WORKSHOP
ON
FLOOD PLAIN MANAGEMENT

Quail Roost Conference Center
Rougemont, N. C.

June 6, 1969

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9:00 a.m. "Seminar Objectives and Procedures". . . Professor David H. Howells


9:30 a.m. "An Overview of State Law Pertaining to Flood Plain Management" . . . . Professor M. S. Heath, Jr.

9:45 a.m. "An Overview of Legal Powers Which Local Government May Use in Flood Plain Management" . . . . Professor Philip P. Green, Jr.

Community Response to Flood Plain Information Studies:

10:00 a.m. Asheville . . . . . . . . . . . . Mr. Charles Cunningham
Western N. C. Regional Planning Commission

10:15 a.m. Charlotte . . . . . . . . . . . . Mr. William E. McIntyre
Charlotte-Mecklenburg Planning Commission

10:30 a.m. COFFEE BREAK

11:00 a.m. Greensboro . . . . . . . . . . . . Mr. T. Z. Osborne
Assistant Director of Public Works

11:15 a.m. Research Triangle . . . . . . . . . . . . Mr. Ray R. Lester
Research Triangle Planning Commission

11:30 a.m. Wilmington . . . . . . . . . . . . Mr. Timothy Wood
Wilmington-New Hanover County Planning Commission

11:45 a.m. Winston-Salem . . . . . . . . . . . . Mr. Joe H. Berrier
Director of Public Works

12:00 noon LUNCH

1:00 p.m. Dual Workshops, each addressing itself to the following and other pertinent questions:

GROUP I . . . . . . . . . . . . Dining Room

GROUP II . . . . . . . . . . . . Closed-in Porch

Public understanding of the nature of flood damages and role of flood plain management.

Possible approaches to initiation of community action.
Community attitudes toward land use planning and zoning.

Nature of socio-economic-political forces affecting community response.

Principal determinants to community response.

Adequacy of state law.

Adequacy of local ordinances.

Subject areas where studies and research might contribute to development and implementation of programs.

3:00 p.m.  BREAK

3:15 p.m.  Reporting of workshop findings and discussion

4:00 p.m.  Adjournment
The objectives of this workshop were to explore the problems associated with utilization of flood plain information reports and the implementation of flood plain management plans for the reduction of flood damages; to identify additional steps which might be taken by action agencies to implement flood plain management plans; and to characterize specific research needs directed toward social, political, economic and legal aspects of flood plain planning and management.

Participants included representatives of federal and state agencies concerned with water resource planning for flood management, representatives of local government and planning commissions, and the university community.

This is the second in a series of research workshops sponsored by the Institute to increase the communication between research users and researchers on water resource problems and research needs.

David H. Howells
Director
Gentlemen, if you will forgive me for starting with an opinion and a generalization, I will say that up until 1966 the program relating to flood plains in North Carolina, and in my opinion throughout the nation, consisted of technical studies to delineate the possible limit of flooding within municipalities. These studies were made by the federal water resource development agencies which supplied the impetus for the program. The communities selected were those which the federal agencies could interest in applying for a study. Not all of the communities were willing even to have a study made, some from fear of being pushed into unpopular zoning, some perhaps for other reasons. The state's role was that it was asked by the federal agencies to endorse the applications from municipalities for the studies and to participate in the presentation of completed studies to the local officials. This program, as it was then and as it intensified later, has produced thirty-seven completed flood plain information studies in North Carolina. The Tennessee Valley Authority has completed eighteen, the two Corps of Engineers Districts at Wilmington and Charleston have completed fourteen between them and the Geological Survey has completed five. Most of these are specialized in nature, and I may be a little out of date on Ralph because he has been moving very fast. (Ralph Heath of the Geological Survey). At this time we have underway an additional one by TVA which is just being completed, sixteen by the two Army Engineer Districts, and forty-four in a new abbreviated format by the Geological Survey. This makes a total of sixty-one underway and altogether ninety-eight that have been completed or in progress. This figure is quite significant when you consider that there are one hundred and twenty-five communities in the state with a population of 2500 or more—a figure which we have used as part of an index of our progress in the flood plain study coverage in the state.

Two of the studies that have been completed have features of particular interest. In Charlotte, the first of a three-phase study has been completed and presented to the local officials. The feature of interest is that the local officials raised the question of extending the study to provide a floodway in
the city—a floodway which could be rigidly controlled and allow filling and other development outside of the floodway. The study in Winston-Salem reported on three major creeks in the city but failed to report on the one that runs right through the middle of the city—Peters Creek. The reason is that the creek has been so encroached on that the studying agency found it could not produce any meaningful flood information on the area.

In 1966 the program underwent some intensification largely as the result of the Federal Task Force study on flood control headed by Gilbert White of the University of Chicago. Emphasis began to be placed on flood damage prevention and alternatives to structural measures for flood control. In view of the Task Force's finding that flood damages were increasing at a greater rate than flood control structures were being placed, the Army Engineers intensified its program by hiring Jim Goddard, whom a number of you know and who has just retired from TVA and is very prominent in this field of flood plain management. They used him on a consultant basis to reorganize their program and broaden it under the title of flood plain management services rather than just flood plain information studies.

Both the Corps of Engineers and TVA sought larger appropriations in order to make these studies at an increased rate, and they also asked for greater state involvement. With the Corps this took the form of a new regulation which specified that the states be asked to play a greater role in stimulating requests from local government for flood plain information studies, establishing priorities among these requests, and in presenting the studies to local officials. We have tried to respond to this. The Geological Survey also developed a new program of abbreviated studies which in my understanding, Ralph, had its beginning in this 1966 study. The following year, 1967, one of our legislative years here in the state, as a part of a package of water resource laws which grew out of a two-year study of needed water resource laws, North Carolina passed a flood plain management law. It specified that primary responsibility for flood plain management rests with the local levels of government and that the state's role is one of encouraging and assisting local government. We are trying to get a little beyond this. In 1968, last year, we hired Jim Goddard to make a study for us, and his real choice—what he would like to have recommended—was a very aggressive position by the state including a large flood plain management staff. Perhaps, I might tell you that I have a division
consisting of me and a girl—and now Selby Jones—and flood plain management is only one of my jobs. Jim wanted to get about nineteen people in there for flood plain management, and beyond that he wanted us to seek legislation that would require that communities establish flood plain management measures within a certain period of time—I think this was a year, based on an experience in Wisconsin—with the alternative that if they didn't, the state would step in and zone the areas for them or take whatever measures were to be imposed. Because we had a different philosophy about the state's methods of dealing with local governments, plus some practical considerations about the effect on other legislation we were trying to get and the availability of funds, our Department of Water and Air Resources did not accept this recommendation.

We were able to augment our staff by hiring a flood plain information specialist, Selby Jones, and although we don't have funds to continue this position after June 30, he has been able to make a contribution in working up a priority list of communities and in establishing personal contact with local officials in a number of areas. Now, this priority list has given us trouble. We have attempted to determine the special needs which would establish priorities by personal visits to communities and by advice from the federal agencies. We consulted the federal agencies on the first draft of our priority list but found that the list placed communities in the eastern part of the state generally in the upper part of the priority list—because of the prevalence of hurricane flooding—those in the Piedmont generally in the middle of the list, and those in the western part of the state at the end of the list. In addition to the fact that this is probably wrong because there must be communities in the west that have special pressing needs for flood plain management, it's also unreal in that we have three agencies that cover these three areas, and they work simultaneously on a number of studies. We are reviewing this further now with the federal agencies.

Another step that the state took was again at the suggestion of the federal agencies, and it was the formation of an informal committee to investigate ways in which the state could assist local governments in the implementation of the control measures to take advantage of the technical study data. This committee included Milton Heath, George Monaghan, representatives of TVA and the two Engineer Districts. The need for this investigation of state assistance was evident from the lack of controls that had been imposed in areas where flood
plain information studies had been completed. We made a little survey of this and found very little that had concretely been done. The need was evident from difficulties reported by some communities in trying to impose controls. One that comes to mind is Winston-Salem which Joe (Joe H. Berrier) may be able to tell you something more about. After some general discussions by this committee we decided that we would take a case study, and we selected Greensboro because it had a good completed flood plain information study and a strong planning organization. Two principal results came out of our work with Greensboro. First, it was decided that the establishment of a floodway would permit the rigid protection of an adequate water course and the filling of other parts of the plain as the Charlotte people had suggested. I presume that Mr. Medford and Mr. Osborne will tell us more about that later. The Army Engineers, Wilmington District, did provide the technical data on the floodway; and as I understand it, the city is putting a plan into effect by ordinance. The second result of the committee's work was the decision that the state's flood plain management law of 1967 needed to be modified to insure that the various control measures—zoning, subdivision regulations, building codes and the authority to acquire open space—could be used by counties and municipalities for flood plain management purposes, specifically, without being open to successful challenge. The amendment was written and had been passed and ratified by the current session of the General Assembly. In presenting this amendment to the General Assembly the principal selling point that we used was its need in order to be sure that communities are able to qualify for federal flood insurance under the new flood insurance law. We have also been trying to get all the information we can in order to tell the communities what they have to do to qualify, and this hasn't been easy. We have some information from Florida to the effect that they expect a survey will have to be made, probably by the Army Engineers, for a community that wants to qualify so that its people can get federal flood insurance. We haven't been able to confirm this from HUD, and I presume that the gentlemen from HUD here will tell us a little more about that. The last word we had from them (Mr. Ross who administered this program) is that the federal regulations in their final form will be published soon; and he asked that we not try to disseminate any advice to the communities prior to the publication of these regulations.
Jim Goddard, in his work with us, had told us that he understood HUD was going to have some forty-eight areas in the country in which the flood insurance would be available with three in North Carolina. This may be wrong or out of date, but they were Wrightsville Beach, Charlotte and Asheville. There is a deadline of June 30, 1970, for communities to qualify for flood insurance. We have heard rumors from various sources that the date will probably be extended, so we are just going to move as fast as we can to make sure that everybody interested in getting flood insurance knows what they have to do to qualify.

We are also doing a little administrative thing in helping the Geological Survey disseminate its new abbreviated flood plain information studies in much the same way as we disseminate the flood plain studies by the Corps. We feel that this may offer some promise in another area of interest.

The three-county planning commission that Ray Lester is in covering Wake, Durham and Orange Counties, which is headquartered at the Research Triangle Institute, has proposed a flood plain information study covering the three counties--the whole rural area, as well as the urban areas that have and have not been studied--and it does appear that this could permit planning and the imposition of controls in a large area prior to the time when imminent development would cause the kind of resistance you will hear more about with regard to zoning and subdivision regulations later on. This is my own unsubstantiated opinion, but I feel that this has great promise; and if it could be worked up in a practical, applicable way, it could set a pattern for use in other parts of the state and be the beginning of a really effective set of statewide controls.

I have named several things that we are trying to do to broaden the state flood plain management effort. In addition, of course, we are intensifying our effort to develop interest by communities in getting flood plain information studies; and we are open to any suggestions that any of you might have as to what the state might do to be helpful. I hope and expect that some things will grow out of this workshop that we can get busy with.

Question: The Colonel mentioned they went to Greensboro for the study on what the committee should recommend after another city indicated they wouldn't be too cooperative.
Page: No, the other city had brought up the floodway proposition, and we didn't follow it up. Nobody turned it down; and Greensboro, Mr. Medford, was very cooperative.

Howells: As I indicated earlier, before we proceed with the legal background for flood plain management we would like to give the representatives of the federal agencies a chance to amplify on Colonel Page's remarks if they care to. Ralph Heath, USGS, do you have anything further you would like to say at this point?

Ralph Heath, USGS: I have here the first of forty maps with which the USGS has outlined areas of occasional flooding. This is kind of a vague term which I'm sure we'll hear more about today. I have two examples of a map which I brought--I didn't bring enough for everybody. Later, I'll bring in the envelopes with maps and brochures. We are now in the process of transmitting these to the communities involved.

I have been concerned with flooding conditions in North Carolina for the last three years. My specialty in the USGS is actually ground water. One of the things I have noted in traveling around the state is that North Carolina cities--especially in the Piedmont--were built in the upland areas, between the smaller streams. As a result of the present rapid growth of the state, we are spreading into these small-stream valleys and the problem of floods is accelerating. This meeting is very timely in approaching this problem.

Bernie Ingram, Wilmington District, Corps of Engineers: I don't have anything of a formal nature to offer. We were glad to see you taking this step in flood plain management. We feel this will mean a lot to the field at large and our activities, and we look forward to working with the group here today.
We do know, do we not, that it will be necessary for communities to have flood plain zoning (in order to qualify for federal flood insurance)?

They (HUD) have actually formulated the federal regulations in a tentative form. The final form has not been published. This is reasonably specific, I would say. The vagueness lies in our being asked not to disseminate anything.

We have Dr. Levin from the Flood Insurance Administration who might address himself further to this later on.

I think Colonel Page has just about said everything I need to say. In the Tennessee Valley as a whole 120 communities have flood plain information reports, and 65 of them have adopted flood plain regulations--slightly over 50 percent. In the North Carolina portion of TVA, however, nineteen have flood reports, only six of which have adopted flood plain regulations. So we have not been quite as successful in western North Carolina as we have in the Tennessee Valley as a whole. My particular opinion is that a community usually adopts flood plain regulations for one of two reasons:

1) A particular situation arises which causes them to recognize the need for them. I note particularly a town in Tennessee where a subdivision was going in an area where the planning board knew it should not be, but they had no way whatsoever to refuse the subdivision plat unless they had had flood plain provisions in their subdivision regulations.

2) The persistence of someone--TVA staff, planner or local citizen. Jim Goddard has been mentioned, and I will mention him again--he has been a tremendous strength to this program nationwide. One of our communities adopted flood plain regulations in its zoning ordinance some time ago. The planner, in presenting this to the planning commission and later to the city commission, said, "for God's sake adopt this thing and get
Jim Goddard off my back." This may not be the most desirable way, but it is one way of getting adoption—the persistence of somebody who is sold on this program.

Dr. Theodore H. Levin, (Department of Housing and Urban Development, Federal Insurance Administration)

We appreciate very much the opportunity to meet with you here and participate and improve understanding of the national flood insurance program. I will be around all day to answer questions, and I have brought some material. I am sure there will be a lot of questions, but I really expect to learn, in fact, as much as I will contribute. I don't have to speak to this group about the history of flood damages. I just want to give you a brief history of the flood insurance program. I want to briefly tell you where we stand and give some earlier answers to some of the questions raised, and I will answer the others later.

In 1956, there was a Flood Indemnity Act passed. It went through the Congress despite the doubts of some experts in the field and some very influential executives of the insurance industry. There was no scientific method for studying risk premium rates, so that the following year when the representatives of a predecessor agency went up the hill for appropriations, questions were asked—how are you going to set rates? The Congress was not satisfied with the answers. No funding was provided, and that was the end of that flood insurance program. However, the bill remained on the books including borrowing authority for $500,000,000 with what Washington called "back-door financing." This type of financing is absolutely necessary in a federal program where contingent liabilities are involved and the payment of claims cannot wait for the appropriations. The Southeast Hurricane Disaster Act of 1965 directed a predecessor agency to make a study on: (1) The feasibility of alternative methods including flood insurance for meeting the problems of flood losses, and (2) the feasibility of earthquake insurance. The latter study, parenthetically, is being conceived primarily for California, and we hope to get it up to the hill by the end of this month.

On the basis of this recommendation, a task force was set up headed by Dr. Marion Clawson which made a very thorough study with cooperation of various federal agencies, Corps of Engineers, TVA, Geological Survey, Soil Conservation
Service, Geodetic Survey and Coast and Geodetic Survey, called in many experts and consulted with the insurance industry. The nub of the report was that flood insurance was feasible, and by integrating flood frequency information and available flood damage information, it was possible to derive a satisfactory actuarial basis for determining premium rates, but that it would be costly. I might add that when this report came out in 1966 we were more fortunate than at an earlier date. We had the benefit of computer techniques where the inadequacy of samples can be partially remedied by simulation techniques and the report recommended three alternative methods of approaching the problem:

1. a program operated entirely by the insurance industry with the federal government providing subsidy in some way to spell it out in great detail,
2. a federal program using the industry only as an agent, and
3. a cooperative program of the federal government and the insurance industry.

This report was completed about August 1966 contemporary with the Gilbert White report on a national program of managing flood losses. The Gilbert White report went up without a complete picture of what was coming up in the flood insurance report. The flood insurance report came up without the clear understanding of what was coming up in other reports. There were two separate task forces. However, there was nothing inconsistent with this except that the Gilbert White report in speaking of the flood insurance as one way to meet the problem recommended a highly experimental program. When I joined HUD over two and a half years ago, that was when I started, the feasibility report was placed on my desk. It appeared obvious that the third recommendation, the preferred recommendation, a cooperative program of the insurance industry and the federal government, would be the way it would go. The report also stressed that if this program were to be successful, in fact, that the important objective of providing flood insurance, there should be promotion, encouragement and requirement of flood plain management.

Over this period there were discussions and negotiations with the insurance industry, with insurance commissioners, various experts of state and local people. We were very happy to find that we had the full support of the insurance commissioners--no small measure due to the efforts of Broward Williams of Florida--
and we had the complete support of the insurance industry; that doesn't say that every company will come into it. I know of some big ones who are standing aside. The legislation was drafted and went up the hill in 1967. This legislation made a requirement flood insurance until June 30, 1970, the assurance of flood plain regulations for flood insurance to be made available and thereafter the requirement that there be satisfactory flood plain regulations. The bill passed both houses, in the House of Representatives with an amendment which would have killed the back-door financing and, therefore, the program, and in the Senate an amendment which would have severely limited the profit possibilities of the insurance companies participating and, therefore, killed the program. It went to conference and they didn't write us letters. That was that in 1967.

In 1968, the friends of flood insurance working behind the scenes found ways to remedy differences, compromise these differences, and surprised us by tacking onto the omnibus housing bill, the Housing and Urban Development Act of 1968, Title 13, the National Flood Insurance Program, and this became law on August 1 of 1968. When the supplemental appropriations went up the hill, we asked at first for $3,000,000 to get the program going, but our friends in the Budget Bureau cut that in half ($1,500,000) that went up the hill. When the appropriations committee reported out supplemental appropriations, the amount appropriated for flood insurance was zero, so we didn't feel we were in business. We had no basis to get staffed and get going. To our surprise on the floor the full million and a half was tacked on and was appropriated.

Now, where are we today? First, I will give you status, and then I will give you briefly a summary of provisions which interest us here today. The agreement with the industry is being signed today. The policy which reflects coverage will be approved within the next few days. Rate-making studies are underway in some twenty communities. We hope that flood insurance will be available in at least two communities by the end of the month. Notice of the proposed rule-making describing our idea of what land use management criteria would look like was published February 27 with a month for comments. These comments were reviewed. When I left Washington a draft was waiting for final approval and signatures before going to the Federal Register. This draft sets forth what is expected of communities in terms of evidence of interest which
puts them upon register for rate-making studies, and what is expected from them in assurance of land use management by June 30, 1970, what our criteria are and our concepts of program of state coordination and participation. I have drafts of these available. I will be available to answer any questions.
AN OVERVIEW OF STATE LAW PERTAINING TO FLOOD PLAIN MANAGEMENT

Milton S. Heath, Jr.
Associate Director
Institute of Government

About seven or eight years ago I made a study for the then North Carolina Department of Water Resources, financed primarily by TVA, on flood damage prevention in North Carolina with the help of Jim Goddard and Colonel Page's remote predecessor, General Wolf. This report was prepared and issued in 1963. One part of the report dealt with laws and programs for flood damage prevention in the various states, and I think this can serve as a good point of departure for me.

My investigations then showed that there were several major categories of state legislation on the subject. In the first place, most states had some kind of enabling legislation which provided a basis for local land use regulation. I won't say anything more about that since it is Phil Green's subject. In the second place, there were then and are now a fairly large number of states that have some form of dam safety legislation that provides for inspection and licensing of dams for the protection of the public against hazards to life and property that would result from dam failure. There are about twenty-nine or thirty states with laws of that general description; and since that time--since 1963--a few more have been added, including a North Carolina law in 1967 that provides for certification of dams on the basis of a report by a supervising engineer and gives the Department of Water and Air Resources inspection powers.

A smaller but still fairly significant number of states had gone beyond enabling legislation for local flood plain regulations and dam safety laws to some sort of state level regulation of flood plains to prevent encroachment, often referred to as channel encroachment laws or floodway encroachment laws. The substance of these laws usually is to prohibit the erection of structures or encroachments within natural floodways or stream channels, variously designated, without obtaining some kind of authorization for the encroachment or the structure, from a state agency. There were about eleven states with statutes of this description when I did my study. There have been several more of this general type enacted since that time, including some that bite a little
harder than the ones that were in existence then. For instance, Wisconsin
has enacted a statute which contemplates that unless local flood plain regu-
lations are adopted within a specified time that meet state criteria, the state
will be empowered then to move in and adopt regulations for that particular
area itself. A fourth type of law that falls in this general area that I am
talking about deals with the subject of coastal protection in states like
North Carolina that have coastal areas. There has been some legislation to
protect sand dunes and encourage local shore protection action. North Carolina
has one of the strongest sets of laws on this subject: an enabling statute for
sand dune protection by local ordinance, authority for a variety of local
financing methods for shore protection programs through property taxes, benefit
assessments, and so on.

Always an alternative to any sort of regulation, of course, is public
land acquisition, and public land acquisition has been used as a means of
providing protection against flood hazards, often in the context of broader
purposes such as getting the flood hazard area out of circulation while acquir-
ing land that can have valuable use for public recreation along stream bottoms
and the like. Then, there are a few miscellaneous sources of state legislation;
for instance, a few states have made some use of the tax laws to take account
of flood problems by permitting property tax adjustments or exemptions to be
granted to reflect flood-hazard land. Then, there are perhaps one or two
states that have considered or enacted legislation authorizing state agencies
to identify by signs or markers flood hazard areas.

Of course, a lot can be done at the state level by way of flood plain
management through simple administration and planning, by encouraging state
construction agencies such as the Highway Departments to take into account
flood problems in their planning, and by encouraging lending and housing agencies
to do the same. Most proposals for any sort of state action in this field con-
tain suggestions for adequate coordination by interdepartmental committees.

There, very briefly, is a review of the legislative situation that I found
as of 1963. There have been a few subsequent developments that I might mention
very briefly. I referred to the Wisconsin legislation which uses the familiar
"carrot and stick" approach that we have become accustomed to. Another slight
variation on this is a California law which provides a state incentive for local
action. It assumes that local government is the proper level for flood plain
regulations, but calls for state review of local regulations if a locality does not establish adequate regulations within a reasonable time. Instead of giving the state the authority to move in and adopt regulations it merely authorizes the cutting off of state aid that would otherwise be available to pay land acquisition costs, right-of-way acquisition, etc. in connection with federally supported flood control projects. Another development in one or two states, since that time, which I think has some relevance to the situation deals with the special problems of the flooding in coastal areas as a result of hurricane damage and storm damage. Some legislation has been enacted in the field of state insurance laws trying to provide some assurance that property insurance will be available in these areas to those who demand it. This year, North Carolina has passed a sort of assigned-risk law that sets up a pool of insurers who are to be available to provide insurance that is requested.

As to North Carolina's implementation of the 1963 report: immediately the implementation was essentially nil. We did not have the momentum then in North Carolina that has since developed for water resources legislation; it seems to be a lot easier to get water law passed now than it was in 1963 to 1965. The first small by-product of this study was the repeal of an obsolete 1957 law through which North Carolina had authorized municipalities and counties to zone areas subject to seasonal periodic flooding. It was intended to establish eligibility for federal flood insurance under the old 1956 law that never was actually activated. This was repealed, I believe, in 1965, in order to clear away some questions that are raised. It was really a very poorly drafted law, and it was more of a hindrance on the books than off, so it was repealed in an effort to clear away some litter.

I have been talking about legislation, but I haven't said anything about enforcement or administration. Needless to say, the fact that the state has a dam safety law or a floodway encroachment law or something of the sort does not mean it is enforcing it very effectively. I don't think a great deal is known, factually, about the actual enforcement of this legislation, but such information as is available to me indicates that enforcement is generally rather spotty and thin.

I believe I will stop at this point. I think that it might be appropriate for me to say a word or for Phil to say a word or two about the constitutional
questions involving state legislation and local legislation; but since time is running a little short, I will save that until after he is through. If he doesn't tell it, maybe we can come back to that.
AN OVERVIEW OF LEGAL POWERS AVAILABLE TO LOCAL GOVERNMENT IN FLOOD PLAIN MANAGEMENT

Philip P. Green, Jr., Assistant Director
Institute of Government
University of North Carolina at Chapel Hill

You will never believe that I haven't checked with Milton Heath, because part of my talk which I decided to scratch covered the constitutional restrictions. I think maybe since we are going to have some discussion this afternoon we might begin by talking about local powers with just the statement of a few of the constitutional and other legal principles which govern the local government. The first principle is that the local government can do only what the General Assembly says it can do. It has to have statutory authority, either specific or implied, for everything it does; and what the General Assembly gives, it can take away. These "authorizing" statutes normally contain certain restraints on local action in either requiring some specific organization or specific procedures, or in a more general sense just in the scope of the powers which are granted. When they grant some powers and don't grant others, that's an indication to the courts that they do not intend to grant the other powers. Next, there are constitutional restraints which must be observed. The restraint that you can spend public funds only for "public purposes" as defined by the court is one essential restraint. The restraint that you can exercise the power of eminent domain to acquire property only for "public use" as defined by the courts is another. In the area of regulation you have the due process concept that any regulations must be reasonable, and must have a reasonable and substantial connection with public health, safety, morals, and general welfare. They must be specific enough that people can understand what is required of them. You have the concept of uniformity, equal protection, which requires that you treat people in similar situations similarly; and where you want to have different regulations for different people you must have an adequate basis (or rational basis) for making this kind of a distinction. There is a restraint against the undue delegation of legislative authority as the courts describe it, by which they mean that you cannot delegate unrestricted authority to a particular official to grant or deny permits and so forth without any written standards to go by.
Now, against this kind of a background there are a number of powers which local governments can use in the process of flood plain management, perhaps more than I am going to mention today, but among these at least are your zoning ordinances, your subdivision, health and building regulations, your power to acquire open space, your power to acquire park land, and your policies for provision of public services. And I would like to deal with these very briefly in turn.

First, the power to adopt the zoning ordinance, is the fundamental power for the purpose of flood plain management. This is the power by which we control the permitted land uses in any given area. We also control the intensity of use, and we control the land coverage within that area. It is the basic legal device that is available where you want to have different regulations for different areas, and so obviously it ties in very specifically with your efforts to regulate the use of land in flood plains which would be regulated differently from the use of land in other areas. Essentially the effort in the zoning ordinance, as it has been applied to date, is to restrict the types of uses permitted in the flood plains to low density uses and uses such as farming, parks, golf courses, airports, parking lots and so forth which will suffer minimal damage from flooding and will have the least constricting effect on the channel when you have flood conditions.

As Milton indicated, we had at one stage a very poorly drawn enabling act authorizing flood plain zoning in this state, which has now been removed from the books because it is generally believed by zoning authorities across the country that the Standard Zoning Enabling Act is adequate to give you the powers needed for flood plain zoning. In North Carolina all municipalities currently have the authority to adopt zoning ordinances within their limits; most municipalities over 1250 population have authority to adopt regulations for one mile outside their limits. Most of our counties have authority to zone portions of their unincorporated areas consisting of at least a square mile. They also have authority to zone all the unincorporated areas which are not subject to municipal regulations and, with the concurrence of a particular municipal governing board, they have authority to zone inside the municipality. So in most of our counties, both the city and the county have a full range of authority to adopt zoning ordinances.
Next, I would like to talk about subdivision regulations. These, basically, are a method for controlling lot and block size and layout, street and road layout, and a method for requiring installation of utility systems, such as water and sewage systems, drainage systems and so forth. In many states under subdivision regulations, there is authority to require dedications to the public of land for park and recreational purposes; and this is a particularly useful means of acquiring land in the flood plains which the developers probably would not be able to put to use for other purposes anyway in many cases. In a very few states there is specific statutory authority to prohibit all subdivision activity within unsuitable areas, and flood plains are one specific instance of this sort. In North Carolina there is no current authority to require dedication of land for park and recreation purposes, despite a series of attempts in the legislature. In North Carolina there is no authority to prohibit subdivision activity in any given area--no specific authority, although I think that perhaps just a few planners have exercised this authority, regardless. We have no specific authority to require improvements such as the installation of utilities except inside our city limit. As a result, we have numbers of regulations which are enforced not by the legal penalties that are provided, but as part of the bargaining process between a developer who wants something that the city can give him and the city which wants him to comply with certain regulations. Within these limitations, most of our North Carolina municipalities do have authority to regulate subdivisions within their limits and for one mile outside. Counties can regulate subdivisions in portions of the county which have been zoned or they can regulate subdivisions on a countywide basis in all the unincorporated areas outside municipal jurisdiction, and with the approval of a particular municipal governing board they can regulate subdivisions inside.

The next type of regulations that may be applicable are health regulations. Our county and district health boards have very broad regulatory powers, and these powers as applied in septic tank regulations, drainage regulations or water supply regulations can have impact on the development which takes place in flood plains. I might point out that the State Board of Health recently exercised power which it had been directed by statute to exercise for a great many years--and adopted regulations for development within watersheds of public water supplies which sharply restrict the permitted density of development in those areas. I think this is a sample of the type of thing that could be done by local health boards with respect to flood plains.
Still another type of regulation which could have some impact is the building code. In North Carolina the building code essentially is the State Building Code; and as far as I can tell, it applies to flood plains primarily in its requirements concerning the footings of structures. Special regulations have been developed, as many of you know, for our coastal areas, which require buildings to be erected on pilings to get them up above the potential flooding from hurricanes, and it seems to me that this is a potential area in which regulations could be developed for flood areas generally.

We have been talking regulations. When you want to place your controls on a somewhat more permanent footing, then you move from regulations into acquisition of property rights, and it seems to me that the local government which wants to stand fast on its controlled development in a flood plain ought to give at least some consideration to the acquisition of these rights. One level of acquisition of rights is the acquisition of open space. Under a general statewide enabling act municipalities and counties have the authority within their respective zoning jurisdictions to acquire property for the purpose of preserving open space. A variety of techniques are authorized: The acquisition of so-called development rights, the acquisition of property and then the sale back to the purchaser subject to deed restrictions, or the acquisition of property and lease back. All of these schemes have the concept that the land will remain in use by private interests rather than by the public, but that the public will have acquired the development right which would be considered detrimental if exercised by a private owner. When you carry this one step further, our cities and counties all have the authority to acquire land for use as parks and municipalities can acquire land for use as parks outside. This is acquisition of the land in fee and the retention of the complete title to the land. Related to this is the special act which Mecklenburg County got a number of years ago after failing to pass a bond issue for acquisition of park lands which authorizes Mecklenburg County to acquire flood plains as such and to develop and maintain them and use them as parks.

Finally, there is one other way in which I think a locality can exercise some control over development in flood plains, and that's through its policies on extension of such services as the water and sewer systems and so forth. In many cases the ability to control the areas into which you will extend these
services may be more important than the ability to adopt regulations. It may not stand fast over the long haul.

Summing up with one general observation: I would say that my notion of the most critical problem in the management of flood plains relates to the reasonableness of local regulations, and this in turn depends upon what we know in a technical sense—the definition of what is a flood plain, how far it extends, what kind of flood we are talking about, and what is permitted there. If you just cut off all rights to use the property in an area, you'd better have a pretty good reason for restricting it. If you restrict the use of property less severely, then perhaps you can be somewhat looser in your definition of what land falls in the flood plains.
I am glad Mr. Weathers is here because he has been around the mountains and looked at the flood waters for a lot longer than I have, and he might have to fill in on some basic information that I do not have. We've had floods in 1916, 1928, and 1940. I guess the 1940 was the most recent major flood. We did have a little flood in 1964, and at that time when Bob Barbour was there as our planning director, there was some interest expressed in establishing a floodway zone in Asheville. However, we've never been able to. I understand that this is what you want to know—why we haven't done anything about it. I guess it is because if we had been there with the TVA and with our proposed floodway zone in 1941, or maybe in 1917, the year after the big flood, we may have done something about it. I did a little checking on what has happened in the flood plains, what has happened since TVA prepared their very comprehensive report in 1960, and asked the staff to give me a little rundown on some of the construction that has taken place. One of my people got very enthusiastic about it, and he ran down everything that has since been built in the Asheville City limits. From the issuance of this report up to the last week, we experienced, according to the building permits and these are conservative, one and three-quarter million dollars worth of construction in the flood plain, and it is continuing every day. In two of the towns that I worked with Mr. Weathers and his staff, we collaborated on writing the zoning ordinance. Both Canton and Andrews were the ones in which we were successful in getting to adopt an ordinance which did contain a floodway zone, and we also had what we called a floodway fringe area where we had certain regulations about building construction. I'm not completely familiar with how well they are enforcing the provision of that ordinance. I wish somebody from Canton were here to tell us about it.

In the actual area this year we are having a good opportunity to bring the subject up again of establishing a floodway because I'm in the process of working up what we are calling a prototype zoning ordinance for Buncombe County to apply mainly to the Woodston Section, which is an unincorporated section.
bordering the French Broad River just outside the city limits of Asheville. So I think we will have a chance to revive the subject and determine what some of the problems might be in taking more restrictive measures.

We have a proposal to build a levee along the French Broad River as part of the overall stream development of the French Broad. It's not funded and hasn't been pushed forward in some years. We really don't seem to be doing too much or worrying too much. One of the things that is a little bit different about our place is that we don't have much flat land up there, and a lot of the flat land is right beside the river. We also happen to have a railroad track that comes along by that river; and so, naturally, it seems to be a desirable industrial site. The people--I have called on a couple of them--Jerry Sternburg, is a scrap dealer who is right down there on the flood plain, but he's built himself a little A-frame office, and now he is up above--he's up there about fifteen feet. I still think he would be flooded out if we have a '16 flood again. I also went over to the Enka plant--American Enka, to see their dikes. The Enka people came from Holland, and they are supposed to know something about flood prevention measures, but they built this big plant there. In 1929, when they built it, they built a little five-foot-high dike, and the 1940 flood was quite a disaster. It was quite an expensive flood. I never did get any dollar figures from them, but the dike was completely intersected. I think TVA told them at the time, or sometime during those years, that that five-foot-high dike wasn't going to do them much good, didn't they Mr. Weathers?

Weathers: I'm not too sure what they did.

But anyway, after the 1940 flood when the plant was completely flooded out and they had 28,000 electric motors that run their rayon process which had to be rewound among other things. They raised the level of the dikes to the present level of about fifteen feet above the floor of the plant. We walked along the dike the other day, and the plant engineer showed me how it would work and how they close the gates and pump water up over. They feel quite confident that this is going to save them from a flood of the 1916 range. In fact, they feel that they've taken some measures in clearing the stream of underbrush and that they are in a lot better condition than they were--they can withstand a flood greater than the 1916 flood.
We do have a subdivision ordinance for the City of Asheville and a mile beyond, but we have not been able to incorporate flood plain provisions in that. I think this device—perhaps if we took the policy of maybe withholding some public services, utilities in areas in the flood plain—that we might effectively take some measure on it. Anybody want to ask me any questions?

**Question:** Could you say anything more about the breakdown on that million and a half for construction?

**Cunningham:** Mostly plants, industrial plants and warehouses and restaurants. I don't think we have any residential construction. If you would like to see this, I've got it in red ink in this report here.

**Question:** Are most of the areas zoned industrial?

**Cunningham:** Yes, this is an industrial zone. Mr. Greene, we need to revise the zoning ordinance. Maybe you can do that for us.

**Comment:** May I add just a word on Asheville? I know a little bit about it. One of the things that might be emphasized is that the City of Asheville itself has been one of the worst violators of good flood plain management. The City of Asheville prepared a sanitary land fill in the flood plain from the banks. If floods of the magnitude of 1916 or 1940 occurred, the fill which the City put in restricts the flood plain until that same flood would be about four feet higher under present conditions than it actually occurred at the time. When the City itself does something like this, well aware of the flood conditions they have there, it is rather difficult for them to pass regulations and rules saying that somebody else can't do the same thing. That, in combination with the Upper French Broad project that Mr. Cunningham mentioned, looked real hot a couple of years ago as if it were going to provide control on the major stream coming through Asheville, and a lot of people felt that they were going to get flood control and regulations they thought were not necessary. There is a shortage of federal funds for that sort of thing. No money has been appropriated to actually
start work on that project, and it may be years away. At least the City's action, the need for reasonably flat lands which have rail and highway access, and the possibility of a flood control project have been three things which have contributed significantly to the lack of active flood plain planning there.

**Cunningham:** I might say that in connection with the flood insurance rate study both our county commissioners and our city manager, at least, have agreed to request that the studies be made; and of course, they are saying that they will do something by June 1970. They indicate that in their letter to you.

**Question:** Is the area that would be covered by a 1916 flood mostly industrial and commercial?

**Cunningham:** Yes sir, although we do have in the Biltmore section quite a few residences, there has been very little residential activity that has occurred, in the flood plain, mostly industrial and commercial.

**Question:** Mr. Cunningham, the description of the limited industrial site area and rail service—is the condition that exists also in the Town of Elkin? Where you have this situation and where they must go into the flood plain for industrial development, it gives rather considerable interest in flood proofing, does it not? I think we ought to keep this before us in our discussion. It may come generally under the building code as part of our control.

**Cunningham:** We are trying to find some alternatives, the choice of industrial land and with the cooperation of the Housing and Urban Development in helping to finance some of our planning studies; one of our studies this year on industrial locations in all Buncombe County, so we hope to find some areas where we can get away from the flood plain and develop this industrial park.
In Charlotte-Mecklenburg County we have been pecking away at various approaches trying to do something about preventing flood damage since about 1960. I think our first approach was the bravest and also the most fatal in terms of really getting anything done. At that time we were doing a new zoning ordinance for the city and adjacent urbanizing areas, and we were brave enough and perhaps unsophisticated enough to define zoning districts along the stream and establish these as districts in which no development could be placed that would be damaged by flood. In other words, the allowable uses in that district were really very few and would have made a very good flood damage prevention idea, I think. The howl that went up from that was, I guess, one of the most bloody I have ever heard in any of the kinds of things we have attempted to do. I think it was bloody for two basic reasons. We were defining as flooding districts not only lands that were vacant, but also lands that had already been built up and most of them had some development on them; most of the development was housing. A stream of people through the office protesting this went on for weeks and weeks and weeks, and the principal objection of those people who had houses in the areas that we were going to define as flood plains--I guess it was an obvious one if you think about it for a moment--they said this would put a cloud on their property and reduce the value of it. If they ever wanted to sell it, the first thing a person would do would be if he came into our office he'd see that the house was in a flood area, and I suspect that any hope for sale of these houses would have been eliminated by that classification. The other howl--this wasn't as large a one--was from the people who had vacant lands who were hoping to develop them. I think the resistance to this kind of sole blanket interdiction against development of vacant land--the reaction you will get to it, it seems to me--increases as the development potential of the property increases.

In an urbanizing area where there is a lot of development going on, everybody has very high expectations of the pot of gold that they are going to find when they sell their property for development. So, we backed off from this or we were pushed back off this idea; and since then, we've been taking a variety
of sort of tangential approaches to try to reduce the amount of development in areas subject to flooding. One of the things we have done, and this is pretty innocent really, but it has had a little bit of effect, I think, on all of our land development plans we have indicated as a wide land development policy that none of the flood lands along the streams should be developed. In other words, we always have a legend item on every general development plan which is green, and it says that this ought to be open space; and of course, we draw green bands down the stream. Well, I think that it has had a little effect, but obviously, not too much. It put some people on notice who otherwise might not know that the dry land of July is the wet land of September. So another thing that we've done--and this, I think, has been fairly successful, but it is not a comprehensive approach to the problem--we have enacted a subdivision regulation, and this enables us fairly well to forestall intensive development of any land that does not at the present time have access. If the land doesn't have access at the present time, that means that people have to build a road to get into that particular land; and if they have to build roads to get into the land, that means our subdivision ordinance is applicable to the development of that property. So I think this has been fairly successful. A thing that really amused me about this--when we were proposing this regulation, we thought that we would like to establish an interdiction on the development of all lands that were subject to fifty-year floods. So this went into the media for discussion, and we got some suggestions to this. People felt that we were going too far out--that we ought to establish a restriction that would say twenty years, or something like that. Fifty years is too far off to try to do anything about. Both you and I know that the fifty years isn't measured that way. So we compromised that and said okay how about twenty years plus two feet, and they bought that idea. I expect twenty years plus two feet may be more than the fifty-year flood. That satisfied people. Now the problem, one of the loopholes in that deal, is that we have no means of preventing people from filling up the flood land, getting the flood land filled up so they establish a new elevation of the property; and if they do this, they can build on it. Of course, if they do this, they are also reducing the flood storage capacity of the stream. Obviously, if they did this comprehensively, you would be right back where you started from in a few years. But to date, and this regulation has been in effect now probably about seven years, we have not had too much
filling. Although that technically is a problem, maybe actually it isn't the problem too much.

Another approach that we have taken, and I couldn't tab this as being eminently successful to date although I don't think the final judgment can yet be made on this particular approach, we took the positive approach of saying, let's not just prevent development in these lands, but let's bring these lands in the public domain and make recreation and open-space areas out of them. We proposed to the Board of County Commissioners a project we call McKelpen Creek Greenway, and this is a proposed greenway that stretches for about seven miles along one of the creeks in the county out in the suburban area, and the board of county commissioners that we originally proposed this idea to was quite enthusiastic about it, so we proceeded to go through all the technical details in planning and so forth that you have to go through to set up a thing like this; and we got an appropriation draft from HUD to enable us to spend only 50 percent of our money and spend the other 50 percent theirs. But the project has gotten tangled up considerably on the way by assessments of land for purchase price that the county is not very happy with, and it got tangled up in a variety of ways. The project is still officially on go, but it hasn't been funded very well by the Board of County Commissioners in the last couple of years, and we are up at bat again, now, on that subject. We are hopeful that the board will this year appropriate a sufficient amount of money to enable us to get on with the acquisition of land; and of course, if we can do this, we will eliminate the flood hazard project of possibilities there.

**Question:** Is this under the special act I mentioned that applies only to Mecklenburg County?

**McIntyre:** Well, I think so. It is under that, and it is under the recreation condemnation authorization, whatever we need to put it under. If it's ever challenged, we will put out the best we've got, whatever they are. I guess we have got several. Really, we have open-space recreation, we have a general open-space act, right? We have authority to acquire land for recreation,
for recreation facilities, and then we have our own special acts, so among these three I hope we could substantiate or defend if we are ever challenged.

We are taking even a more positive approach rather than a negative one. We are taking a very positive approach in one area of the county, an area of the east campus of the University of North Carolina, and there we have done sort of a new town plan for this area about the university. The new town plan—to the extent that we have means to implement it, we don't own the land so we really aren't taking a bona fide new-town approach—but we are doing as much as we can in terms of quite definitive planning for that area without owning the land. It so happens that there is a configuration of stream courses that really gives it the possibility of having an open-space system that I think would be quite singular in the way it fits into the total plan for this community. We are trying to sell the idea that this open-space system will help us define neighborhood, establish small neighborhoods as a part of this total large community. The open-space system will preserve in the community a semi-rural kind of environment, at least in part. It will keep in that community the kinds of openness people go to the suburbs to get, and then they find out that it is all closed in after they have been there for about five years. We are selling this as a very positive idea as I indicated. It so happens that this total open-space system of several streams focuses right on the campus of the university in the main activity center of the community. This means that if we can get this all carried out, we can have pedestrian systems and bicycle paths for professors who would like to ride their bicycles to the campus rather than drive their automobiles, and maybe get the students to ride their bicycles and tell dad he doesn't need to buy an extra car for the family. We're trying to sell this idea on a whole bunch of notions. So far, the reaction on the part of the elected officials to this has been very good. They like the concept. What we are going to do—the plan was just presented two months ago—is take this general idea and analyze every piece of property, analyze the whole system that we are proposing, to see where we can apply various types of strategies, regulations and so forth throughout this whole system to try and bring it into being, where we might apply acquisition for recreation as a part of this whole.
system, where our subdivision regulations would be effective in forestalling the development of some of this property and would not allow people to build roads into it, and how much of the land will be affected by this kind of regulation. We have an ordinance on the books that has directly nothing to do with floodplain management; but indirectly, I think that it may prove to be fairly effective in forestalling the development of many of the flood lands in the county and that is an ordinance that we call "planned unit development." It enables us to receive specific plans for development of large tracts of land from developers and if they will allocate in their development an appropriate amount of open space, then we will allow them to build to a little bit higher density on the other portions of their property. We think that as time goes on this ordinance may be effective to a third degree. To sum the situation up, obviously we don't have a comprehensive approach. The comprehensive approach that we tried, which is zoning, failed, and now we are just trying to use every other strategy and device that the community will accept to achieve the same purpose.

**Question:** On this greenway on the river, how far up from the creek do your boundaries go?

**McIntyre:** It is essentially the floodway. In a few places we have proposed to acquire some additional land where we wanted some additional land for recreation or other purposes, but essentially, it's the floodway.

**Question:** What is the total rough acreage included?

**McIntyre:** As best I can remember, it is some 700 acres of land.

**Question:** Is there a Corps of Engineers project in the works along any of these streams that affected any of your decisions?

**McIntyre:** No, the flood protection project came along after, Milton, but there is such a project in the works, and it is very close now to implementation.
Question: If control of the newly defined (post-project) floodways was made a requirement of the city attendant to the project, do you feel that would be a real problem?

McIntyre: I think it would. As a matter of fact, I think, if control of the land along the improved channelized stream were made a condition of the project, the project would fail for just that reason. One of the things that has sold this project is that this is going to dry up the adjacent land and make it available for development.

Question: That is part of the point I am making--the thing we're talking about. The existing fifty-year flood plain may be quite extensive. But if restrictions were put on the "post-project" flood plain, do you feel that would get you around some of these problems?

McIntyre: Oh, yes, I think that would reduce the problem to some extent.
T. Z. Osborne
Director of Public Works
Greensboro, North Carolina

I think the first thing we should do is scale everybody's thinking down from the last two speakers. We don't have any streams the size of the ones Mr. Cunningham has been talking about. Mr. McIntyre has used the big-scale approach, and we've been using the small scale coming up to the big scale. So I think if we can think back down to our level, I might describe first, for those of you who are not familiar with it, the situation in Greensboro. The founding fathers made sure that we didn't have too many big floods there; they made sure that we have trouble with water supply. As far as Greensboro is concerned, we don't have the major streams flooding in the middle of town. We have two streams, essentially two main stems, almost all of which are within the corporate limits of the city, so we are talking about relatively small streams. I guess the real start of any flood plain management was back perhaps in the 20's when there was a so-called park, dedicated and given to the city—or maybe, more appropriately, foreclosed on by the city. Ownership by the city of one of the streams is for quite a long distance down the stream along this park. Something like three miles of the stream actually is in the parkway. This was a real good foreclosure by the city for assessments back at that time, and this has been maintained as a park or an open space. It hasn't been developed until relatively recently, but it is a nice area. In 1954 there was begun a program of flood control with many facets. I think we used about all that you mentioned here this morning with the exception of zoning, and we hope very shortly with the information that has been furnished by the Corps to get into the zoning proposition also. Let me just run through real briefly some of the policies that have been instituted over a period of years. I don't think the time is really that important. Essentially, our greatest control is in subdivision approval, and our greatest leverage is money. You can hardly beat money for leverage. We do participate in the development of subdivisions providing those subdivisions are developed the way we want. Our subdivision ordinances require that all streams either be piped or be in dedicated public rights-of-way. There is, as you can well imagine, a limit to which the developer can go in piping a stream. Beyond that, he has to leave it open, but in these cases he would
dedicate it as a public right-of-way or open space. To kind of urge this along, we will take that as being city property along the floodway of the stream, and we will participate in the cost of the improvement for the abutting streets; that is, utilities as well as the paving. We require that all new streets be paved, and we have to pay the cost of paving for his subdivision.

Along about the same time, we instituted a program of dredging these streams. Now this is possible in our case because of the comparatively small streams which we are talking about. We have dredged—I really can't tell you the total number of miles, but I would imagine it would probably be a total of something like forty to fifty odd miles. This is not an attempt to dredge to a fifty-year flood or anything like that; this is more nearly in the range of a ten-year flood for which we are dredging these streams. Many of them presently are in city ownership because of the subdivision regulations. These we will dredge, but we will also dredge on private property where there's a 100 percent request by the property owners. This has maintained open floodways in the sense of small floods—that is, your ten, fifteen-year flood—but this will not—and it was never intended to—take care of the fifty-year flood or anything approaching this.

I want to comment on one thing. The idea was advanced this morning that while streams or the land are completely undeveloped is the time that these rights-of-way and so on should be obtained. We entered into an agreement with Guilford County whereby we would go outside of the corporate limits and dredge one of these major streams, provided they would get the right-of-way, and we would both participate in the cost. As far as undeveloped, this is about as undeveloped as you can get as far as the land is concerned, but they haven't been able to get the right-of-way at all. We dredged about a mile out of the three miles that were proposed, and they haven't been able to secure the right-of-way on the rest of it, and this is a very bad stream. In effect, we have dredged down to the city limits, and we can't get beyond the city limits. So we are losing a lot of the effect as far as the dredging of our own area is concerned.

We have been working with the Corps in their normal reports, and then we have gone one step further. They have kindly given us the stage and width of channel for the design flood. Our proposal, Mr. McIntyre, hopefully is to go into some type of zoning to protect this.
We are getting encroachment—I don't mean to imply that we haven't—on these floodways. Unfortunately, Interstate 40 and Interstate 85 go right down one of these creeks, and until the time those two interstates came along that land was $200 an acre. Now it is about $10,000 an acre, so you can see that our problem has increased considerably by virtue of the enhancement of the land due to these interstates.

We've had very good cooperation, generally, from the people. Sometimes, though, we have had to work with subdivision ordinances, building regulations and just plain bluffing in some cases. You always run into that one guy that you can't get to stay out, and this is where I think that zoning is the only answer. Incidentally, Bernie, we haven't gotten too far along with this because we are trying to put this into our own mapping system where a description of it can be written, and then we will be ready to start the fight, hopefully.

**Question:** On the subdivision-developer experience, who determines what the public and private interests are?

**Osborne:** This is determined by the city. A definite specification is written. We will participate to the extent that if there is street water contributing to that drainage, we will put in the correctly sized pipe if he will buy the materials; if street water is not involved, the developer bears the entire cost.

**Question:** I recall someone making the comment relative to the maintenance problem of the reserved lands that you have. Do you think that is worthy of comment?

**Osborne:** I would say that this is a very big item. For instance, we are redredging some cases where we really didn't take into account the maintenance on these areas, where we at one time had something like two-to-one slopes along the banks. We are going back in there now with between three and four-to-one slopes for the banks so they can be mowed mechanically and maintained this way. We
found that the maintenance of these areas is a very big item. It's not unlike the interstate highways. You take these interchanges, they are nice and beautiful and everything, but they are expensive as the dickens to maintain. This is the same thing; I don't think that all of your problems are solved with the dedication of the land; I think there is a maintenance item. If it is not grassed and maintained, then you get the growing up again. We found that in something like eight years it's back almost as bad as it was before if it is not maintained--as far as a floodway is concerned.

Question: So you feel that open space--the so-called green areas--does have an extreme in the other direction?

Osborne: Definitely, it is expensive.
Ray Lester, Planner
Research Triangle Regional Planning Commission

If you will excuse me, I'm going to abandon my intended approach. I am Ray Lester, and I'm with the Research Triangle Regional Planning Commission which has an advisory function to the three counties of Orange, Wake, and Durham and the contained municipalities--just an advisory function. We became very directly interested in our present subject some time ago--very specifically, during the course of accomplishing a study which we have finally completed. It is one that has been two years in the making, a comprehensive study of the region based on water, sewer and open space. It is in the hands of the printers now, and we hope to have it back in several weeks.

During the course of this study, we were able to see the very immediate relationship among what we wished for in open space, the waterways, the flood-zone areas and the areas that had been studied by the Army Corps of Engineers and others in flood studies. A correlation between these ought to be somewhat apparent.

We have three principal cities in the area: Durham, Raleigh and Chapel Hill. Each of these has zoning and subdivision regulations. Durham County has zoning and subdivision regulations--not of the very best sort, but they do have them. Wake has limited regulations in that only a portion of the county is included. Orange is in the same situation; only a portion of the county is affected--as a matter of fact, just one of the townships. So we really don't have the tools to apply the controls that might be wished for over the entire region.

Secondly, we are perhaps not really in a position to act for the entire area as might be wished.

Three different sorts of flood studies have been completed within the region. These were done by the Corps of Engineers, the Soil Conservation Service, and the Geological Survey. The Corps of Engineers studies, one on Walnut Creek in Raleigh, was done in 1965, if I remember correctly--three studies by the Corps of Engineers for Durham covering several creeks and virtually all of the metropolitan areas, and a third, an abbreviated study in Chapel Hill including only a portion of Bolin Creek, initially just that portion of Bolin Creek north of Highway 15-501 bypass. Later, that study was extended downstream in order that it cover an area intended for and since used.
as a turnkey housing project. The Soil Conservation Service study was done on Crabtree Creek in 1966, as I remember. The third category of study is being performed by the Geological Survey.

We are fortunate in that four of the forty quadrangles done in North Carolina were in this three-county region, three fifteen-minute quadrangles and one seven and one-half minute quadrangle. As I understand it, these studies by the Geological Survey approximate the fifty-year flood. In the case of the Chapel Hill and Durham studies by the Corps of Engineers, the intermediate flood, or the hundred-year flood, was the base. In Raleigh, the Soil Conservation people used the hundred-year flood in the Crabtree Creek Basin, while the Corps of Engineers used the fifty-year flood in the Walnut Creek Basin in the southern portion of the city.

The only attempt, to my knowledge, to impose flood plain zoning in this region was attempted by Raleigh in 1966, when a zoning amendment was written and introduced to the Zoning Board. This was based on the fifty-year flood elevation in Walnut Creek plus two feet and the hundred-year flood plus two feet in the Crabtree Creek. Obviously, there weren't comparable conditions, and the proposal didn't get very far. It wasn't adopted and we have no flood plain zoning in this region at all.

As I said, we recently completed a comprehensive study of the region, marking out the areas that we recommended for reservation as open space, in part those that would be included by the Corps of Engineers in their two large projects—the New Hope Reservoir and the Falls of the Neuse Reservoir—and other areas along smaller streams that extended on upward from these two large reservoirs; areas where we felt open space would be desirable and necessary. In part, we did this on the basis of the land's elevation and distance from streams and the conformation of the land, in order to approximate as nearly as possible what we felt would be sometimes found in the flood plain. We also used existing flood plain studies that I have already named in support of this. In addition, we went to the Department of Agriculture's soil survey maps, which I am sure you are familiar with, and from these we located alluvial soils, regardless of type, and identified them on the map, and we located these on a map. We found a very close correlation between alluvial soil and our flood plains as marked by the various studies and also the open-space area that we wanted.
We feel now that we are in a position to move ahead, to make recommendations to the various cities for additional flood plain studies as necessary. In one instance, Chapel Hill has done so. This request has been approved; and as I understand it, the study will be made during 1970. This is to cover the entire urban area of Chapel Hill. This will very nearly complete the three largest urban areas in the region. There will have to be an adjustment made between Crabtree Creek and Walnut Creek, of course, and in this case I think we find an instance where two agencies, each doing its own job, have worked to an end that didn't allow their results to be put to the fullest possible use. I believe either agency can, with the data they have, adjust their flood, whether it is a fifty or a hundred-year flood, to the other agency's flood. As long as the one flood elevation is used as a basis for flood plain zoning within the city, legal and practical requirements would be met.

One other thing we have thought about was not waiting for flood plain zoning but to use immediately the results of these flood studies and to mark them on the official maps used by the cities and counties as being flood-prone areas. We don't have to say that they are zoned for flooding. We just say that they are flood prone. The sources of this information can be footnoted. The areas that are flood prone can be shown in colorshading or hatching, and anyone then who has access to maps, any official map, would have an opportunity to see what land within the area is prone to flooding. If he is in the market for land, a developer, subdivider, or lender--no matter--would have a chance to see what land was subject to flooding and avoid it if he wished. Perhaps this would have a beneficial effect on the value, the market value, of some land which appears desirable in the dryer months and somewhat less desirable in wetter months. This, perhaps, could be carried even a step further without interfering too much with our laws by requiring the same flood-prone areas to be shown on subdivision plats. I don't know that it is possible but I haven't been able to find anything that would prevent this being done. I imagine that if you required a subdivider to show on his plat an area that was prone to flood and footnote on the plat the source of this information, he would have a great deal of difficulty selling a lot within that area. I don't think I would buy one. Here again, we might have, in effect, limited flood plain zoning without actually zoning for it.
I have mentioned the several studies we have had in the area and said that we do not have flood plain zoning now in any way, shape, form or fashion. This is quite true. However, these studies have been used to affect the location of development. The studies in Durham have been used, to my knowledge, on four occasions in talks with developers—one, the developer of an industrial park—to cause them to redesign or relocate their development to stay above the intermediate flood level. Chapel Hill's initial request for the "bobtailed" Corps of Engineers flood plain information study, which actually consists only of a map, as I understand it, was made because of the application of a subdivider—a developer—to build a rather large apartment development in what could well be the flood plain of Bolin Creek where the study was made. The study was used to locate the apartment project above what was thought to be a safe elevation. The second increment to this project has since been approved, and this same study was used to show that the land on which this increment was to be located was actually not safe at ground level, and the project is to be built well off the ground on pilings. I think I said that this study was extended then on downstream on Bolin Creek across Highway 15-501 to include an area that was being considered for a turnkey housing project. This site was well in toward Bolin Creek and appeared to be in the danger area and it was well within the danger area. The results of the study caused it to be relocated, the floor level raised to keep it above the intermediate flood level, and also ruled out the use of basements or anything of this sort.

We are just getting on to the point of approaching some sort of comprehensive look at the region for a regional plan for flood "proofing." We have several things in hand, and we have some of the work done. We have a great deal more to do, and our eventual plan will be strongly influenced by the fact that Durham, Raleigh and Chapel Hill now exist pretty much as they are. There's not much they can do to save themselves where they have already built on flood plains. We feel this region is going to grow a great deal in the coming decade, and we can now delineate those areas that are unsafe for building and development and point these out—rule them off-limits for development—by the preparation of a comprehensive flood protection plan and make it possible, then for presently non-urban areas of the region to develop without the necessity of spending the money or incurring the difficulty of protecting development in the flood plains. We are talking about the areas out in the open country—the kind
of country you passed the last several miles on your way out here. There is going to be a great deal of development out this way. It doesn't look like it now, but we feel that there will be sometime.

Our primary concern now is to prepare for the still rural areas of the Research Triangle Region, the areas that will become urban in the decades to come, to prepare for these areas a flood protection plan utilizing all the means that are at our disposal.

Comments: I might comment negatively somewhat in line with Bill McIntyre's experience on brave expectation that delineating the flood-prone lands will keep the developers out. My observation within the past ten years around the state and in the Chapel Hill area, particularly, is that developers of apartments are seeking out the trash lands, and specifically trash lands in flood plains which they can acquire more cheaply and run up their profits a little bit more. One of those apartment developments that he talked about is the kind the Planning Board was first asked to rezone. Upon the recommendation of a local planning student, this planning board went out and looked at it, and they had to wade out over the land in order to examine it.

May I make a comment there, too? We found it extremely useful to remind the planners and the city commissions themselves that they have this thing to contend with. Several of our towns have—in any start on a comprehensive planning program—one of the first things they ever do is to prepare a base map which they can superimpose other things on as the planning program progresses. They have on that map the limits of the flood-prone areas. The developers don't see this very much, maybe, but to the planners and city officials, each time they pick up a map it has those lines, and it waves a flag to them that they had better look at a developer a little bit before they approve a program for him. We have found this to be very good.
Lester: I think it is. Contrary to what Phil says, I don't doubt that the developer is going to make as much money as he may wherever he can, but if you disseminate this information as widely as possible—if you make it available to as many people as you can—you are going to discourage a few purchases. You are going to make it a little more difficult; and we can do something else, too, perhaps we will not have done as much as we should. Go to the lending agencies—let them know what is flood-prone land and what isn't flood prone—let them know what might be a risky area in which to make loans. Sure, the developer is going to take a risk—he's a gambler—but your banker is not.
I sense that some of the talk we've heard is somewhat negative in some respects. This doesn't bother me too much. I think anybody in the planning profession has got to be an optimist or he is not going to stay there too long. We work for Wilmington and New Hanover County in a joint planning commission. We are, of course, in the Coastal Plains. We are a small county. We only have 191 square miles. We have a rapidly burgeoning population and estimate it to be around 85,000. Land cost, as always, is high. Land that was selling for as little as $25 an acre seven years ago is now selling for $1500 an acre undeveloped. We are talking about bay and swamp land primarily. It is a flat country, certainly. There are two grades of land, I think, that we are building on—low and underwater. This doesn't seem to bother anybody too much except the people in planning. Most of our land lies between the ten and thirty-foot contour lines. The only topo-mapping that has been done indicates twenty-foot contour lines, so we have two lines on our contour map which certainly doesn't help too much. We'd be glad to trade some land with Mr. Cunningham. If you want some flat land, Charlie, we've got it, and we'd like to have some hills. Around our area a good compost pile is a significant topographic landmark. Obviously, we have many major problems down there.

We have a lot of active shoreline development, and we are running into all kinds of conflicts here, primarily with the conservation-minded people of which there are certainly not enough in this state. We are concerned about the shoreline development and the type of building that is taking place here. We are also concerned about the sound line, referring to the intracoastal waterway and the estuarine areas. We find that our subdivisions are now beginning to encroach into these estuarine areas. The gambling that the developers are engaging in is becoming rather hectic. For example, in an area where we have no sewage systems whatsoever we find people buying forty and fifty-acre tracts for subdivision development on septic tanks with hardpan seven inches underneath the sand. So you can begin to see the kind of problems we have in trying to control the development. We feel that as far as New Hanover County is concerned, New Hanover County constitutes a flood plain between the Cape Fear River and the ocean.
The question was asked about the community interest; and quite frankly, community interest is somewhat low except after periods of heavy rainfall. It begins to peak and develops into hysteria after a hurricane, but a few days after the land begins to dry up, people tend to forget these things rather quickly. Now, our Board of County Commissioners is beginning to become more concerned about individual complaints that are received regarding drainage problems, high water tables, inoperable septic tanks and so forth. We are faced with the question of how do the county commissioners react through their county manager or county administrator. We find that we have a rather successful round-robin operation. If somebody calls in a complaint to the county manager, he refers it to the planning department. The planning department refers it to the health department which in turn refers it to the county manager. Obviously, we are getting little done, and many of our new residents are becoming extremely concerned over the seeming lack of concern on the part of county officials. We are now beginning to develop a feeling of responsibility among our county administrators that we must assume some responsibility for these problems.

The original request for flood plain studies and flood plain information, quite frankly, comes from the planning commission. Our city council and board of county commissioners put progressive-minded people on the board who are asking questions that were hitherto unasked. We feel, in the planning department, that in order to make some sound decisions about what our development policy should be within the parameters of what we are allowed to do, that we must accumulate data and then look at the data to determine what should be done and then figure out what can be done to aid in sound development such as the subdivision controls, flood plain zoning and so forth. Technical data now are in various stages of preparation, and at the risk of getting off the subject just a little, I might tell you what we think is significant and what we have been able to encourage federal agencies to do. As far as our flood plain studies are concerned, ours is a little different than we might find in Buncombe County in that we are extremely interested in a tidal flood plain study. We think this is extremely significant. Some people in the county are beginning to see the tremendous importance of the proposed flood insurance program, and we feel certain that this is a necessary step. So we made the long haul for the
first time in our county to the Corps of Engineers to ask that this type of study be conducted. Bernie Ingram's group is beginning to work on the study at this point. We hope to get fifty and hundred-year flood plain and tidal flood plain data from this. The primary emphasis, of course, will be in the estuarine areas where, if you just meander around some of our burgeoning subdivisions, we see septic tanks being pumped full of water in order that they will sink to the bottom of the hole that has been dug for septic tanks. We are finding building lots where tidal flood plain creeks at low tide are perhaps less than two feet above the ground level of the building. Yet, apparently at this time, there doesn't seem to be any way other than enforcement of health regulations to stop them. We don't know where our Health Department people are when these things are going on. Unfortunately, this is not within our purview here.

We have asked the Soil Conservation Service to begin a medium intensity soil survey on one-acre delineations. Our prime concern here, obviously, is the septic tank. We are fortunate in that the Service has cooperated to the extent of sitting down with us and asking for the type of interpretations we desire. We no longer care how many cabbages per acre can be grown. We're concerned about how many houses per acre can be supported, and we feel that the soil survey will tie in very well with our flood plain study. This is underway, and we have been promised field sheets as they are completed, rather than have to wait four years for the printed study. We can begin to apply techniques of development control from the field sheets.

Another thing that we've done, and we think can be extremely significant and dovetail into these other two areas, is in our application for assistance in planning and carrying out works of improvement under the Watershed Protection and Flood Prevention Act, also a program of the United States Department of Agriculture, through the Soil Conservation Service. I'll talk a little bit in a minute about what we hope to get from this. A question was also asked about the type of community response you have from the area. Now, the community response, so far, is minimal primarily because the studies are underway, and we haven't tried to tell anybody what they can or cannot do as a result of the interpretation of data. We find some people carping about expenditure of tax monies, but this is to be expected; it's a natural response. We find some very vocal criticism from developers who own marginal land, rather obviously,
and we find some expressions of support from developers who own relatively high land. As far as the interpretation and use of the study data are concerned, we run up against one significant problem in that the planning department is not technically qualified to interpret much of this data. One of the things that we have persuaded our county commissioners to put into the budget in New Hanover County, and this is a real plus in our little county, is the retention of a full-time county engineer. I know some counties in the Piedmont have them. (Comment: Very few counties have them.) We hope to be one of the first counties in the Coastal Plain area that will have a full-time county engineer. We think that if we can attract the right person with enough perserverance he can provide some valuable service in the interpretation of the data and guide the planning department and the county commissioners in action that should be taken.

We feel that through the USDA program we can get some tentative plans for master drainage ways. We're not talking here about rivers or major creeks; we're talking about tremendous problems occurring periodically when we get three to six inches of rain in a twenty-four-hour period. We feel that if we can get a system of major drainage ways designed, then the county might be able to carry the ball--hopefuly with some federal aid--in an implementation of the structure, the actual construction, the purchase of the easements or rights-of-way or what have you. Then, ignoring Phil Green's frequent exhortations to do what the law says you can do, we hope to be able to persuade in the subdivision regulations that if "you're going to develop some land, you're going to tie into this drainage way or else." I'm sure that some of this will be bluff, but on the other hand I think our Health Department, through the exercises of its authority, might be able to help along these lines. Obviously, the utilization of the tidal flood plain study and the soil data can help us in many ways.

The tools that we hope to use are obvious, and they have been mentioned several times. We would like to think that we can encourage and require some flood-proofing techniques through the building code. We're already beginning to see a little of it on the beaches where people are getting tired of rebuilding after every minor hurricane. So we're beginning to see more and more buildings on pilings. We think that we can encourage this and perhaps even require it in the tidal flood plain area where currently we are just treating it as though it were high land and there was no problem. There will always be problems in our neck of the woods from these infrequent hurricanes.
As far as the zoning is concerned, obviously, there is gloom in here because it apparently hasn't worked too well. How well we can make it work we don't know, but we'd certainly like to try it in the area of land use and in the density controls. Through our subdivision regulations, we can also exert density controls by delineating the minimum size of lots. Right now, we feel that we're wasting land on the 20,000 square feet minimum lot size; but because of inadequate utilities, we're not able to bring this down. If and when our county does get into the sewage business, we would hope somehow to be able to increase the optimum use of the land by increasing densities in certain areas. But in tidal flood plain areas, obviously, we would hope to keep the densities extremely low and enforce building code provisions which might include flood proofing.

Our health ordinances—again, I hate to be critical of an organization that's not here to defend itself—but our health ordinances need more effective enforcement. This is a problem in an area where you can't get the money to hire enough sanitarians. But certainly, the issuance of septic tank permits could be regulated much stricter than it currently is. The desired results are obvious, and this is what we're all striving for. We hope that if we can successfully enact these measures upon completion of the studies, we would have less damage. I think we have to continue to plug away at all levels in our county to recognize that drainage problems are within the purview and responsibility of our Board of County Commissioners. Currently, as I say, we have the round-robin; and as a last resort, we'll even throw in the Highway Commission to see what they can do. The Highway Commissions in the coastal areas have a tendency to just get the water off the road, regardless of where it goes afterwards. Ultimately, it is somebody's problem. In our subdivision regulations—we have revised them recently—we are now requiring thirty-foot easements in order that we may get a dragline down one side of a drainage way with a place to dump on the other. Most of our existing subdivisions have no easements. There's a ditch in the back yard; one guy owns one-half, the guy behind him owns the other half; and if you can get a dragline down this, you can go ten lots and find somebody who's got azaleas and "hell no, you're not gonna knock down my azaleas." So this is a problem that certainly has to be eliminated. This is about where we stand. As I say, we tend to be optimistic. We are just getting into it; but hopefully, we can do something.
Joe H. Berrier
Director of Public Works
Winston-Salem, North Carolina

After hearing the comments from the other gentlemen present this morning, I think we're not in as bad shape in Winston-Salem as I had thought when we first got into the problem of trying to do something about flooding. Actually, we've been engaged in this work since about 1958, at which time we were having some rather severe rains that created problems on some of our minor streams. We, like Greensboro, are in an area where most of the problems that we experience result from flooding on the small tributaries that have their origin within the city limits. This, of course, pretty well rules out the possibility of using storage reservoirs and dams as a means of control. So we decided that perhaps the thing we should do was attempt to improve our capacity by dredging some of our creeks. The city, on its own initiative, began this program, as I said about 1958, and has carried it on continuously since that time.

Today, we have done work on all of the major streams within the city and have begun to try to cooperate with the county in extending this on beyond the city limits. When we began this program, we didn't have a great deal of data on which to base decisions about how the dredging work would be carried on. We were limited, to some extent, by bridge openings and to some degree by the elevation of utility lines that had been located across the streams, and also by the encroachment of development adjacent to the stream channels. So it was pretty much of a guessing situation and an attempt to get as much area within the channel as we could. This, incidentally, has worked pretty effectively in that in the streams that have been channelled, we have had no major amount of flooding since this work has been done; but there again, we certainly don't claim that we have improved the channel to the extent that it would take care of the type of storms we would like to plan for.

About 1964, we began a program of gaging stations through the USGS to try to collect some data on flood flows and normal flows in order that we might approach this problem a little more scientifically. We have carried on this program continuously since that time and are beginning to gather some data that we hope will be quite useful in the future. Then, at about the same time, we were able to encourage the Corps of Engineers out of the Charleston District to
help us with a flood plain report. Studies were made on all of the major streams within the city and on some that were in the urban area or outside of the city limits. We were fortunate, I think, in that we had also convinced our council, some years before that, to authorize an appropriation for contour mapping, so when the Corps got ready to delineate the flood plains we had available for them two-foot contour mappings on the entire area that was covered. This, of course, eased their problem to some extent. About two years ago the report was completed, a presentation was made to the council, and an attempt was made to try to adopt zoning to provide a means of keeping encroachments out of the flood plains. I think we attempted to bite off too much, frankly, in that our approach was based on prohibiting practically all developments within the flood plain using the area primarily for open space, farming, parking, what have you; and it was based on using the project flood as the limit for this. Of course, our people who were concerned with flooding, most of them had never experienced any serious flooding in the city. They couldn't conceive of why we needed to think in terms of even a fifty-year flood when to the memory of most of these people this had never been a problem. They also, in looking at the report, found that fortunately for us we had very little development within the flood plain region. They didn't seem to think that this was a problem worthy of the serious consideration that the city planners and the Public Works Department tried to impress on them. A few developers came down to the public hearing when the attempt was made to include this in our zoning amendment and cried loud and long that we were confiscating their land, that we were prohibiting them from developing as they had intended, and that the best approach to this problem would be for the city to go out and buy these properties and retain them in public ownership. Well, the council didn't feel that we were financially able to do this so the matter was dropped for a while. Since that time, we have been trying to think of new approaches that might be used to encourage a more moderate solution to the problem. As has been mentioned here by some of the other cities, we have worked with the Corps in an attempt to think in terms of control for the floodway which would be an area much smaller than the flood plain, and we would attempt to develop with some control the areas that were outside of the floodway but were still within the flood plain.

Colonel Page mentioned earlier this morning that we do have one creek, particularly going through the heart of the city, that shows the effects of lack.
of any type of control. We have buildings that have been built over the creek. We have a conglomerate of pipe sizes and pipe types and other structures that have been built in the drainage way. While this particular creek has caused us no problem in recent years, we foresee the day when property owners along the stream will come to the city and cry that something has to be done. The Corps and the city, together, have concluded that in this particular instance there is very little that can be done. Channel control is just about out of the question financially, and our legal people have always advised us that this is not really a matter that the city administration has responsibility for, but that this is a matter that the property owners have to handle for themselves. So I think that before we effectively control development in the flood plain, it's going to be—in our case—a matter of trying to educate the general public, to educate the council and convince the legal people that zoning can be used to control development within these areas that we're concerned with.

Comment: I just want to raise one general point. That is what we call contingency planning. Everybody here would agree that it is possible to do something immediately after a crisis. There is here a strategy that says, to the extent we have time now, that we lay plans to do the things we want to do and then these contingency plans are brought out at the time when a crisis occurs. Now when this will occur we don't know, except we can predict it will occur. So I just throw this out for discussion this afternoon because there is—as some of you know—a fairly well-developed theory of crisis planning—contingency planning—and a considerable body of literature to draw on.

Comment: I would like to make a comment on that. I am sorry that the city manager of Canton could not be here because their problem fits into this picture. A flood report was done there. They couldn't get anybody to take any interest in it particularly, but with assistance from planners, the Planning Board did prepare a flood damage prevention planning study for the City of Canton. This didn't get anywhere. Nobody wanted to do anything. So it sort of got stuck on the shelf. But a situation arose where somebody
started filling along the river at Canton. The city didn't know what in the world it could do about it when the Planning Commission pulled this thing out and put it on the table, saying that it had recommended this thing four years ago, and if the city had had the things that were recommended, they would have had some control over the filling operation. While it was too late to do anything about this particular fill, the contingency planning had been done and the city immediately adopted the recommended zoning ordinance so they would have control in the future.

Comment: There is a dynamic component to this discussion which I think we should emphasize more in our discussions this afternoon, and that is that these plans are all subject to change with changing land use, particularly in urban areas where you have shopping centers going in with an increase in the amount of surface runoff in the areas. In the case of these towns with small streams—in Cedar Rapids, Iowa, they have a similar case where a stream, which was no problem in the past, was put into a pipe and with the increase in development in the surrounding area there was increased surface runoff. They are now having floods where they never had them before.
North Carolina law places primary responsibility for flood plain management on local government with the state's role limited to assistance to local government. The latter program includes the development of a priority list of communities requiring aid in this area, encouragement of needed studies, assistance relative to federal flood insurance, and the formation of a committee to investigate ways in which the state can assist local government in the implementation of flood plain management programs. Ninety-eight flood plain information studies have been completed or are under preparation by the Corps of Engineers, Tennessee Valley Authority and the Geological Survey for North Carolina cities. However, a survey by the North Carolina Department of Water and Air Resources disclosed very little has been done toward the implementation of flood plain management plans.

Among the powers which local government can use for flood plain management are zoning ordinances, subdivision regulations, health regulations, building regulations, acquisition of open space, acquisition of park land, and policies for the provision of public services. The zoning ordinance is the fundamental power for flood plain management. As used today, it restricts the types of uses permitted in the flood plains to low density and open-space uses which suffer minimal damage from flooding and have the least constricting effect on the channel under flood conditions. Most cities and counties in North Carolina have a full range of authority to adopt zoning ordinances.

There is no present authority to require dedication of land associated with subdivision development for park and recreational purposes. Neither is there authority to prohibit subdivision activity in any given area or to require improvements such as the installation of utilities except inside city limits. As a result, many measures are enforced by such non-legal means as the bargaining process between a developer who wants something from the city and the city which wants him to comply with certain requirements. Within these limitations cities and counties have authority to regulate subdivisions.

County and district health boards have very broad regulatory powers. Where applied to septic tank installations, drainage and water supply, they can have an impact on flood plain development. Another type of regulation which
can be used is the building code, which in North Carolina is the State Building Code.

Under a general statewide enabling act municipalities and counties have authority within their respective zoning jurisdictions to acquire property for the purpose of preserving open space.

None of the cities represented at the workshop has been successful in the adoption of flood plain zoning ordinances. Other techniques are used with varying degrees of success but flood plain encroachment continues. Public understanding is not good and perception of flood management would appear to be directly related to personal encounter with flood conditions. Contingency or "crisis" planning seems to be an imperative.

Asheville has a subdivision ordinance, but has not been able to incorporate flood-plain provisions. It was the position of some observers that the city itself has been one of the worst violators of good flood-plain management.

In Charlotte, a comprehensive plan for the adoption of a flood plain zoning ordinance recently failed because of land-owner resistance. Consequently, the city has had to settle for such tangential approaches as the delineation of flood-prone areas on maps, subdivision regulation and land acquisition for greenways.

Greensboro hopes to get involved with flood-plain zoning in the near future. At present, its principal control is subdivision regulation. Flood plain encroachment is steadily taking place. Maintenance of reserved lands and green areas has been found to be very expensive.

The only attempt to adopt flood-plain zoning in the Research Triangle Area was by Raleigh in 1966 and this failed, ostensibly because of different criteria applied to the two watersheds involved and lack of public support. Not much can be done now in the urban areas of Chapel Hill, Durham and Raleigh because of existing encroachment and primary attention needs to be given to the adjacent rural areas expected to undergo urbanization in the future. However, means are not now available to apply the necessary controls over the entire region. It was suggested that information on flood-prone land might be provided to lending agencies as a supplemental control measure. The value of indicating flood-prone areas on maps to discourage encroachment was debated by one participant who concluded that developers, particularly for apartments, are looking for trash land and would not be deterred.
In the Wilmington-New Hanover County area, there are problems of subdivision regulation and concern over subdivision encroachment on estuarine areas, shoreline development and the quality of building. Development is occurring in unsewered areas where soil conditions are not satisfactory for septic tank installations. Health regulations covering such installations allegedly are not being effectively enforced. Need was expressed for master drainage ways and additional flood proofing. Interest was expressed in zoning of land use and density controls.

Winston-Salem attempted flood-plain zoning about two years ago, but this failed because of opposition. It is believed that development in flood plains cannot be effectively controlled unless steps are taken to educate the public and local officials as to the necessity for this measure. Very little can be done about many areas where encroachment has already occurred.
SUMMARIES OF DISCUSSION GROUPS

GROUP I

A. C. Davis
Department of Sociology and Anthropology
North Carolina State University

If I might ask those in Group No. I to append, correct, or do whatever you want to do with regard to my responses, I'd appreciate it. I find that my notes are not as meaningful to me now as they might have been when I was taking them. But in terms of the questions that were put to the group, we attempted to follow the order given. We were not successful. We chose probably, I think, the first five as one lump sum and then picked up six, seven and eight separately. So if I might, let me give you my impression of what the conclusions were.

Relative to public understanding of the nature of flood damage and role of flood plain management, our group seemed to feel that there was virtually none, that people who themselves were experts in the area or whose job it was--those whom flooding or potential flooding touched--were sensitive, that others were not particularly sensitive except when it hit them. If they had just been flooded out, then they were very sensitive; but prior either--and I think one time limit mentioned was five years--then within five years, the memory of a flood no matter how large had faded so that there was in general a lack of awareness on the part of the general public about local problems or potential problems relative to flooding and flood damage, and certainly that flood plain management was for many people a specialized area which they knew nothing of at all.

Now in terms of No. 2 on the approaches to the initiation of the community action, the general suggestion was to let them have a crisis. That will get action faster than anything else. Then, some discussion was made concerning the use of mass media, and it was felt that perhaps good mass media coverage of floods and of building in areas where flooding was a potential hazard might possibly help; but here again, it was felt that if these became part of the record and were pulled out of the record immediately after a flood, then they could be used as evidence to get passage of the kinds of plans that a planning agency kept for this kind of an emergency, so that mass media was used as a supplemental effort.
Some discussion of the delimitation on all maps—certainly, all official maps—concerning the flood plain was thought to be desirable so that at least people who were aware of the maps, the plats, would have some idea of what they were buying. Those who would not be aware of these kinds of facilities or devices, perhaps the Consumer Protection Agency would step in or be useful in helping get them more information or help them be protected from some of the more unscrupulous builders. Then, one idea mentioned was that schools of planning should include within their course efforts some emphasis on flood plain management, some flood plain planning. It was the general feeling that this is probably done, but certainly in many schools it could be emphasized. And finally, that lending agencies—those people who control financing—probably could be more or greater facilitators of this awareness of flood plain potentials than any other group because they could say, in effect, "We know it's a problem; and because it is a problem, we're going to pass this on to you in the form of control of money."

No. 3 on community attitudes toward land use planning and zoning—again, a couple of ideas—one was back to the crisis idea, again, that any community crisis increases the awareness of the problem and promotes positive attitudes toward flood plain control and flood plain management, that action has to be taken relatively rapidly after a crisis of this nature so that this response will be in the desired direction. Secondly, that when you delimit or delineate a plan of action on the flood plains or whatever, this generally does create some interest, but it's also in the interest in areas which are negatively affected by the plan, so that this is one way to line up your attitude structure within the community concerning both planning and zoning.

No. 4 on the nature of the socio-economic-political forces affecting community response were implicit, I think, in all of the discussion. Certainly, the extent of economic and political pressures that could be exerted by persons who were interested either in having no interference with their wish to develop land in particular ways were very active components that had to be taken into consideration.

No. 5, the principal determinant to community response. I would have to say that in our discussion probably the major forms were crisis, which I mentioned a couple of times, and then the constant nagging and pressure put on responsible personnel by people who are themselves exceedingly interested in flood control or in flood plain management. These two forms were probably more responsible for
determining community response to plans than any other two mentioned here today.

No. 6--there was quite a discussion about the adequacy of state law. There is a bipolar kind of discussion going on as to whether the state ought to really step in and take complete control and make all actions a function of state law or whether it should be left up to the local municipality. I think I'm right in that the general feeling was that state enabling acts at present, with perhaps the exception of subdivision acts, were adequate as presently generated and that they need some strengthening in a few other areas; but this is about as far as the majority of people were willing to go in terms of having the state take direct responsibility for flood plain action. It was felt, however, that the state should provide competent support to local people of an expertise nature in their efforts to get information or to develop controlling mechanisms or laws in this area. The adequacy of local ordinances--I think the best summary of this could be that they're inadequate, largely, because the local groups do not take advantage of the State Enabling Act and that it is this failure that makes this particular conclusion a realistic one.

The last area, there were several such areas that were discussed--one was to investigate the whole perception of flood potential and flood plain management programs on the part of the general public. Another one was the whole cost of flooding. The question was raised, "What does it really cost to a local area, both to those persons directly affected and those indirectly affected, of having a flood?" It was felt that if this kind of information could be generated, it might make it a lot easier to sell flood plain programs--flood plain management. And then one question Mr. Heath raised of whether the hundred-year flood criterion was justified. I think he felt that before the discussion was over this should not be a researchable kind of question, but there's one other area. I almost left it out. That is an area that'll take a look at the dissemination of information, how it happens, how far it goes to actually informing the interested public concerning the various aspects of flood plain management.

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GROUP II
David H. Howells, Director
Water Resources Research Institute

Our group experienced some difficulty in following the suggested questions. There was so much of interest that discussion frequently took it own subject form as we moved along. In the interest of time, I will try not to repeat any points already made on behalf of Group I.

There was complete agreement on the need for promoting greater understanding. There were limitations expressed as to the effect of the mass media approach, unless it's continued on a sustained basis. Emphasis on the need to exert considerable effort on the decision-makers and the public at the same time so as to undergird the decision-makers when they are in a position of having to make what may be unpopular decisions.

It was stated that Gilbert White has demonstrated that the public has little understanding generally of flood damage control, flood plain management and such items as probability of flood occurrence, etc. and that many people even deny that floods occur. There's a problem of semantics. To some people storm runoff would not be floods, to others it would. The Charlotte experience, which was referred to this morning, was cited again as a very good example of excellent press support and coverage which still failed, and so, the emphasis was on constant repetition. The point was also made that what may influence people in one area of coverage would not affect others, and it's important to have the coverage relate to the area that the people live in. The pragmatic suggestion was made that a cameraman should always be on the alert to get good graphic illustrations of actual flood damages.

The problem of developing public awareness was seen as twofold by one participant—on the one hand, the need for contingency planning and exploitation of flood situations as they occur, and on the other, the need for continuous education. In small communities city officials themselves often don't understand what flood plain management is, and in situations such as we've had in the Piedmont where we've been preoccupied with droughts, it's extremely hard to convince them of the importance of flood plain management. Interest in newspaper articles, etc. is directly related to proximity of the flood. In between crises where contingency planning might be utilized there are enough situations involving
developers, other entrepreneurs, etc, so there is a continuous array of problems that can be cited as illustrations of the need for proper planning and regulation. The public is generally thought of as a large homogenous unit where, in reality, it is an aggregate of many smaller publics. One of the possible research activities might be to identify each of the publics, including their interests and the points of sensitivity, etc. of each to flood damage.

Concern was expressed over the unrepresented public, which is a substantial part, and that public officials really have some responsibility to act as surrogates for them. One example of this situation was cited in Lumberton where a low-income area called French's Quarter, under the leadership of a minister—a ghetto area—was requesting assistance from city officials trying to get relief. In the overall economy of the community, apparently, it would be more effective to simply remove all of the housing. So here you have, on the one hand, this group attempting to get relief through normal channels and the city working toward urban renewal. The people would much prefer to stay in their area, but the cost of the project would be too high.

Then we got into the meaning of flood plain management in its very broad sense and the importance of considering, as we talk to people, all of the alternatives involved, both structural and non-structural, in bringing about proper management; the importance of not permitting encroachment subsequent to structural works through hard-nose local regulations, etc. and possibly future fiscal incentives at the federal level to maintain these in a form that is conducive to proper flood plain management. There is a substantial part of the public that simply assumes that a generalized concept of government has taken proper precautions for flood damage prevention and in a sense kind of exerts a complete dependency on this. This dependency brings with it a responsibility on the part of government to provide adequate information to these people as to flood hazards and to somehow represent them. Industry, as it was pointed out, will generally go to the people with the information, to the proper levels of government, and will protect themselves—or at least they have the opportunity of protecting themselves, where the average citizen will not do this.

The view that most of us have been thinking of flood plain management in too narrow a range was presented. This included preoccupation with the application of techniques developed for other purposes such as zoning to improve the situation—the need for a fresh look, without any prior inhibitions—to think of flood
drainage as a natural and essential system and to attempt to convey this concept to the public more than we have. This included the need to identify natural drainage systems and to attempt to develop a concept of their preservation and utilization—not only for drainage but for all those other natural functions which they can serve. These include open space, recreation, utilities, and so on. The desirability of incorporating the channel occupied by a river at flood stage into the public domain was stressed. If the public is encouraged to consider natural floodway systems in this light, over a period of time at least, there might be some feeling developed in the public mind that (as with the highway system) it might become a more natural thing to donate easements and so forth to meet this public need.

Federal guidelines should be such that they will stimulate guaranteeing agencies to adequately bring their programs to bear on the problem and to whatever extent it is possible to bring the federal financial incentive to bear.

In view of the high cost of maintaining developed open-space floodways perhaps more consideration should be given to leaving these areas in their natural state.

Moving down to the legal end of things, it was concluded that the legal structure is about as adequate as it can be made for action at the local level. At the present time, there really isn't any statewide legal basis for the natural drainage system concept just mentioned. The principal problems we are concerned with here really aren't technical—they are more social-economic-legal-institutional problems.

Some thought that more effort should be given to the identification of specific successes in community handling of flood management problems, case studies so to speak to develop illustrations of what might be done under similar circumstances.

Attention was called to the problem of upward tax assessment in developing areas which forces land owners in the flood plains towards premature development rather than to more conducive land use. This problem doesn't appear to be too different from general differential taxing associated with agricultural land in urbanizing areas, or forest lands, and so on. I think that is about all. I would appreciate suggestions from the rest of the members of Group II as to omission and corrections.
LIST OF PARTICIPANTS

GROUP I

University

Dr. Michael Amein
Department of Civil Engineering
Raleigh

**Dr. A. C. Davis
Department of Sociology & Anthropology
Raleigh

Professor Philip P. Green, Jr.
Institute of Government
Chapel Hill

Dr. Arthur J. Hawley
Department of Geography
Chapel Hill

Dr. Deil S. Wright
Department of Political Science
Chapel Hill

State

Colonel R. J. B. Page
North Carolina Department of Water and Air Resources

Mr. M. A. Davis
Division of Community Planning
Department of Conservation and Development

Mr. John Wray
Department of Water and Air Resources

Local

Mr. Charles Cunningham
Western North Carolina Regional Planning Commission
Asheville

GROUP II

University

Professor Milton S. Heath, Jr.
Institute of Government
Chapel Hill

**Professor David H. Howells
Water Resources Research Institute
Raleigh

Dr. Maynard M. Hufschmidt
Department of City & Regional Planning
Chapel Hill

*Dr. Edward J. Kaiser
Department of City & Regional Planning
Chapel Hill

Dr. Joseph A. Phillips
Department of Soil Science
Raleigh

State

Dr. Leigh H. Hammond
Coastal Plains Regional Planning Commission

Mr. C. Selby Jones
Department of Water and Air Resources

Mr. Ronald F. Scott
Acting State Planning Officer
Department of Administration

Local

Mr. Joe H. Berrier
Department of Public Works
Winston-Salem
<table>
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<th>Group I</th>
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</thead>
</table>
| Mr. Ray R. Lester  
  Research Triangle Regional Planning Commission  
  Research Triangle Park | Local (Continued)  
  Mr. T. Z. Osborne  
  Department of Public Works  
  Greensboro |
| Mr. William E. McIntyre  
  Charlotte-Mecklenburg Planning Commission  
  Charlotte | Mr. Timothy Wood  
  Wilmington-New Hanover County Planning Commission  
  Wilmington |
| Mr. H. L. Medford  
  Director of Public Works  
  Greensboro | Federal  
  Mr. Bernie Ingram  
  Wilmington District Corps of Engineers  
  Wilmington |
| *Mr. Ralph Heath  
  U. S. Geological Survey  
  Raleigh | Dr. Theodore H. Levin  
  Flood Insurance Administration  
  Department of Housing and Urban Development  
  Washington, D. C.  
  Mr. David Singletary  
  Department of Housing and Urban Development  
  Atlanta, Georgia |
| Mr. John W. Weathers  
  Tennessee Valley Authority  
  Knoxville, Tennessee | |

*Discussion Leader  
**Reporter