized the power of the Soil Conservation districts as a political force at the time they were set up, he certainly was able to use them.

WCL: Do you know the details at the end, how the Department had to fire Bennett? He'd gotten these Soil Conservation districts to send delegations to the Department of Agriculture and to the Congress. You see, they'd had him set to retire at the age limit, and he wanted to extend a year beyond this time; and then when the year was up, he wouldn't step down. So instead of separating him totally from the Service, he was made a consultant in the office of the Secretary of Agriculture, in a little room, I was told, where he couldn't do anything.

I have never discussed my relationship with Hugh Bennett before, even with my colleagues. I preferred to put it out of my mind during the active and very happy years following my retirement from the Soil Conservation Service. But because it was a part of the early years of the Service, and because you seemed to feel I should include it, I have talked about it with you, for the record.

Gilbert Grosvenor

Chall: You have mentioned frequently that you gave a lecture and wrote a leading article for the National Geographic. Did you deal directly with Gilbert H. Grosvenor? What kind of person was he?

WCL: He was a tall, fine-looking, hard-working dedicated man. He set very high standards for any work done for or by the National Geographic. He was very conscientious. We had numerous consultations. Their movie editor, Mr. Joe Rideout, edited my China film and it was truly a beautiful job and made the lecture a great success, from what people said.

I must tell a true story about dignified Dr. Grosvenor. Before leaving for the Friday lecture, a maiden aunt phoned for him to come over quickly and find out why her prize goldfish had died (Grosvenor was a specialist on fish). He had to hurry so wrapped the gold fish in his folded handkerchief and carefully tucked it in the pocket of his tuxedo.

When he went out after the lecture, several inches of fluffy snow had fallen. He was about the last one to leave and stood outside on the corner waiting for a taxi. It had been warm inside and Dr. Grosvenor unthinkingly grabbed his handkerchief to wipe his forehead. The goldfish was tossed out into the snow--there was no trace where it had fallen. Dr. Grosvenor squatted down and sifted the light snow between his fingers.

A policeman across the street watched him for some time, then came over and said, "Buddy, you better let me take you home." Dr. Grosvenor continued to sift snow as he said, "No, I won't go home until I find this goldfish; I have to make a report on it."

The policeman urged, but Grosvenor resisted, saying, "No, I won't go home until I find this goldfish."

The policeman said, "If I help you, will you go with me?" And he began to sift the snow through his hands. Almost immediately, he grasped a goldfish. Stunned, the policeman said to Grosvenor, "Say Buddy, you better take me home."

Soil Conservation Districts--Accomplishing the Tasks

Chall: I want to ask you about Soil Conservation districts. At the time

Chall: that you came back and made your extensive speaking engagements, the Soil Conservation districts were quite new. The figures show that in 1943, the Soil Conservation Service estimated that 96 million acres needed strip cropping, but in 1950, less than six million acres had been so treated.*

There's a feeling among people analyzing the early days of the Soil Conservation Service that the Service never was capable of accomplishing all that it set out to accomplish. As you went around in the field, did you think the districts were doing all that was needed?

WCL: We had quite a number of arguments over this. I know that there were a few who got into the Service who were more or less this political type and who were always crowding the government to carry out certain measures in certain districts. That was a development that came largely after I retired.

I became rather suspicious of this group because the far-sighted thinking, it seemed to me, was giving way to localized, temporary advantages that these people wanted, rather than the development of the program as a whole for the entire country.

Speaking Tour Through the United States

Chall: You were out making illustrated talks for about a year and a half after your return from the tour abroad, mainly to give the new Soil Conservation district people an opportunity to see what soil erosion had done to lands of the Old World, and perhaps because Bennett had already replaced you in research by Nichols. Did you find that people were interested and excited by your talk?

WCL: Oh yes. And the illustrated lecture--I had good pictures--not only must they tell the story, but the pictures must have a pictorial value as well. I had many compliments on the quality of my slides. To me it was really an inspiration to get out with the farmers, in their grange meetings and into these Soil Conservation districts.

Chall: Many of them were quite newly formed, were they not?

WCL: Yes, and I opened up new ideas to them. For instance, I pointed

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*Hardin, op. cit., p. 274.

WCL: out my method of land survey in Europe and the Middle East. I had to work rapidly and cover a lot of ground in a comparatively short time. I used the measure of a thousand years of agriculture.

I asked my guides to take me to fields that, by their own knowledge or by clerical records, had been farmed for a thousand years or more. Then we tried to figure out why this field should be destroyed and those nearby not destroyed. We found that where land was generally on the level, there was very little loss of soil. My public conclusion was that one of the most difficult problems in the long experience of agriculture has been to establish a permanent agriculture on sloping land.

Farmers Are Important

WCL: Then when I gave lectures to these American farmers, I'd say, "Let's use this measure of a thousand years of cultivation as a measure of success in conserving your soil." After my lectures, I'd go out into the field and talk to farmers and ask, "Do you consider that this field that you're farming will last a thousand years?"

It's only a short time in the history of a country or a civilization. You must see how important it is that this basic physical integrity of the soil be preserved. We have the liberty of choice in farming it with this crop or with that crop, of adding more fertilizer or less fertilizer, according to demands. If we could safeguard the physical body of the soil, then we had this liberty of action, and the future of our country would be safeguarded in the production of foods.

Chall: This was a dramatic way of showing them.

WCL: I would say, "You farmers are most important, you are the foundation of our entire social structure in the division of labor. It isn't until you have produced enough for yourself and more, that others are released to do something else besides grow food. You're the basic occupation of all civilization."

Then they began to realize they were more important than some of the politicians treated them. [laughter] I really had a lot of fun. Canada repeatedly asked to have me come up to talk to their farmers, who were also keenly interested.

WCL: I remember an amusing incident in the state of Washington where I was making one of these speeches. There was a schoolteacher who wanted the Soil Conservation Service to help her work out a program for her class on how to plan a farm to control erosion and grow crops at the same time. She wanted her class to sit up front in this lecture hall so the children would hear well. The man in charge refused; he said the children would be noisy and disturb the meeting. But this determined teacher went to the Soil Conservation man and begged him to let her class come to the lecture and take part.

I came in backstage and didn't see the audience before I went out in front of them. When I saw these sixty or seventy youngsters down in the front rows, I said to myself, "I'm going to talk to these youngsters tonight, and not to the oldsters."

I decided to direct a question to these boys and girls. I told them of the water wheels of Hama, Syria. These big water wheels are seventy feet in diameter and are run by the current, and they lift water in pipe-like buckets to an elevated trough to conduct the water to where it is needed. There used to be hundreds of these water wheels on the rivers in ancient times, but now there are only a few left up at Hama in Syria.

I said to the youngsters, "I'm going to give you a puzzle I want you to answer me after the lecture." I said, "Here this great wheel is over two thousand years old, but no part of the wheel is that old. How can that be?" [laughter]

When I finished and came down off the platform, these youngsters just swarmed around me, as they were excited. They worked it out that the constant repairs kept the wheels running for two thousand years, as new parts replaced old ones. Instead of being a nuisance the children were an inspiration.

One of these boys took this matter of gullies to heart. His neighbor was an old man of about ninety years, whose farm was badly cut with gullies. This little fellow said to the old farmer, "Do you know that gullies are washing your soil away?" The farmer said, "What do you mean?" And the boy said, "Your gullies are washing your soil away."

The little boy was told, "Oh, that's none of your business. Go on and leave me alone. Don't bother me." This child went back to his teacher and said, "You know, teacher, I think this man is too old to learn." [laughter]

Chall: When you began public work, you once said you hated to make

Chall: speeches. In the intervening years, have you improved?

WCL: Well, I should hope so. At first I read my manuscript and that was deadening, so I employed Mrs. Butler who taught congressmen how to become speakers. She demanded that I throw away my manuscripts and insisted I speak without any support at all. I soon caught the idea. I worked over my material carefully, and then she had me practice my speech aloud beforehand until I could say what I wanted without hesitation.

"Conquest of the Land"

WCL: People generally liked this illustrated talk which was my basic lecture. My "Conquest of the Land" is still one of the most asked-for public documents of the Department of Agriculture.

I had more demands for this lecture than I was able to handle. I had duplicates made of my slides and mimeographed the text of the talk. When people wanted a lecture on "Land Use in the Old World," we sent them the slides and mimeographed manuscript, so they could work out their own lecture to apply locally.

Our field men, when making talks on erosion problems, made much use of this lecture. There were so many demands for this that the Department decided to print the lecture which I entitled, "Conquest of the Land Through Seven Thousand Years."

Breasted had used "Conquest of Civilization." I wanted to use the title, "Conquest of the Land Through Seven Thousand Years," as a future elaboration of my work.

Chall: It occurred to me that the average farmer must have found it immensely interesting.

WCL: I got a lot of inspiration out of it because the farmers, those at least who were really thoughtful people, recognized that they were dealing with a resource of inestimable value.

Conservation and the Churches

WCL: Out of this came an annual Sunday meeting called "Conservation of the Good Earth." Many churches held such services. This idea spread all over the United States. Richard Howard Bailey, the great botanist and agriculturalist, wrote "The Holy Earth."

WCL: He emphasized an ethical and moral relationship between man and the earth. Many of us made Sunday talks, and ministers of all denominations preached an annual sermon on conservation.

Writing a General Report of the Survey Trip

Chall: Is this a copy of your entire general report of your trip?*

WCL: No, not my entire report. I started out on details of all countries studied, and to summarize the entire land use survey, and articles I had written and to add further impressions as a general report. But as you see, it was becoming quite voluminous when only partially completed. No part of it was ever published.

The war came and all else was put aside. This was a document I had hoped would arouse considerable interest. I had a staff working on maps and two secretaries working on my dictation. I also had an assistant over at the Library of Congress who worked up my documentation and references, so we were going fine until our entry into the war.

Chall: What did you plan ultimately to do with this long report, file it in the Archives, or use it for research?

WCL: It would be a document that would be available for research. I had hoped the Department of Agriculture would publish it, even though it would be as large as the Agriculture Yearbook.

Theories on Regulating the Use of Land

Chall: Now I want to discuss with you your theories of land-use regulation. When you went around to newly-formed districts, most were operating voluntarily. As a matter of fact, in 1951, according to some figures, only eight of 2,300 districts enforced

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*Op. cit.

Chall: regulations.*

In your later material, written after the 1938 trip, you felt there was need for regulations. I think the result of your trip dramatized in your mind the need to regulate what people did with the land.

You wrote in "The Eleventh Commandment" article:**

> "The present and future well-being of a people call for long-range policies for the maintenance of productive land and resources. These policies must be founded on what is right for the greatest number of people in the long run . . . . Practices of land use which work against the good of the whole must be regulated, whether by law or by public opinion, to achieve a dual purpose: to maintain individual initiative, and to safeguard the integrity of resources."

Then, elsewhere, you wrote:

> "The conservation of the physical resource, the soil material in place, the heritage of a people, becomes a high duty of the individual and of the nation. Where economics of individual interest fail, social economics must take up the burden, with cooperation, technical assistance and regulations."***

Then you discussed with Mr. Brandeis something that you called "the beneficial use of land." Now, can you explain two things: does the beneficial use of land idea entail regulations? And what about your feelings toward regulating land use?

WCL: Let's go back to this beneficial use of land. Actually this idea came to me in Haifa [Israel], when we were making the land survey in 1939. Amihud Goor was leading me around to see the country and give some talks. The Israelis are very thoughtful people, and Israel was a place where the integrity of the land resource was a very real problem because there was no land to spare or to waste.

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*Hardin, op. cit., p. 75.

**W. C. Lowdermilk, "The Eleventh Commandment," Proceedings of the South Pan Pacific Science Congress, Vol. IV, 1939, p. 895.

***W. C. Lowdermilk, Tracing Land Use Across Ancient Boundaries, Letters on the Use of Land in the Old World, to H. H. Bennett, Chief, Soil Conservation Service, Washington, D.C., 1940, p. 133.

WCL: It brought to mind the gradual development of rights in the United States. In England, the common law of riparian rights was the principle that settled disputes over water, because of the riparian juxtaposition of water and the land. When colonists from Great Britain came to the United States, they settled in the humid eastern part of the country, so that the principle of the riparian right still was adequate to solve disputes over water.

But out west where the land and climate were different, and where waters were diverted out of stream basins to where water was needed, this principle of riparian right wasn't adequate to the solution of disputes over land and water. So we had to have a new principle that we called the right of appropriation, or the right of prior use.

As a farmer, if you were the first to develop and use water, you had the first right to use of water. That was the general practice of the law. But where water was a limiting factor in the development of land, then the right of prior use was not adequate.

So we developed, primarily here in California, the right of beneficial use. In other words, you cannot file on water and maintain a right to it unless you use it beneficially. You cannot use it wastefully, which would mean that you were depriving someone else of water that he might otherwise have. The right to water is based upon whether or not water is being used beneficially for the community, not the individual alone.

I said in Israel, after I had been over so much land that had been misused and destroyed, "Why shouldn't we have another principle--that the right to land is based upon beneficial use?" Actually, the only real argument we had to take the land away from the Indian was that he was not using the land beneficially, to its maximum use.

When I returned, I spoke to Justice Brandeis about this. I outlined these steps and principles involved, and he said, "You are right. That's true, but you are fifty years ahead of your time." [laughter]

Chall: Now the beneficial use of land would require rather strict regulations, wouldn't it?

WCL: Absolutely.

Individual Enterprise and Regulation

Chall: While you believe in allowing individual enterprise and education to determine, as far as possible, how a person will use his land, you feel that land use ultimately requires some regulation, not only an individual approach?

WCL: Well, yes. Regarding this question of harnessing the energy motivation of people to problems of making the best use of land in production of useful crops, I have always said that our objective is to give play to individual initiative, within a framework of social objectives, arrived at by the democratic process.

Chall: Now that seems very good, but at what point does the democratic process set forth the regulations which the farmer has to live by? Is that done by Congress? By whom?

WCL: Well, we have not yet reached the point where we would accept this type of regulation. My position has always been that so long as we have farmers in considerable numbers who want to make use of our methods of conserving land under use, we can cooperate with them. Our time generally was so occupied in cooperating with interested farmers, we left until a later time, attempts to regulate by law the proper use of land by reluctant farmers.

But as we have seen--and Israel is an excellent example of it--where land resources are limited, and population is exploding, and pressure on the land resource is increasing, then we have to develop public sentiment for land conservation. By establishing scientific truth of what happens when you do or when you do not, we can get compliance from a good portion of our population in this way, perhaps without strict regulations.

But there still would be those who will resist and who will not of their own accord take care of their land. We have a lot of trouble at the present time in getting these Soil Conservation district farmers to comply with these minimum measures we have worked out that are needed to conserve the soil under use.

In Israel, where land is limited, if land is damaged or destroyed by wrong use, then you not only harm yourself but you are harming all future citizens who must depend on this or that field. I many times have said that we must be born again out of an economy of exploitation into an economy of conservation, as a basic, long-range point of view.

Chall: But what if you had a farmer living on class four land, and on which he had paid off the mortgage--what could be done to prevent this farmer from going on exploiting the land? Could the government take him off his own land and put him some place else?

Chall: What could be done in a case like this?

WCL: Are you acquainted with the lengths the British went to in the second World War? They passed a law and established farm or agricultural boards, made up primarily of farmers. They set up standards of production for maximum results. Then they went another step and required that farmers follow these practices that had proven successful for their particular localities. That's why these boards of authority covered lands that were more or less similar in character.

If the farmers didn't comply, these boards went still further and would take possession or control of the farm. Either the farmer would be hired to farm his own land under direction, or he would be given another job. This land would then be turned over to a recognized successful farmer who would use the land wisely.

This is a case where necessity has brought such regulations into use. Many here might resist because we have not faced this necessity. You see, we are still an underpopulated country where we have land resources more than we need for the present, but not more than we need for the future.

Chall: It should not be wasted in the present.

WCL: That's right. Our objective is to harness the energy of man and his mind to carry out measures that will safeguard resources, not only for the present, but for the future. So I say, let's give play to individual initiative--we want to keep that alive--but individual initiative that will operate within the framework of social objectives. That's where neighbors will have an opportunity to influence the kind of measures necessary, that are arrived at by the democratic process.

Chall: Well, that's a good statement. It allows for the development of regulations--

WCL: I'm very strong on making use of individual initiative, because that's where originality and motivation are generated, especially where it comes to the production of useful things, crops, and so on.

Flood Control Act of 1944

Chall: In your written material you mentioned working on watershed phases

Chall: of Soil Conservation Service research. Were you consulted to help draft the Flood Control Act of 1944 which provided for research on eleven watersheds, or to help with administration after passage?

WCL: The bill that really started this was our bill that was passed in 1936, the Omnibus Flood Control Act, which, as you remember, signalled a breakthrough in flood control, but didn't result in immediate action.

Chall: That's right. Apparently nothing much came of it, and then you attempted again in 1944 to get some specific work done on watersheds.

WCL: One of the reasons for the delay was that the war came on. There was a slowdown. If any additional money was involved, it was frowned on, because the country was being taxed heavily for military developments.

The Act of 1944 provided for eleven experimental pilot watersheds. One of my boys, Carl Brown, was a keen, able young geologist. I put him in charge of this phase of the watershed bill. He worked at that so ably, and these eleven drainage basins were so well received, that Congress authorized continuation of this type of watershed development.

These projects were continued even in Eisenhower's administration, when he almost ruined our Soil Conservation Service, by by-passing the civil service and putting political appointees in technical jobs. But this pilot watershed idea was so successful that even Eisenhower favored this Act of 1944, which was rather a new thing for him, to do anything about national or governmental responsibility. In this bill was included the lands of towns and villages as well as lands of farms within the pilot basin.

In the Soil Conservation districts, we had district supervisors who were farmers and independent of any other organization. If they favored something and let Congress know it, they usually got results.

Anyway, this was the basis for the development of this pilot project idea.

WCL: But now the laws have changed so that work on watersheds is now concerned as much with urban as with agricultural problems. This was an amplification or an extension of authority. For instance, there is a district in Walnut Creek, California, and up at Santa Rosa, there is quite an elaborate one.

Chall: Do you have any feelings about this amplification? There are some writers who feel that the idea of protecting watersheds from the point of view of agriculture alone has now been scuttled in favor of all kinds of watershed projects, regardless of their use for agriculture. As a matter of fact, I understand that the Soil Conservation districts changed their name to Soil and Water Conservation districts, so they could take in all this development and have some responsibility for it.

WCL: In recent years, I haven't kept up with all that is going on. But I've been very much interested in it, for I was very keen on this from the very beginning.

When we get into agricultural and urban problems, we have to become hydrologists because rain runoff is now very much increased by urban sprawl, impervious roofs of houses, street and highway pavements, parking places, extensive freeway cloverleaves, and airports.

This produces more runoff than under natural conditions so you can have destructive flash floods that can overwhelm towns and villages that are especially affected by these floods. So our treatment must include finding out how much runoff we expect from each type of area. This has become very popular among rural areas.

If you are going to treat this problem at all, which involves both agricultural land and flood control in villages, one must realize we are dealing with the same water, so we have to become hydrologists. At first the agriculturalists didn't understand that flood water in a village was their problem as well as for the hydrologists.

I usually say that our trouble is that we haven't prepared the earth to make the best use of the blessings of heaven that come in the rains. We have to prepare this earth if we want the blessings.

Technical Committee on Forestry and Forest Products

WCL: I wrote a long memorandum on principles of sustained land use and gave it to the Interim Commission on Food and Agriculture of the United Nations. I felt the foresters were not giving enough attention to soils of the forests, actually none at all.

Chall: So yours was supplemental to the published report.* You felt that they were dealing only with trees.

WCL: Yes. At the White House conference on conservation of natural resources, which was a landmark in the progress of this development, Teddy Roosevelt, who was a very far-sighted man, had different people give lectures to governors. Little attention was given to soil losses in our country. It was the destruction of forests that caught the public attention. People forgot that forests need soils. Practically no program on soils was discussed.

Pinchot, who was a picturesque individual, a very wealthy man and politically very powerful, had taken an early interest in forestry and became acquainted with the foresters, especially in Germany, and also with Henry Solon Graves, and others here. As I put it, it took another generation and another Roosevelt to bring in the problem of conservation of soils.

Chall: At this time, Graves must have been the dean of foresters. As an older man, he was the chairman of this FAO committee, wasn't he?

WCL: Yes, and everybody loved Solon Graves. He was a marvelous person.

Chall: Did you get him to accept your idea about consideration of soils?

WCL: Yes. He seemed to be in entire agreement with my long memorandum of November, 1944, which laid special emphasis on the role of soils in the production of forest crops as well as agronomic crops. This long memorandum was published as Confidential 462.

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* Third Report to the Governments of the United Nations, by the Interim Commission on Food and Agriculture, Washington, D.C., April 25, 1945.

Measuring Needs of Wood

WCL: I wrote an article entitled, "World-Wide Need of Wood." Also, I gave a lecture in Philadelphia before the Philosophical Society that Benjamin Franklin founded. I mentioned wood pulp as one of the products that had become very important. I expressed the idea that the advancement, culturally, of a nation can be measured by the amount of pulp per capita in use for newsprint. The London Times objected to this. [laughter]

How can one find out how much wood the world needs? I used England as an example of an advanced country which would be economical in its use of wood, for it couldn't grow enough to meet the full needs of the country and much had to be imported.

I used that as an indication that the importation of timber would be a measure of their relative need for timber. We would have some measure of what an advanced country would need per capita, if we added to what they grew in timber, what it was necessary to import.

Chall: So you felt that this FAO commission was not concerned enough with statistical facts on forests?

WCL: Well, many countries had not yet built up statistical records of their forests and use of forest products. In some countries where they had an excess of timber, they could be wasteful. Other countries did not have enough for their needs.

People were concerned not only with commerce in timber, but were concerned primarily with the product after trees had been harvested; whereas we foresters, in managing forests, would take into account the relationship of forests to soil and water, and how to manage and protect growing timber stands from fire. We want to get the most out of the forest.

FAO and Forestry

Chall: What has been the result, in terms of FAO and forestry?

WCL: FAO established a branch of forestry. Foresters have been

WCL: energetic and cooperative with other foresters here and abroad. This gives the forester pride in his profession and in the significance of it. It requires him to think in longer terms, of a century or more, because he is dealing with a long-range crop and its indirect benefits.

Foresters were the first to be interested in the wastage of land by soil erosion, before the agronomist became concerned. Maintenance of the scenic and inspirational beauties of forests in the state of nature was a part of the foresters' life and training.

Chall: Do you think foresters working in other parts of the world have these same high motives?

WCL: Yes. There's pride among international and our American foresters. You have a camaraderie with anyone trained as a forester. I have represented the Society of American Foresters at international congresses and felt it quite an honor.

Justice Louis Brandeis

Chall: Can you give me a sketch of Mr. Brandeis, since you knew him well during this time?

WCL: Perhaps it is not necessary to say much more here, for in my written replies to your questions on my return from Palestine in 1939, I went into more detail. Justice Brandeis was extremely intelligent, deeply spiritual and conscientious in administering justice. My contacts with him were an inspiration. We had a beautiful friendship up until the time of his death.

Chall: So he was a very careful scholar and legal man and a humanitarian?

WCL: One of the great spirits of our time.

Mrs. Lowdermilk Tells About Washington, D.C.

White House Receptions

Chall: Do you remember anything in particular about President and Mrs. Roosevelt?

Mrs. L.: I remember vividly my first reception in the White House. We gathered in the famous East Room. Then we went in line through the adjoining Blue Room, where President Roosevelt sat on a high stool, so one had the feeling that he was standing. An aide stood beside him to whom we gave our names and Roosevelt was most cordial to Walter.

When I stepped up, he put out his hand warmly and took mine; and as he looked in my eyes, he said, "Oh Mrs. Lowdermilk, I'm so glad you could come this evening." Well, I knew he didn't care a hoot about me, whether I was there or not; but I appreciated this extreme friendliness and gentlemanliness that made him so very popular. The close association we had in government contacts was very wonderful in those early days. And what stamina Mrs. Roosevelt had! I've seen her stand out in the garden and literally shake hands with two thousand people.

And just in contrast--but not to belittle another President's wife--I went with the Federated Women's Clubs of America, when at an annual Washington convention, to Mrs. Truman's for a reception. The White House was being repaired so they were living in Blair House.

These Club women were very excited about this supposedly great social event. I was quite amused as I listened to them. Many had bought new hats and dresses for the occasion. They were all dolled up to the utmost of which they were capable.

Blair House was sort of a double house--we were ushered in one door so guests could make a sort of circle and out another door. There were not too many of us, but Mrs. Truman did not shake hands with anyone. It would be too much of an effort, I suppose. As each passed by, she smiled and nodded as they were introduced to her.

Then we went from that room into a sort of family sitting room adjoining a big banquet room. I went into this dining room. There was no sign of tea or cakes and no servants were around. I said to one of the Washington women (a few of us had been asked to go along as hostesses), "Heavens, aren't we even going to get a cup of tea and a cookie?" She said, "If we do

Mrs. L.: not, I think it would be utterly disgraceful."

Anyone who went to the Roosevelts' was served graciously in recognition that you had come as an honor to them. We all stood around, waiting for somebody to do something. Finally the man who led us in the door maneuvered us out the other door.

These leading women from many states were simply furious. They stormed all the way down the street. To think that arrangements had been made and they had been invited to the temporary White House by Mrs. Truman, and she not only had not shaken hands with them, she had not even offered them a cup of tea or a cookie.

They said, "We know that it isn't because they don't have the means, because we pay taxes to give them an enormous budget for entertaining."

They were hurt that they were not considered important enough for Mrs. Truman to bother about them. The Federated Women's Clubs of America were decidedly unhappy and disappointed with what they thought would be the high point for them in their annual congress in Washington.

Mrs. Roosevelt and the Girls' Reformatory

Mrs. L.: But we were speaking about Mrs. Roosevelt. She had to endure a great deal of criticism. Some people wanted a President's wife to be just a feminine doll, but Mrs. Roosevelt was a personality and a woman of vision and she could not do that.

She was making a public talk in Washington, and expressed her interest in people generally and their welfare, and said she would do what she could to help them. Afterward, a Quaker, a close friend of ours, went up to her and said, "Do you really mean what you said about interest in people who are down and out and making life better for them?" Mrs. Roosevelt said, "Why, indeed I am in earnest."

The Quaker said, "Then I would like to have you come down and see the Washington Reformatory for Girls." Mrs. Roosevelt said, "I'll be glad to." She took her name and said, "But I will have to see my secretary and make a time."

"Well," the Quaker friend thought, "this is the end. This is just her way out of doing anything." But sure enough, within a few days, the secretary called and said, "Mrs. Roosevelt would like to make a date to come and see your work at the girls'

Mrs. L.: reformatory."

The Quaker showed Mrs. Roosevelt how some of these girls were in windowless rooms, or else with windows so high up they could not see out. Ventilation was very bad, so that in heat of summer, it would be simply unbearable, and in the cold of winter, there was no central heating to give the girls the warmth they needed.

She showed Mrs. Roosevelt some places where girls in desperation had used their fists to beat on the wall in a frantic effort to give expression to their frustration in such confinement. Actually it was almost a medieval prison.

Mrs. Roosevelt was visibly shocked that this condition existed in the Capital. Believe me, she did not delay to do something about it. She raised a public stew. She went to Congress and got passed whatever was necessary so that these reformatory girls should have proper heat for winter and proper ventilation for summer; and not continue in a medieval prison, but should have certain things that are now a part of modern reformatories.

Of course, that was thirty years ago. I presume we have done a lot for such people since then. But before Mrs. Roosevelt, no one had bothered to take an interest in the welfare of such people.

Herbert Hoover

Mrs. L.: Walter worked with Hoover, and he adored him in many ways; but yet Hoover didn't have an understanding of the people. He fought the poor veterans who had nothing and were out of work when they swarmed into Washington. The depression was on and these veterans were miserable. Their families were hungry, they had insufficient winter clothes, and in desperation, they marched on Washington for help. And Hoover had the soldiers pitch on them as though they were an enemy coming in, yet they were all veterans.

Hoover lacked an understanding of poverty. He had money and gracious living in his own life, and he just didn't understand people who were suffering and down and out. He ordered our army out and drove the veterans away as though they were enemy encampments.

WCL: When Hoover was my chief in the Belgian Relief, all that needed to be said was, "The Chief wants this done," and it was done.

WCL: And we looked upon him as a very great leader, but I know of another case when Hoover took the evening train to Chicago from Washington.

He came into the dining car and sat down for dinner, and some friend was with him. The steward was very much excited that the President was dining with him that evening and was anxious to have everything just right.

After he'd done quite a bit of serving, he came up to Hoover and said he was honored to have him, and asked if there was anything he wished and was everything all right.

Hoover bruskly replied, "If anything wasn't all right, I would tell you," and turned away.

Mrs. L.: He wasn't very gracious. You see, he just lacked that sympathetic touch. If he had given that man a smile and said, "Everything is just fine," that man would have been lifted up for weeks to come. As it was, he was squelched completely and hurt.

Soil Conservation Service: Missionary Zeal

Mrs. L.: In the early days of the Soil Conservation, men had a true missionary zeal. Some of the men really preached sermons and warned people about the dangers of soil erosion and the doom that awaited our country if we did not fight this great enemy.

I remember how Mr. Winston would get as excited as a minister preaching against sin and the sinner. With a tremulo voice and waving his arms, he would almost shout in his seriousness of warning people against the dire things that were to come because of the neglect of our lands and wastage by soil erosion.

There was a supreme dedication among these early conservation men, and they worked hard. There were a number of men who had heart attacks from overwork. They were so interested, they wouldn't stop, and some attacks were fatal, which was a great loss to the work.

In fact, Walter set a terrible pace himself for years and was able to take this physical pace, whereas some men who tried to keep his pace just couldn't take it. However, in time exhaustion overtook Walter and he lay in the hospital nine weeks to give his wounded heart and body a rest.