Minutes of the **South Regional Economists Workshop**

Fort Worth, Texas

February 24-26, 1976

Engineering and Watershed Planning Unit

South Region – TSC

Fort Worth, Texas

History of Document:

2018 Presented to David Buland from Noel Gollehon.

I assume it came from either Jim Mitchell, Bob Caldwell, or Mack Gray.

AGENDA, SOUTH REGION ECONOMISTS WORKSHOP

Fort Worth, Texas, February 24-26, 1976

Tuesday, February 24 (Morning)

Chairman - W. W. Snyder
Recorder - J. Kazda

8:00 a.m.	- Introductions and Announcements	-	Thomas C. G. Hodges
8:30 a.m.	- The TSC and Resource Planning	-	J. Vernon Martin
9:30 a.m.	- New Policies Affecting Project Formulation and Justification	-	Jim Mitchell
10:30 a.m.	- Economics, Program Planning and Evaluation Unit and the Field Economist	-	R. M. Gray
12:00 noon	- Lunch		

Tuesday, February 24 (Afternoon)

Chairman - J. M. Nicholson
Recorder - F. E. Killian

1:00 p.m.	How FIA Regulations Affect Urban Damage Evaluations	-	R. M. Gray and Staff
	Social Well-Being Effect Evaluations		
	Concepts Involving Land Treatment and Economic Evaluations		

Wednesday, February 25 (Morning)

Chairman - H. R. Cruise
Recorder - E. R. French

8:00 a.m.	Levels of Protection and Maximization of Net Benefits in Relation to Plan Formulation		
	Watersheds	-	Thomas C. G. Hodges
	RC&D		and
	River Basins	-	Robert L. Caldwell

Wednesday, February 25 (Afternoon)

Chairman - M. L. Holder
Recorder - R. Pepper

1:00 p.m. -	Use of Linear Program and Other Statistical Models in Water and Land Resource Planning	- R. M. Gray
	External Economic Effects of Water Resource Development	
	Proposed Economics Guide Revisions	

Thursday, February 26 (Morning)

Chairman - H. Jolly
Recorder - G. Jarvis

8:00 a.m. -	Evaluation of Flood Prevention and Drainage Effects on Forest Product Production	- Robert J. Terry
9:00 a.m. -	Economics Computer Programs (Econ 2, URBI, Value of Ag. Production, Land Damage)	- Robert F. Rubel
10:00 a.m. -	Cost Allocations	- Thomas Hodges
12:00 noon -	Lunch	

Thursday, February 26 (Afternoon)

Chairman - C. Green
Recorder - F. Artley

General Discussions	- Robert F. Rubel
Closing Remarks	- Thomas Hodges
Adjourn	

ECONOMICS WORKSHOP ROSTER

Tom Hodges	Fort Worth TSC
Ambers E. Hanson	Auburn, Alabama
Doug Ward	Auburn, Alabama
Robert F. Rubel	Fort Worth TSC
Jim Mitchell	Washington, D. C.
George Cross	Little Rock, Arkansas
Bob Caldwell	Washington, D. C.
Gene W. Jarvis	Lexington, Kentucky
Mack Gray	Washington, D. C.
R. V. Pierson	Little Rock, Arkansas
Bob Bush	Little Rock, Arkansas
Henry Hammond	USFS Atlanta, Georgia
George W. Cameron	Athens, Georgia
Wayne Farmer	Athens, Georgia
William Lewis	Athens, Georgia
E. B. Dyer	Nashville, Tennessee
Frank Killian	Columbia, South Carolina
Sue Harper	Columbia, South Carolina
Thomas C. Hill, Jr.	Gainesville, Florida
Rufus D. Pepper	Gainesville, Florida
Marion L. Holder	Gainesville, Florida
Claude Greene	Alexandria, Louisiana
John Flora	Jackson, Mississippi
Wayne Ellis	Jackson, Mississippi
John Thomas	New Albany, Mississippi
M. D. Turnipseed	Greenwood, Mississippi
W. W. Snyder	Temple, Texas
Francis W. Artley	Alexandria, Louisiana
Charles E. Borel	Alexandria, Louisiana
Aaron Hinkston	Alexandria, Louisiana
Carl Ragus	Alexandria, Louisiana
James R. Nicholson	Columbia, South Carolina
Phillip Bando	Nashville, Tennessee
David N. Smith	Auburn, Alabama
Joe B. Camp	Temple, Texas
Buford G. Berry	San Marcus, Texas
W. T. Jones	Temple, Texas
Jerry W. Kazda	Waco, Texas
Joe Brandon	Waco, Texas
Bill Worley	Waco, Texas
E. R. French	Nashville, Tennessee
Jack Webb	Raleigh, North Carolina
Jim Hutchins	Raleigh, North Carolina
John F. Meek	Chickasha, Oklahoma
Robert Dotson	Chickasha, Oklahoma
Dwight Waugh	Chickasha, Oklahoma
Harold Jolley	Lexington, Kentucky
D. Dale Davis	Chickasha, Oklahoma
L. V. Ledvina	Fort Worth, Texas
Andrew Hudson	ERS Little Rock, Arkansas
Neil R. Cook	ERS Little Rock, Arkansas
Haskell R. Cruise	Nashville, Tennessee
Calvin Jackson	Fort Worth, TSC
A. Thomas Hill	Claremore, Oklahoma
Robert Terry	FS, Atlanta, GA
Glen Johnson	Washington, D. C.

MINUTES OF SOUTH REGION ECONOMISTS' WORKSHOP
Fort Worth, Texas
February 24-26, 1976

Tuesday Morning - February 24

Chairman: W. W. Snyder

Recorder: J. W. Kazda

W. W. Snyder called the meeting to order at 8:00 a.m. and introduced Thomas C. G. Hodges.

Introductions and Announcements — Thomas C. G. Hodges

Tom Hodges welcomed all present and then asked that participants stand and introduce themselves.

The TSC and Resource Planning — J. Vernon Martin

Water resource planning has gone through a lot of changes. It has grown and magnified. The position of the economist has also changed. As resource planners we must search the broad opportunities offered in the water resource field. Our attitudes are fundamental. As an economist on this multi-discipline team, you have a key position to lead, guide, and suggest possible alternatives.

The economist must relate to the staff the varied feelings of landowners in the watershed. Because of his many contacts with landowners in the watershed, he is more apt to find out about peculiarities which exist in the watershed.

These local people must make the decisions rather than the planners who are not familiar with the watershed. The local people are going to get involved in the planning process if the plan is to be successful. The "publics" are looking to the local people who are closer to the problem area.

Current land values are dictating a closer look over an array of alternatives in the planning process. Land rights and easements are coming in slowly and are very difficult to obtain in nearly all cases by the sponsoring local organizations.

We must be well acquainted with our area conservationists and district conservationists. We must keep up communications which are important and essential to coordinating our efforts in the planning phase.

An economist must be technically qualified, fundamentally well-balanced with education and experience, and must know how to deal with people. He is not doing his job if he only takes data presented by the hydrologist, geologist, etc., and evaluates these numbers without making a detailed study of all aspects of the watershed.

New Policies Effecting Project Formulation and Justification - Jim Mitchell

The economist is now a watershed planner with an economics background. No one specialist on the watershed planning staff is capable of making the final decision. The day has come when we no longer make unilateral planning decisions. The decisions must be a team effort and reflect all inputs of all disciplines.

Has PL566 been burdened to death by NEPA, bureaucratic processes, publics, etc? Why should federal money be poured into states when nothing is coming out? Six states have spent $2,750,000 since 1971 and not a single plan has been sent through Washington. Since 1971, 16 states have sent in one plan.

Pre-NEPA plans have taken up considerable time of technical people on the planning staff. But this is now being offered as an excuse for not putting out plans. Instead, we need a positive "can do" attitude. None of the SCS planners can have a negative attitude and do their jobs.

A study is being made in the Washington Office to determine if PL566 funds should be cut off to states that don't produce. Some positions are not as secure as you may think in these states. Where there are inputs (PL566 funds), there must be outputs. This requires a higher level of management from the Washington Office level all the way down to the particular planning staff.

The role of the Washington Office is changing. Work plans will no longer be reviewed in detail as they have been in the past. The Washington Office will be primarily responsible for an overview to determine if the plan follows the constraints as spelled out in Principles and Standards so that the plan will meet with approval by Congressional Committees and with the Office of Management and Budget.

The State Conservationist will be responsible for all questions from Congressional Committees. The Washington Office will contact the TSC on any problem with a plan. The states will not call the Washington Office, but will contact their counterpart at the TSC with any problems that they may have.

No plan will violate the Agricultural Committee's restraints. If any are violated, then the State Conservationist will appear before the Committee to answer the questions.

The TSC will be playing an important role in all future planning. They will have an active role in helping the Administrator in determining which states get new planning starts. There are only 10 new planning starts, and any state with 10 or more unfinished plans can be assured that they will not get a new planning start.

Plan watersheds one at a time and not four or five. We cannot get out a plan working on four or five--that is mismanagement, not management. We can no longer lead sponsors on for eight-ten years and do nothing. We need to get rid of watershed plans that are no good. For too long we have overplayed the idea that the SCS can do anything, at all times, for everyone. The SCS is always responsive. The greatest need is for the application of better management during planning and presenting the facts to the sponsors, even if we have to go and say "no" to the sponsors on a bad project.

In the preparation of watershed plans we must get rid of sloppy habits. Don't expect the next level of review to catch and correct your mistakes. We must prepare a document that is sound and technically adequate.

Chapter 13 of the Watershed Protection Handbook has been revised and will be out to the field as soon as copies can be printed. It spells out in detail the review process and most of the aforementioned subjects are covered in it.

Also Chapter 5 of the Watershed Protection Handbook has been revised. The level of protection will be commensurate with future land uses. In urban areas it is spelled out. We must provide a level of protection that will prevent the hazard of loss of life from the 100-year with-project flood. The level of protection provided an urban area must be defended by the state. There is no need to write the Administrator for an exception to the rule. It will not be answered. Only the state can make the decision whether the level of protection is adequate.

The decisions of resource planning will be given to the states. Also the states will have to defend these actions in Congressional Committees. If you are not taking part in decision making as a staff person, then you are not doing your job.

Under the subtopic of "preaching and meddling," Jim pointed out in no uncertain terms the need for mobility. There is a definite need for top level careerists to be mobile. Top jobs in Washington are often filled by second or third choices because the top choices are immobile. There is no excuse for not being mobile. No one really makes money on a move, but this is being used only for an excuse. Your career

objective should be thoroughly prepared and examined frequently. Don't imply a position of mobility if you are not going. A good planner needs 2-or 3-state experience before he can get a decision making position. There are two positions open now in the new economics section.

Economics, Program Planning and Evaluation Unit and the Field Economist — Dr. R. M. "Mack" Gray

The SCS economist position was set up initially in 1954. The economist's job has gotten tougher over the years. Everyone is interested in your work as an economist in the preparation of work plans.

Your first and foremost job as an SCS economist is to be a professional. Your evaluation and analysis of a project must be technically sound. You are not an advocate of the project. Study the project and then, with supporting data, either recommend or turn down the project. If a project is no good, say so. Tell your staff leader and the responsible assistant state conservationist.

Times have changed and so has the review of completed work plans. Congressional committees are asking many questions about plans and 90 percent deal with economics. You must be a better professional today than yesterday.

The economics section was set up to provide leadership and assistance to SCS economists.

The basic responsibilities of the economics section staff were outlined as:

1. Update cost-return section for the Field Office Technical Guides (Section 5) - most are out of date and very few are being used.

2. Training for economists - Dr. Gray has attempted to set up two courses for economists at Texas A & M University:

   A. Mathematical or Linear Programming (1 Week)

   B. Statistical Methods (1 week)

   These are needed so that SCS economists will be current and knowledgeable, and can do a professional job of evaluating watersheds.

3. Liaison with ERS and WRC

   A. The SCS transfers $3,000,000 annually to ERS for studies. There is a definite need for studies to be made and these studies should be conducted within the proper constraints or the answer that we get is no good.

   B. The USDA is represented on the WRC Technical Economic Committee by Dr. Gray.

4. Development of methodology - This is especially important today because of the great concern over the proper evaluation of watersheds. Much has been written about what an economist is to do, but very little effort has been put forth by anyone on how to do these varied tasks. It is especially important for today's economist to know the proper procedures and concepts if he is to properly plan a technically sound and defendable watershed comfortably.

Tuesday Afternoon - February 24

Chairman: James R. Nicholson, Jr.

Recorder: F. E. Killian

I. How FIA Regulations Affect Urban Damage Evaluations - Glen Johnson

The Flood Disaster Protection Act of 1973, Attachment No. 1 has a great impact on how we analyze floodwater damages. Several items found in the Act are especially significant. One item, found under Sec. 2(b) states that one of the purposes of the Act is to, ... "(3) require States or local communities, as a condition of future Federal financial assistance, to participate in the flood insurance program and to adopt adequate flood plain ordinances with effective enforcement provisions consistent with Federal standards to reduce or avoid future flood losses." Another item, Sec. 202, explains the implication of nonparticipation in the flood insurance program. It states, ... "(a) No Federal officer or agency shall approve any financial assistance for acquisition or construction purposes on and after July 1, 1975, for use in any area that has been identified by the Secretary as an area having special flood hazards, unless the community in which such an area is situated is then participating in the national flood insurance program."

All communities shall be under this Act. It is comprehensive for all areas, except those not identified as having flooding problems. Therefore, in planning we must consider this program to be in effect for all urban flood plains - especially for new development. After all, if a community has not been identified as having a flooding problem, one should question the validity of any planning efforts to solve those problems.

Chapter X, Sec. 1910.3 of the Federal Insurance Administration rules specifies the conditions which must be met by community land use and control measures for their flood plains. The two situations addressed are especially applicable to SCS planners. Situation (c) is, ... "When the Administrator has identified the flood plain area having special flood hazards, and has provided water surface elevations for the 100-year flood, but has not provided data sufficient to identify the floodway or coastal high hazard area, the minimum land use and control measures adopted by the community for the flood plain must --

(1) Meet the requirements of paragraph (b) of this section;

(2) Require new construction or substantial improvements of residential structures within the area of special flood hazards to have the lowest flood (including basement) elevated to or above the level of the 100-year flood;

(3) Require new construction or substantial improvements of non-residential structures within the area of special flood hazards to have the lowest floor (including basement) elevation to or above the level of the 100-year flood or, together with attendant utility, and sanitary facilities, to be floodproofed up to the level of the 100-year flood;

(4) In riverine situations, provide that until a floodway has been designated, no use, including land fill, may be permitted within the flood plain area having special flood hazards unless the applicant for the land use has demonstrated that the proposed use, when combined with all existing and anticipated uses, will not increase the water surface elevation of the 100-year flood more than 1 foot at any point."

Situation (d) is ... "When the Administrator has identified the riverine flood plain area having special flood hazards, has provided water surface elevation data for the 100-year flood, and has provided floodway data, the land use and control measures adopted by the community for the flood plain must --

(1) Same as Situation (c)
(2) Same as Situation (c)
(3) Same as Situation (c)
(4) "Designate a floodway for the passage of the water of the 100-year flood. The selection of the floodway shall be based on the principle that the area chosen for the floodway must be designed to carry the water of the 100-year flood, without increasing the water surface elevation of that flood more than 1 foot at any point;
(5) "Provide that existing non-conforming uses in the floodway shall not be expanded but may be modified, altered, or repaired to incorporate floodproofing measures, provided such measures do not raise the level of the 100-year flood; and
(6) "Prohibit fill or encroachments within the designated floodway that would impair its ability to carry and discharge the waters resulting from the 100-year flood, except where the effect of flood heights is fully offset by stream improvements."

Q. Snyder - Isn't there a danger of raising the flood elevation by 1 foot when buildings are floodproofed, say, by raising their foundations?

A. The permit system should take care of these problems.

You are advised to develop a close working relationship with your Federal Insurance Administration representative during your planning for urban areas in order to get his interpretations of the local ordinances (which will probably vary somewhat from community to community).

This law must be dealt with seriously in projecting future land use. We can no longer claim damage to either new structures or existing ones with substantial improvements. A substantial improvement is interpreted to mean either (1) any addition not confined to the existing foundation, or (2) any improvement within the existing foundation which increases the value of the house by 80% or more.

As homes are floodproofed, damages may decrease over time. Floodproofing will continue to be a cost on new development and on future growth.

To Illustrate:

The flood damage reduction benefit for a given time frame should be the sum of both reduction in damage and reduction in floodproofing cost. It follows that our objective in urban flood plains is to provide housing or desired development in the most efficient manner. Our problem is to provide flood protection in the cheapest manner, regardless of whether it involves floodproofing or flood control.

1. Evaluating Remodeling. The extremely high flood insurance rates suggest some severe alternatives for property owners. They must either pay the premiums (if their community is participating), flood proof their homes, abandon or evacuate home, or relocate their house. For example, the annual flood insurance for a one-story house with a basement could cost $13.13 per $100 value, excluding land. This would amount to nearly $4,000 per year for a $30,000 house. This insurance is subsidized for existing property up to $35,000 in value.

Q. Snyder - It appears that the rate structure is based strictly on flood stages relative to the one percent chance flood stage only. You get an inconsistency when the flood with stage one foot below the 100-year flood is the 90 year (1.11% chance) flood.

A. This problem further points out the need to work with the F.I.A. representative in making projections. (In other words, we aren't here to criticize the Flood Insurance Program. We are trying to make better economic evaluations.)

2. Evaluating New Homes. Involves similar types of projections as those for remodeling.

Q. Does the damage include both the insurance premiums and the cost of administering that insurance?

A. The insurance is used, but not the administrative costs. They are already rated into the insurance.

Q. What date applies to new dwellings under the Act?

A. July 1, 1975. Any house built in the flood plain after that date is covered. No federal loans or other assistance would be available to such a house unless it were insured. No insurance would be available unless certain floodproofing features were installed.

Q. Aren't loans still available in areas where the 100-year flood line is not yet delineated and where the deadline has been extended to 1976?

A. This line would have to be known if we were planning a PL-566 project.

Evaluating New Homes (cont'd) ...

We need to project when development is to take place. Then we insert this into, say, 10-year time frames.

	Base Year	10 yr.	20 yr.	30 yr.	40 yr.	50-100 yr.
Population (OBERS)						
Labor Force						
Other Economic Factors						
Number of Families						
Housing						

The types of housing expected will greatly affect your evaluation, e. g., multi-family dwellings will be handled differently than single family. Use OBERS and local planning units (city, county, and state) to get the number and type(s) of housing to come in.

Then, determine what means of floodproofing will be required (most common is landfill). Determine floodproofing cost without project for each time frame and discount back to base year. (When discounting the 50-100 year time frame, consider the fact that you are representing 50 years rather than ten.)

Keep this in mind. Our problem is to compare costs of alternatives emphasizing floodproofing with those emphasizing structural flood protection.

Q. Land use maps should be developed by local planners to determine where development is to be located. Isn't it possible that no development is anticipated?

A. In some cases, development is necessary in the flood plain, e.g., where the flood plain is 300 miles wide or where flooding spreads out in all directions with little or no pattern.

Q. Cross - Will frequency of occurrence determine the flood insurance rate schedule?

A. You will have to work closely with the F.I.A. representative in each case to determine what effects the rate structure will have in developing damage tables.

Q. Snyder - Why get into this flood insurance in evaluating damages to existing development?

A. The insurance will effect even the existing development and the high rates involved will induce many to either floodproof or move out.

Comment - Cross - Financing will be available to flood plain homes with no flood insurance only through private individuals or insurance companies.

3. Evaluating all Development Outside Flood Plain. Where there will be more flood plain development with than without protection, the benefit is the economic advantage of building there. To illustrate, without-project development may require a considerable additional investment in transportation, communication and utilities systems.

Example:

Suppose we have three alternatives for development -

Alternative 1 is to development outside the flood plain;

Alternative 2 is to develop inside the flood plain and floodproof all buildings;

Alternative 3 is to develop in the flood plain and provide structural flood protection and minimal flood proofing.

You analyze development costs for each alternative considering the structures, floodproofing costs and public services, etc., and find the respective costs to be: Alternative 1 - $200, Alternative 2 = $250, and Alternative 3 = $150. Your benefit is $50, the difference between the with project development and the least costly alternative.

Q. Pepper - Are you suggesting that if the basic costs of housing development are the same, that cheaper public facilities could still possibly make it advantageous to use the flood plain?

A. Positive.

Q. Pepper - Shouldn't you consider the impact of increased runoff on downstream damages?

A. Upland development would probably cause worse problems.

Q. Pepper - Should we be encouraging development in the flood plain?

A. To reiterate -- this is simply a question of efficiency gains and only one part of the decision making process.

Comment - Snyder - The ultimate decision will be made by the people in choosing where they prefer to live.

Response: The project may cause land use to be different with the project than without the project.

Q. Hammond - Shouldn't there be an effect on cost-sharing when windfall benefits accrue?

A. This will be offset by losses elsewhere. Total efficiency gains are our only concern.

Q. Meek - Even when urban development protection is not our principle purpose, do we evaluate the same way?

A. Yes.

Closing Comment - In making projections, hydrology should also be identified for each time frame.

Q. Snyder - In regard to future development under the Act, you run into a problem in projecting future values. When incomes increase, what about values of homes?

A. First, be very cautious if this is the principal benefit of the project. If the increased value of damage reduction in the future, discounted, does not pay for the incremental cost of providing that additional protection today, you can't justify that much protection. It may be that you will have to wait until a later time frame to add the extra protection economically.

Secondly, assume you have no change in the number of homes. The real value of those homes may increase, but not at a one to one ratio to real income.

Q. Several questions were asked regarding what items in upgrading homes are restricted under the Act, such a central air, bathroom, carpet, etc.

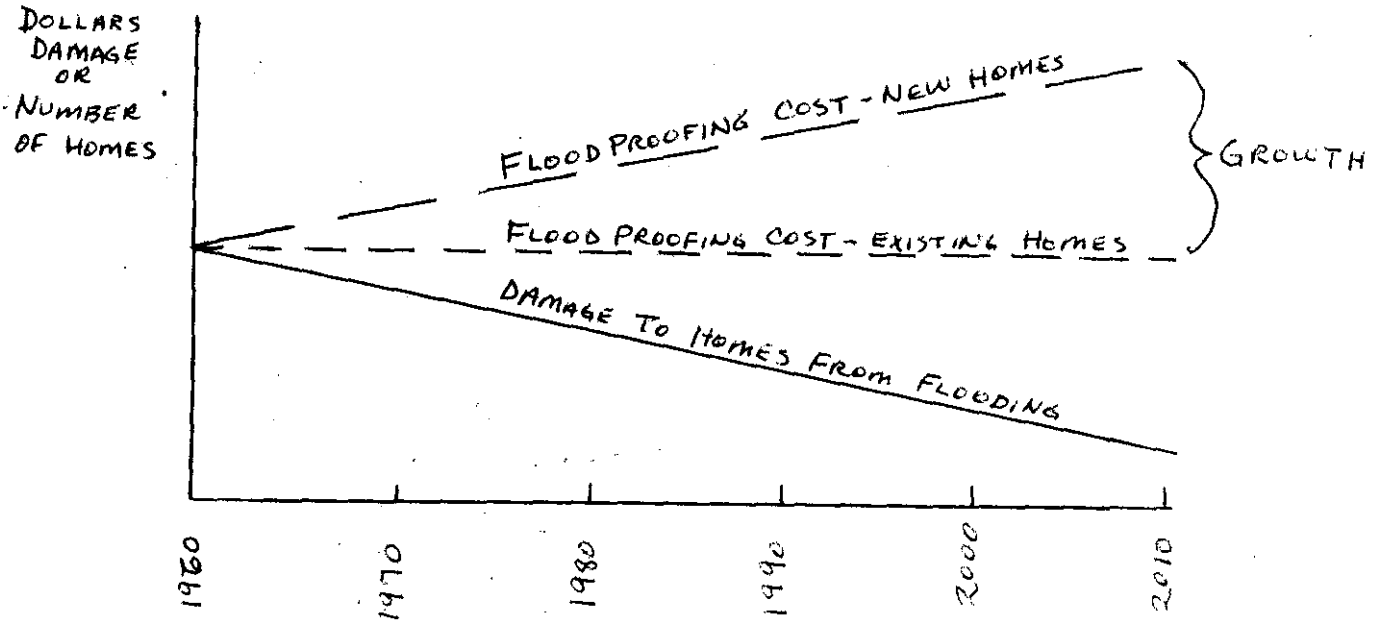
A. To reiterate, the 80 percent rule for improvement applies to improvements confined to within the existing foundation. All expansion will be treated the same as new construction.

Comment - Hodges - When we are projecting or planning for certain development, we need to keep in mind that the State Conservationist is responsible for seeing that there is no significant risk of life or major loss of property.

Q. Pepper - Why is it not correct to use the income factors for future property values? Labor is one of the major ingredients in replacement costs.

A. We are supposed to use current values in our non-agricultural analyses. An increase in price is not the same as an increase in real value in constant dollars. Also, not every dollar of increased income will go into upgrading the home.

Real value - current market price. Assume that price relationships will hold over time, i.e., inflation effects all at the same rate.



II. Concepts Involving Land Treatment and Economic Evaluations - R. M. Gray

The policy not to evaluate land treatment is being questioned. Exploratory work is already being done.

Potential and Requirements - We will probably never use a strictly monetary evaluation for land treatment.

Erosion Reduction - Procedures are not available to evaluate erosion reduction.

a. First, we need an inventory of land use and projected land use by capability class-subclass-possibly even by mapping unit. Before going further, let's look ahead to the problems.

   Assume you have 10 soil capability class-subclass groups involved. You also need to describe the typical characteristics needed to plug into the soil-loss equation. Assume 6 rotation combinations, 3 tillage levels,and 4 structural practices. You have 10x6x3x4 = 720 potential activities. How do you achieve a reduction in erosion? You need a crop base budget which is 1 acre rotation with minimum tillage and terraces. This is your Basic Unit used to determine your Base Yield.

   Then see what rotation, tillage, and structural changes do to yields.

Your budget for each activity will have to relate each change in farming cost and yield. Apply these factors to the Basic Budget and develop indices representing the ratio of returns to Basic Budget.

Q. Snyder - Should we account for the changes in yields and costs down the road (over time)?

A. You should be projecting to about 25 years down the road. Changing technology may tend to overshadow the factors we now use over any longer period than 25 years.

For items such as terraces, installation should be converted to an annual cost.

Next, determine what to do with the indices. Put into a Linear Programming Model with these constraints:

a. Land base, i.e., total acres in each class.

b. Cropping pattern, i.e., minimum total production of certain crops. Force cropping into model by class.

c. Desired future.

d. Either acres of each crop or total production of each crop -- not both.

e. OBERS (still in discussion stage).

f. Irrigation.

g. Yield and activity related to drained and undrained areas.

For example, if only 10,000 acres are projected to be drained, you don't want to account for any more than that in your model.

Comment - Snyder - You may have cropping patterns changing from year to year.

Comment - Davis - Your desired future should be identified for regional interests as opposed to national.

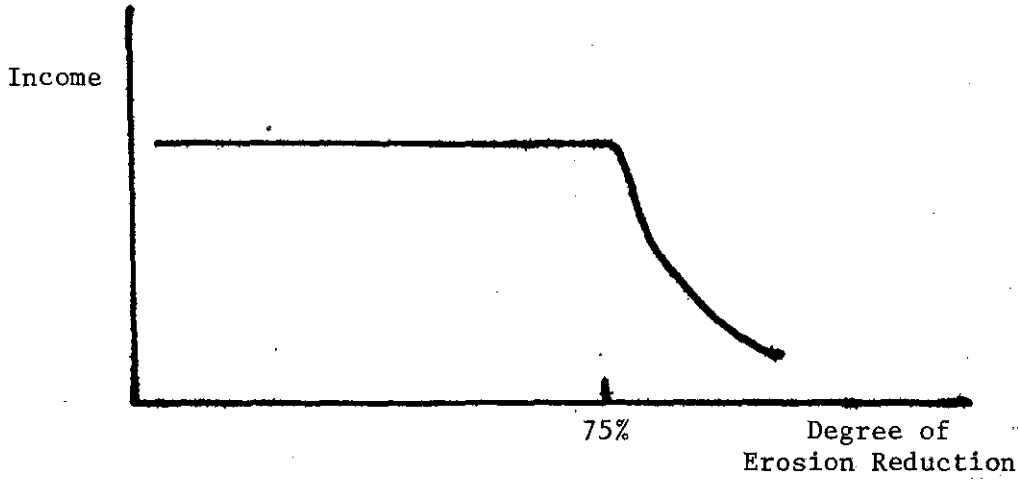
Comment - Hodges - Your model without future development may show a decline in yields and in production.

This leads to an additional constraint:

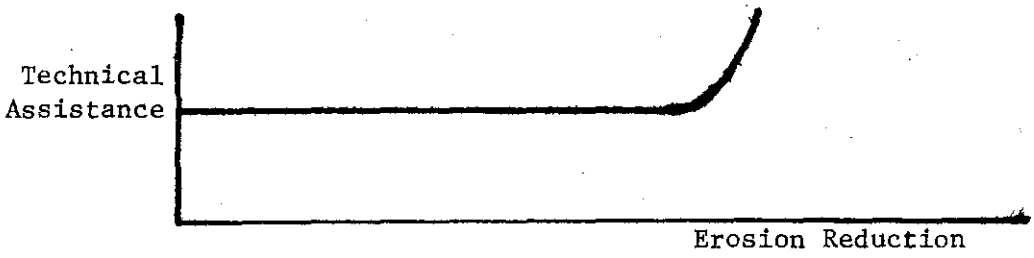
h. Acreage associated with future production would be a future constraint, e.g., yields will decrease because of poor O&M. With good O&M, they may be constant over time.

In summary: In land treatment evaluation, try to get your constraints to reflect what is on the ground and what the expectations are for the area.

In one case study, income dropped drastically after erosion had been reduced by 75 percent.



In another case study, a relationship was determined between the rate of erosion reduction and the cost of associated technical assistance. After a certain level of reduction, there is little gain made by providing more assistance.



Apparently, NEPA has enabled us to consider erosion control to be an ecological value.

Comment - Snyder - We may be talking about evaluating land treatment on our watershed projects, but one might expect that we will be evaluating each farm plan.

Comment - Cook - (1) According to the analysis to date, using OBERS as a base for cropland and erosion, it will be difficult to meet production requirements in the year 2020; (2) land treatment costs should be considered as a cost in production; (3) using conservation as a constraint, you will find that it is economically efficient to shift production from intensive areas to non-intensive areas, possible even out of an entire basin. The Water Resources Council stated that a strict erosion constraint on a national model would probably take an enormous amount of production from the southeast United States.

(Johnson) It is helpful to look at the gross erosion on an area and check out the impact of reducing it to a tolerable level. But, in reference to PL-566 plans, we can't really disaggregate to this level. Therefore, we are limited to constraints such as cropping patterns.

i. One last constraint to consider is an environmental constraint.

Yield projections are very critical. Models are super-sensitive to those yields.

Whether or not we evaluate land treatment in terms of dollars, we should at least measure it in terms of erosion reduction.

Comment - Erosion reduction cannot be measured in dollars for your E. Q. account. It should be measured in tons per acre.

Comment - Holder - Cost sharing appears to be desirable, assuming that farmers are being asked to lose income.

Response - A task force has been initiated by the Administrator to determine why land treatment installation is going down.

Comment - Bando - Someone needs to analyze the trade-off between higher food prices and higher tastes .., then let the people decide whether they prefer to pay the subsidies through taxes or through the market place.

Wednesday Morning - February 25

Chairman: H. R. Cruise

Recorder: E. R. French

LEVELS OF PROTECTION AND MAXIMIZATION OF NET BENEFITS IN RELATION TO PLAN FORMULATION — Thomas C. G. Hodges, Robert L. Caldwell

Hodge's presentations are included as Attachments 2 and 3.

Bob Caldwell discussed plan formulations and how they fit within the maximization of net benefits and emphasis of E. Q. concepts. He showed that the selected plan may go beyond the point of benefit maximization due to specific desires of the public.

Wednesday Afternoon - February 25

Chairman: Marion L. Holder

Recorder: Rufus Pepper

USE OF LINEAR PROGRAM AND OTHER STATISTICAL MODELS IN WATER AND LAND RESOURCE PLANNING — Dr. Roy M. Gray

A. Linear Program

Land treatment models in linear programs. Data input involved is a consideration. The results are only as good as the input data and the assumptions made.

The computer will optimize within the constraints you set up.

Parametric programming to increment the damages or other variable.

Erosion can be reduced up to some point, and after this point farm income drops drastically.

Technical assistance cost to reduce erosion are relatively constant up to a point, after this point, the input of technical assistance to increase erosion reduction is excessive.

MPS-360 or MPS-X can be used to consider various combinations of protective measures. Econ 2 program will give Cost-Return. Constraints are Flood Damage Reduction, constraints on land use patterns, crop constraints. Force in the amount of a crop projected in first run. Constraint the level of protection. Each evaluation unit has a constant level of protection. Gives Net Farm Income and Net Farm Income Per Acre.

Can evaluate more intensive utilization. Can optimize cropping pattern.

Feasible land use changes (Economic). Change or remove one constraint at a time. Runs cost $6 to $7 per run. Every crop must be run with Econ 2 program for each level of protection.

Cost of protection per acre of land protected. Econ 2 program inputs: (All inputs are on a per acre basis): 1) Net returns per acre, 2) Cost of protection, 3) Annual Flood Damage (Annual flood damage reduction), 4) Intensive Benefit, 5) Annual Damage Reduction, 6) Land Constraints, 7) Cropping pattern constaints.

If soils parallel flood plain, it may be good to run by soil types. Costs are not prohibitive. Outputs: 1) Annual Damage Reduction, Net Returns, Benefits to more intensive land use. Most inputs come from Econ 2 program.

This is extremely sensitive to cropping damage. Must have cost estimates. Run ranges to see how sensitive the program is to changes. Pre-requisites are TR20 and Econ 2.

Must run by systems instead of levels of protection. The computer will not take judgment out of planning.

Different reaches of a watershed may have varying levels of protection.

B. Statistical Procedures

Regressions can do many things. Use statistics where applicable. We cannot put confidence levels on much of our work. We make projections from time trends. Damages are usually historical.

If you have the capability you can and will find the opportunities.

SAS - Statistical Analysis System - North Carolina State.

BMD - Bio Med Pack (UCLA). Linear Programming is available on trial basis (MP53) through Washington Office.

SOCIAL WELL-BEING EFFECT EVALUATIONS — Glen Johnson

Elements in National Economic Development and Environmental Quality Account: 1) Personal Income, 2) Damage Reduction, 3) Recreation, 4) Municipal and Industrial Water, 5) Environmental Quality, 6) Water Quality.

Social Well-Being is not an objective we can plan toward. Only minimal costs can be included for social well-being. We must show the project impacts on social well-being, but won't give heavy consideration to it except for adverse effect.

Considerations: effects on real income (approximate from budgets), (Cost-Returns), some shortcut methods Input-Output multipliers (Type I). Secondary data sources may also be used.

Make your figure reasonable, but don't spend an extensive amount of time. Use Input-Output mulitpliers disaggregated to the state level if desired. Employment Multipliers may also be used.

Since there is no good way to consider income redistribution, there seems to be a need for research in that area. Dr. Gray will work on this if necessary, but he suggests that we work in this area and see what is actually required.

Input-Output effects are being worked on by ERS personnel. The multiplier will become smaller as the area under consideration becomes smaller.

Secondary benefits can't be used to justify a project. Several states are setting up basic data Input-Output models.

PROPOSED ECONOMIC GUIDE REVISIONS — Dr. Roy M. Gray

The Economics Guide is being rewritten. The first draft is due by June 1976. Changes that have come about since 1964 are being incorporated.

Chapter 1: Several changes are due to P&S. (Sensitivity especially). prices received and prices paid will be current normalized prices. The Statistical Reporting Service reports Agricultural Prices on a monthly and annual basis. Use the current month cost returns.

Chapter 2: There are some changes in terminology. The public involvement and relevance to the economist will be discussed. General discussion of and identification of the publics. Non-structural measures

will also be discussed. Benefit optimization will be discussed. The procedures in the Economics Guide are suggested; if you can document another procedure, use it. The Economics Guide is not policy, just procedures.

Chapter 3: This chapter is almost completely rewritten. FIA and the procedure discussed Tuesday have changed this drastically. There are no changes in the agricultural area or the unmodified urban property.

Damageable values and damages need to be shown by time frames.

Consider the percent probability of flooding especially in an area where urban type development may occur and the size of the floodplain.

There is a proposal in several states that any new development in a watershed will hold its own increased runoff. Damages have to be discounted back to the base year.

Additional flood proofing costs may be incurred with further development. Use of capitalized values is suggested. We must recognize risk of loss of life.

Chapter 4: Restoration of former productivity will be deleted.

Chapter 5: Principles and Standards requirements are being incorporated.

Chapter 6 and 7: Rehabilitation and benefit maximization will be included.

Chapter 9: This chapter is in a draft form. Principles and Standards is being incorporated.

Chapter 10: Cost allocation is being rewritten.

Chapter 11: It is titled "External Economics," and is in draft form. The bulk of the chapter is examples and developing multipliers.

Apply the multipliers to Gross Benefits less Regional Costs plus non-Regional Costs.

Chapter 12: Redevelopment according to P&S is discussed.

Chapter 13: Relocation is being incorporated into this chapter.

Thursday Morning - February 26

Chairman - Harold K. Jolley

Recorder - Gene W. Jarvis

Evaluation of Flood Prevention and Drainage Effects on Forest Product Production — Robert J. Terry

Forest research requires a long time frame; i.e., it is difficult to obtain results on the impacts of drainage and flood prevention in a short time period. Most forest research has been done on natural stands, and the Forest Service is using infrared photography to determine land use and the different species of trees. Some research has been done under artificial conditions, but the use of these data is questionable for field conditions.

All timber in south Georgia is priced by cord, and pulpwood prices range from $20 to $50 per cord. Although present demands for timber are very high, the forest area is declining. Intensive use and good management of the forest area will be required to produce timber products for future demands. Some items of management for more intensive forest land production are fertilization, stocking, water management, etc.

The Forest Service does not recommend the planting of pine trees in swamp areas. There is a need to drain some areas and manage them for hardwoods. Most land drainage has been done by commercial companies, and not all wet areas can be drained because of insufficient fall. The southeastern area has 37 million acres classified as wetland.

Too much water on land:

Prevents germination of seed;
Causes mortality of seedlings;
Prevents low growing vegetation;
Prevents access;
Retards growth, and
Prevents equipment use for fighting fires in harvest.

The Forest Service is calculating benefits resulting from drainage in PL 566 projects in Georgia. They use soil data and the team method in the field. They calculate site index for present and future conditions.

Site index - height of trees at 50 years of age to estimate volume in that site.

Future condition considers management practices, drainage prices, etc. The Forest Service calculates average annual benefits with allowances for lag in accrual, all costs, and areas which cannot be drained. Design for drainage - remove a 2-year storm in 5 days.

Objectives of study:

1. Secure reliable data on productivity on a with and without basis. This proved difficult to obtain;

2. Reliable cost figures; They were successful in this;

3. Reliable data on price trends of forest products;

4. To utilize the data with automatic data processing. They do have a program which will produce annual returns for a given site index.

The computer program is available to SCS economists and can be used to update benefits. Benefits range from $5 per acre to approximately $20 per acre.

SUMMARY

Too much water during the growing season is detrimental to pines; however, this is not the only drawback. Therefore, field work is necessary to determine the individual problems. (Attachment 4)

Economic Computer Programs Robert F. Rubel

Bob Rubel made the following points about the Economic Computer Programs. (Attachment #5)

1. TR-20 is not applicable to flatland areas except in urban evaluation.

2. Be sure to include a description of data in letter when requesting reruns.

3. ECON-2 should be used as tool in project formulation.

4. General agreement that the urban floodwater damage program is useful.

Cost Allocation for Economics Guide — Thomas C. G. Hodges

Tom Hodges discussed a draft of Chapter 10 of the Economics Guide which deals with cost allocation and sample allocation for a multiple-purpose structure. An illustration of cost allocation with separable cost remaining benefits allocation method is included as Attachment #6.

Thursday Afternoon - February 26

Chairman: Claude Greene

Recorder: Francis W. Artley

This was a general session of questions and answers on economics in general as applied to land and water resource planning. Answers were provided by members of the Regional and National Economics Staff.

Question: Some of you who are conducting the workshop keep referring to USDA procedures while others refer to WRC procedures. There appears to be some conflict in which set we are to follow. Which are we suppose to use?

Answer: Actually, both are appropriate. USDA Procedures supplement WRC Principles and Standards.

Question: How does Environmental Memorandum 15 effect planning?

Answer: Environmental Memorandum 15 places a restraint on all plans.

Question: When do you allocate to the EQ objective?

Answer: When a cost is incurred for EQ, you allocate to EQ. Any associated costs are considered associated structural measures or otherwise an extension of group measures. They are not a part of land treatment measures. The new revised Table 1 presents associated measures as a line item which automatically accounts for them.

Question: How much latitude is there on projections as related to RB 34?

Answer: Projections were discussed. In summary, if a reasonable desired future is different than what it would be within existing restraints, run it out. Also run one projection out as constrained by OBERS as a matter of comparison. Ranges,however, are going to be set for OBERS to provide a certain amount of flexibility and serve as a guide on the amount of allowable deviation from OBERS based trend lines.

Question: What is the possibility of an interest rate to discount an inflation-free interest rate?

Attachment 1

Public Law 93-234
93rd Congress, H. R. 8449
December 31, 1973

An Act

To expand the national flood insurance program by substantially increasing limits of coverage and total amount of insurance authorized to be outstanding and by requiring known flood-prone communities to participate in the program, and for other purposes.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That this Act may be cited as the "Flood Disaster Protection Act of 1973".

Flood Disaster Protection Act of 1973.

FINDINGS AND DECLARATION OF PURPOSE

SEC. 2. (a) The Congress finds that—

(1) annual losses throughout the Nation from floods and mudslides are increasing [illegible] as a result of the accelerating development of, and concentration of population in, areas of flood and mudslide hazards;

(2) the availability of Federal loans, grants, guaranties, insurance, and other forms of financial assistance are often determining factors in the utilization of land and the location and construction of public and of private industrial, commercial, and residential facilities;

(3) property acquired or constructed with grants or other Federal assistance may be exposed to risk of loss through floods, thus frustrating the purpose for which such assistance was extended;

(4) Federal instrumentalities insure or otherwise provide financial protection to banking and credit institutions whose assets include a substantial number of mortgage loans and other indebtedness secured by property exposed to loss and damage from floods and mudslides;

87 STAT. 975

87 STAT. 976

(5) the Nation cannot afford the tragic losses of life caused annually by flood occurrences, nor the increasing losses of property suffered by flood victims, most of whom are still inadequately compensated despite the provision of costly disaster relief benefits; and

(6) it is in the public interest for persons already living in flood-prone areas to have both an opportunity to purchase flood insurance and access to more adequate limits of coverage, so that they will be indemnified for their losses in the event of future flood disasters.

(b) The purpose of this Act, therefore, is to—

(1) substantially increase the limits of coverage authorized under the national flood insurance program;

(2) provide for the expeditious identification of, and the dissemination of information concerning, flood-prone areas;

(3) require States or local communities, as a condition of future Federal financial assistance, to participate in the flood insurance program and to adopt a [illegible] flood plan or [illegible] with effective enforcement provisions consistent with Federal standards to reduce or avoid future flood losses; and

(4) require the purchase of flood insurance by property owners who are being assisted by Federal programs or by federally supervised, regulated, or insured agencies or institutions in the acquisition or improvement of land or facilities located or to be located in identified areas having special flood hazards.

TITLE II—DISASTER MITIGATION REQUIREMENTS

NOTIFICATION TO FLOOD-PRONE AREAS

SEC. 201. (a) Not later than six months following the enactment of this title, the Secretary shall publish information in accordance with subsection 1360(1) of the National Flood Insurance Act of 1968, and shall notify the chief executive officer of each known flood-prone community not already participating in the national flood insurance program of its tentative identification as a community containing one or more areas having special flood hazards. 82 Stat. 587. 42 USC 4101.

(b) After such notification, each tentatively identified community shall either (1) promptly make proper application to participate in the national flood insurance program or (2) within six months submit technical data sufficient to establish to the satisfaction of the Secretary that the community either is not seriously flood prone or that such flood hazards as may have existed have been corrected by floodworks or other flood control methods. The Secretary may, in his discretion, grant a public hearing to any community with respect to which conflicting data exist as to the nature and extent of a flood hazard. If the Secretary decides not to hold a hearing, the community shall be given an opportunity to submit written and documentary evidence. Whether or not such hearing is granted, the Secretary's final determination as to the existence or extent of a flood hazard area in a particular community shall be deemed conclusive for the purposes of this Act if supported by substantial evidence in the record considered as a whole. Public hearing.

(c) As information becomes available to the Secretary concerning the existence of flood hazards in communities not known to be flood prone at the time of the initial notification provided for by subsection (a) of this section he shall provide similar notifications to the chief executive officers of such additional communities, which shall then be subject to the requirements of subsection (b) of this section. Notifications to other community officers.

(d) Formally identified flood-prone communities that do not qualify for the national flood insurance program within one year after such notification or by the date specified in section 202, whichever is later, shall thereafter be subject to the provisions of that section relating to flood-prone communities which are not participating in the program. Supra.

EFFECT OF NONPARTICIPATION IN FLOOD INSURANCE PROGRAM

SEC. 202. (a) No Federal officer or agency shall approve any financial assistance for acquisition or construction purposes on and after July 1, 1976, for use in any area that has been identified by the Secretary as an area having special flood hazards unless the community in which such area is situated is then participating in the national flood insurance program.

(b) Each Federal instrumentality responsible for the supervision, approval, regulation, or insuring of banks, savings and loan associations, or similar institutions shall by regulation prohibit such institutions on and after July 1, 1976, from making, [illegible] or renewing any loan secured by improved real estate or a mobile home located or to be located in an area that has been identified by the Secretary as an area having special flood hazards, unless the community in which such area is situated is then participating in the national flood insurance program.

REPEAL OF DISASTER ASSISTANCE PENALTY

SEC. 203. Section 1314 of the National Flood Insurance Act of 1968 is repealed. Repeal. 82 Stat. 579. 42 USC 4021.

age is provided so as to reduce exposure to flood hazards; and

(8) Require new or replacement water supply systems and/or sanitary sewage systems to be designed to minimize or eliminate infiltration of flood waters into the systems and discharges from the systems into flood waters, and require on-site waste disposal systems to be located so as to avoid impairment of them or contamination from them during flooding.

(c) When the Administrator has identified the flood plain area having special flood hazards, and has provided water surface elevations for the 100-year flood, but has not provided data sufficient to identify the floodway or coastal high hazard area, the minimum land use and control measures adopted by the community for the flood plain must—

(1) Meet the requirements of paragraph (b) of this section;

(2) Require new construction or substantial improvements of residential structures within the area of special flood hazards to have the lowest floor (including basement) elevated to or above the level of the 100-year flood;

(3) Require new construction or substantial improvements of non-residential structures within the area of special flood hazards to have the lowest floor (including basement) elevated to or above the level of the 100-year flood or, together with attendant utility and sanitary facilities, to be floodproofed up to the level of the 100-year flood; and

(4) In riverine situations, provide that until a floodway has been designated, no use, including land fill, may be permitted within the flood plain area having special flood hazards unless the applicant for the land use has demonstrated that the proposed use, when combined with all other existing and anticipated uses, will not increase the water surface elevation of the 100-year flood more than 1 foot at any point.

(d) When the Administrator has identified the riverine flood plain area having special flood hazards, has provided water surface elevation data for the 100-year flood, and has provided floodway data, the land use and control measures adopted by the community for the flood plain must—

(1) Meet the requirements of paragraph (b) of this section;

(2) Require new construction or substantial improvements of residential structures within the area of special flood hazards to have the lowest floor (including basement) elevated to or above the level of the 100-year flood;

(3) Require new construction or substantial improvements of nonresidential structures within the area of special flood hazards to have the lowest floor (including basement) elevated to or above the level of the 100-year flood or, together with attendant utility and sanitary facilities, to be floodproofed up to the level of the 100-year flood;

(4) Designate a floodway for passage of the water of the 100-year flood. The selection of the floodway shall be based on the principle that the area chosen for the floodway must be designed to carry the waters of the 100-year flood, without increasing the water surface elevation of that flood more than 1 foot at any point;

(5) Provide that existing nonconforming uses in the floodway shall not be expanded but may be modified, altered, or repaired to incorporate floodproofing measures, provided such measures do not raise the level of the 100-year flood; and

(6) Prohibit fill or encroachments within the designated floodway that would impair its ability to carry and discharge the waters resulting from the 100-year flood, except where the effect on flood heights is fully offset by stream improvements.

(e) When the Administrator has identified the coastal flood plain area having special flood hazards, has provided water surface elevation data for the 100-year flood, and has identified the coastal high hazard area, the land use and control measures adopted by the local government for the flood plain must—

(1) Meet the requirements of paragraph (b) of this section;

(2) Require new construction or substantial improvements of residential structures within the area of special flood hazards to have the lowest floor (including basement) elevated to or above the level of the 100-year flood;

(3) Require new construction or substantial improvements of nonresidential structures within the area of special flood hazards to have the lowest floor (including basement) elevated to or above the level of the 100-year flood or, together with attendant utility and sanitary facilities, to be floodproofed up to the level of the 100-year flood;

concerning the elevation (in relation to mean sea level) of the lowest floor (including basement) of the structure and, where the lowest floor is below grade on one or more sides, the elevation of the floor immediately above, and (ii) maintain a record of all such information with the official designated by the community under § 1909.22(13)(ii);

(5) Must in riverine situations, submit to the Administrator evidence of coordination with upstream, downstream or adjacent communities adversely affected by any development, fill, encroachment, or alteration or relocation of a watercourse;

(6) [Reserved]

(7) [Reserved]

(8) [Reserved]

(c) When the Administrator has identified the flood plain area having special flood hazards by the notice of a final flood elevation determination which provides water surface elevations for the 100-year flood within certain areas of special flood hazards, but the Administrator has not identified a floodway or coastal high hazard area, the community:

(1) Must require building permits for all proposed construction of other improvements in the flood plain area having special flood hazards;

(2) Must require the review of building permit applications for new construction or substantial improvements within the flood plain area having special flood hazards to assure that the proposed construction (including prefabricated homes) is designed (or modified) and anchored to prevent flotation, collapse or lateral movement of the structure;

(3) Must require the review of the subdivision proposals and other proposed new developments within the flood plain area having special flood hazards to assure that (i) all such proposals are consistent with the need to minimize flood damage, (ii) all public utilities and facilities, such as sewer, gas, electrical and water systems are located and constructed to minimize or eliminate flood damage; and (iii) adequate drainage is provided so as to reduce exposure to flood hazards;

(4) Must require new or replacement water supply systems and sanitary sewage systems within the flood plain area having special flood hazards to be designed to minimize or eliminate infiltration of flood waters into the systems and discharges from the system into flood waters, and require on-site waste disposal systems to be located so as to avoid impairment of them or contamination from them during or subsequent to flooding;

(5) Must require new construction and substantial improvements of residential structures within the area of special flood hazards for which base flood elevations have been provided to have the lowest floor (including basement) elevated to or above the level of the 100-year flood, unless the community is granted an exception for the allowance of basements and/or storm cellars in accordance with § 1910.6(b)(2);

(6) Must require new construction and substantial improvements of nonresidential structures within the area of special flood hazards for which base flood elevations have been provided to have the lowest floor (including basement) elevated to or above the level of the 100-year flood, or together with attendant utility and sanitary facilities to be flood-proofed to or above the level of the 100-year flood in accordance with the standards for completely flood-proofed structures contained within sections 210.2.1 FP1 or 210.2.2 FP2 of the U.S. Army Corps of Engineers Publication entitled "Flood-Proofing Regulations," June 1972, GPO:19730-505-026 Edition or any subsequent edition thereto;

(7) Must provide that where floodproofing is utilized for a particular structure in accordance with paragraphs (c)(6) of this section or (b)(2) of § 1910.6, a registered professional engineer or architect shall certify that the floodproofing methods are reasonably adequate to withstand the flood depths, pressures, velocities, impact and uplift forces and other factors associated with the 100-year flood, and a record of such certificates shall be maintained with the official designated by the community under § 1909.22(13)(ii);

(8) Must (i) obtain information, at the time a building permit is issued for a new structure or substantial improvement located within the identified flood plain areas having special flood hazards, concerning the elevation (in relation to mean sea level) of the lowest floor (including basement) of the structure, and where the lowest floor is below grade on one or more sides, the elevation of the floor immediately above, and (ii) maintain a record of all such information with the official designated by the community under § 1909.22(13)(ii);

(9) Must require within the area of special flood hazards for new mobile home parks for expansions to existing mobile home parks, and for new mobile homes not in a mobile home park and for existing mobile home parks where the repair, reconstruction or improvement of streets, utilities and pads equals or exceeds 50 percent of the value of the streets, utilities and pads before the repair, reconstruction or improvement has commenced, that (i) ground anchors for tie downs are required in accordance with the Mobile Home Manufacturers Association standards or standards determined by the Administrator, (ii) stands or lots are elevated on compacted fill or on piers within areas of special flood hazards for which base flood elevations have been provided, so that the lowest floor of the home will be at or above the 100-year flood level, (iii) adequate surface drainage and easy access for a hauler is provided, and (iv) in the instance of elevation on piers, lots are large enough to permit steps, pier foundations are placed on stable soil no more than 10 feet apart and steel reinforcement is provided for piers more than 6 feet high;

(10) Must require within the area of special flood hazards for mobile homes moving into existing mobile home parks where concrete pads for the placement of mobile homes are in existence and where streets and utility connections are in existence that (i) ground anchors for tie downs are required in accordance with the Mobile Home Manufacturers Association standards or standards determined by the Administrator, (ii) the fact that the mobile home is being located in a flood plain area having special flood hazards is disclosed to the mobile home and/or lot purchaser or lessee in the purchase contract, deed or lease, and (iii) an evacuation plan indicating alternate vehicular access and escape routes is filed with Disaster Preparedness Authorities;

(11) Must require the standards of paragraph (b) of this section within any flood plain area having special flood hazards for which base flood elevations have not been provided;

(12) Must, in riverine situations, submit to the Administrator evidence of coordination with upstream, downstream, or adjacent communities adversely affected by any development, fill, encroachment, or alteration or relocation of a watercourse;

(13) Must require in riverine situations that until a floodway has been designated, no use, including fill, may be permitted within the flood plain area having special flood hazards for which base flood elevations have been provided unless it is demonstrated that the cumulative effect of the proposed use, when combined with all other existing and reasonably anticipated uses of a similar nature, will not increase the water surface elevation of the 100-year flood more than 1 foot at any point within the community;

(d) When the Administrator has identified the flood plain area having special flood hazards by the notice of a final flood elevation determination which provides water surface elevations for the 100-year flood within certain areas of special flood hazards, and the Administrator has provided floodway data, the community:

(1) Must meet the requirements of paragraphs (c)(1) through (c)(12) of this section;

(2) [Reserved]

(3) [Reserved]

* * * * *

(5) [Reserved]

(6) Must prohibit, within the designated floodway, fill, encroachments, and new construction and substantial improvements of existing structures, which would result in any increase in flood heights within the community during the recurrence of the 100-year flood discharge;

(7) Must prohibit, within the designated floodway, the location of any portion of a new mobile home park, of any expansion to an existing mobile home

Attachment 2

Soil Conservation Service
Fort Worth, Texas
February 19, 1976

LEVEL OF PROTECTION FOR PROJECT FORMULATION AND EVALUATION FROM AN ECONOMISTS' VIEWPOINT[1/]

MANY FACTORS MUST BE CONSIDERED IN THE FORMULATION AND EVALUATION OF ALTERNATIVES FOR WATER AND RELATED LAND RESOURCE PLANNING AND DEVELOPMENT. ONE OF THE MOST IMPORTANT FACTORS IS LEVEL OF PROTECTION. SEVERAL LEVELS OF PROTECTION MUST BE CONSIDERED IN ORDER TO MAKE PROPER EVALUATION OF PHYSICAL AND ECONOMIC EFFECTS. LEVELS OF PROTECTION FOR A SPECIFIC PROJECT AREA OR PROJECT SUBAREA MUST BE BASED ON THE COMPONENTS EXPRESSED BY THE PUBLICS. PRINCIPLES AND STANDARDS PUBLISHED BY THE WATER RESOURCES COUNCIL SPECIFICALLY CALLS FOR PUBLIC INVOLVEMENT. COMPONENTS EXPRESSED BY THESE PUBLICS MUST INCLUDE EXPRESSION ABOUT THE TYPES OF LAND USES DESIRED WITHIN THE PROJECT AREA.

WHEN THESE LAND USE COMPONENTS ARE CONVERTED TO COMPONENT NEEDS, IT WILL BE NECESSARY TO ESTABLISH WHAT LEVELS OF PROTECTION ARE NECESSARY TO SUSTAIN DESIRED LAND USES OR LAND USE CHANGES. WE ECONOMISTS, AS A PART OF THE PLANNING

1/ Prepared for presentation by Thomas C. G. Hodges at Economics Workshop in Fort Worth, Texas, February 24-26, 1976.

TEAM, WILL NEED TO CALL ON VARIOUS PHYSICAL SCIENTISTS SUCH AS SOILS SCIENTISTS, AGRONOMISTS, BIOLOGISTS, URBAN PLANNERS, FORESTERS, HORTICULTURISTS, ETC., TO HELP SET THE PHYSICAL EFFECTS ON LAND USES WITH VARIOUS LEVELS OF PROTECTION. THIS IS NOT AN EASY TASK, BUT WE NEED THE OBJECTIVE APPRAISAL BY THESE SPECIALISTS TO HELP SET THE BASIS FOR LAND USE REQUIREMENTS AND PROJECT EFFECTS. APPRAISALS OF A RANGE OF EFFECTS WILL HELP THE PUBLICS MAKE PROPER DECISIONS REGARDING LAND USE DESIRES AND THE MINIMUM LEVELS OF PROTECTION NEEDED TO SUSTAIN OR BRING ABOUT DESIRED USES.

LEVEL OF PROTECTION OR LEVEL OF DEVELOPMENT IS AN EXPRESSION OF THE STARTING POINT OF A WATER AND RELATED LAND PROBLEM IN A WATER RESOURCE PROBLEM AREA. FOR EXAMPLE, IN UPLAND PROJECTS THE LEVEL OF FLOOD PROTECTION MAY BE EXPRESSED AS THE PERCENT CHANCE OR EQUIVALENT FLOODING BEGINS. FOR FLATLAND WATERSHEDS, LEVEL OF PROTECTION MAY BE EXPRESSED AS THE AREA PROTECTED FROM DAMAGE CAUSED BY PRECIPITATION FROM A PERCENT CHANCE RAINFALL EVENT. LEVELS OF PROTECTION MAY ALSO BE EXPRESSED AS THE PERCENT DAMAGE REDUCTION OR THE TIME AND REMOVAL RATE DEPENDING ON THE TYPE OF DAMAGE AND THE UNDERSTANDING OF THE PUBLICS. FOR RECREATION, IT IS THE NUMBER OF USER DAYS PROVIDED.

LEVELS OF PROTECTION (DEVELOPMENT) NEED TO BE DETERMINED FOR ALL ALTERNATIVES INCLUDING THE WITHOUT PROJECT ALTERNATIVE. WITHOUT PROJECT CONDITION ESTABLISHES THE DEGREE OF PROBLEM FLOODING, DRAINAGE, EROSION, OR SEDIMENT THAT WATER RESOURCE MEASURES ARE BEING FORMULATED TO PROTECT AGAINST.

THE ECONOMIST IS INTERESTED IN LEVELS OF PROTECTION MOSTLY AS A BASIS FOR MAKING CLAIMS FOR VARIOUS BENEFITS. HE NEEDS TO KNOW WHAT LEVEL IS NEEDED TO CAUSE LAND MANAGERS TO USE A PROBLEM AREA MORE INTENSELY, AND THE LEVEL AT WHICH LAND USE CHANGES ARE EXPECTED TO BE MADE EITHER TO A HIGHER OR LOWER DEGREE. LEVELS OF PROTECTION ARE A PART OF FLOODWATER DAMAGE EVALUATIONS IN THAT THEY ARE CONSIDERED IN DEVELOPING MONTHLY STAGE DAMAGE FACTORS.

IN MANY CASES IT WILL BE THE JOB OF THE ECONOMIST ON THE PLANNING STAFF TO WORK WITH THE VARIOUS SPECIALISTS TO ESTABLISH THE PHYSICAL NEEDS OF VARIOUS LAND USES AND THE EFFECTS OF VARIOUS DEGREES OF WATER MANAGEMENT OR FLOOD CONTROL. THE MOST DIFFICULT PART OF THIS JOB IS TO INFORM THE SPECIALISTS ABOUT WHAT WE NEED TO KNOW. IT IS DIFFICULT TO BREAK THROUGH ESTABLISHED THOUGHTS AND TRAINING TO GET SOME PEOPLE TO THINK IN TERMS OF WHAT HAS BEEN NEXT TO

IMPOSSIBLE. IN THE PAST, WE HAVE OBTAINED INFORMATION ABOUT FLOOD FREE YIELDS. FREQUENTLY THE SPECIALIST STARTED WITH THE IDEA THAT IT IS NOT PRACTICAL TO PLAN FOR FLOOD FREE CONDITIONS WITH THE LAND USE AND PROBLEM AREA IN QUESTION. WE SWITCHED HIS THINKING AND HELPED HIM UNDERSTAND THAT WE WEREN'T PLANNING FOR FLOOD FREE CONDITIONS, BUT WE NEEDED HIS JUDGEMENT OF FLOOD FREE YIELDS FOR OUR ECONOMIC EVALUATIONS OF DAMAGES.

THIS SAME TYPE OF THOUGHT DIRECTION IS NEEDED TO HELP ESTABLISH THE MINIMUMS NEEDED TO CHANGE AND/OR SUSTAIN LAND USE DESIRES OF THE PUBLICS. SURELY WE WILL NEED TO PLAN FOR A HIGHER LEVEL OF PROTECTION FOR COTTON THAN IS NEEDED FOR PASTURE. THE PHYSICAL SPECIALIST NEEDS TO LET US KNOW WHAT HE THINKS WILL HAPPEN TO YIELDS FOR SELECTED DEGREES OF FLOOD PROTECTION. HIS JUDGEMENT IS NEEDED TO ESTABLISH WHAT LEVELS OF FLOOD CONTROL OR WATER MANAGEMENT CONTROL WILL CAUSE LAND USE SHIFTS AND SHIFTS TO HIGHER OR LOWER MANAGEMENT.

THE FIRST STEP IN ESTABLISHING THE LEVEL OR AMOUNT OF PROTECTION NEEDED IN A SPECIFIC PROBLEM AREA IS TO ANALYZE THE WITHOUT PROTECTION CONDITIONS. THIS, IN MOST CASES, WILL REQUIRE COLLECTING DATA ABOUT PRESENT CONDITIONS AND PROJECTING THESE TO REPRESENT CONDITIONS EXPECTED DURING THE EVALUATIONS PERIOD WITH NO WATER AND RELATED LAND RESOURCE DEVELOPMENT.

AFTER WITHOUT PROJECT CONDITIONS ARE ANALYZED, WE CAN DETERMINE THE VALIDITY OF COMPONENTS EXPRESSED BY THE VARIOUS PUBLICS. ALSO, WITH THE "PUBLICS'" HELP WE MAY DETERMINE THAT THE WITHOUT PROJECT ANALYSIS SHOULD BE ADJUSTED.

ARMED WITH THE WITHOUT PROJECT ANALYSIS AND COMPONENTS EXPRESSED BY THE PUBLICS, WE CAN WORK WITH THE PHYSICAL SCIENTISTS TO MAKE THE JUDGEMENTS ABOUT THE AMOUNT OF PROTECTION NEEDED TO SUSTAIN DESIRED LAND USES AND THE AMOUNT OF PROTECTION NEEDED TO BRING ABOUT DESIRED LAND USE CHANGES AND MORE INTENSIVE LAND USES.

IT MAY BE NECESSARY TO EXPRESS LEVELS OF PROTECTION DIFFERENTLY FOR VARIOUS WATERSHEDS. IN SOME CASES THEY MAY BE EXPRESSED AS PROTECTION FROM A PARTICULAR SIZE STORM EXPRESSED AS AMOUNT OF RAINFALL. IN ANOTHER, IT MAY BE EXPRESSED AS A PERCENT REDUCTION OF DAMAGE AND ANOTHER MAY BE AS A PERCENT CHANCE OF FLOODING.

IN FLATLAND WATERSHEDS DEALING WITH COMBINED FLOOD AND DRAINAGE PROBLEMS, LEVELS OF PROTECTION ARE USUALLY EXPRESSED AS REMOVAL OF RUNOFF FROM A PARTICULAR SIZE STORM WITHIN A TIME FRAME SUCH AS A 24 HOUR PERIOD. IT WOULD

SEEM THAT LEVELS OF PROTECTION SHOULD BE EXPRESSED IN THE TERMS BEST UNDERSTOOD BY THE PUBLICS INVOLVED WITH THE WATERSHED BEING PLANNED RATHER THAN THE SPECIFIC CHOICE OF A SPECIALIST INVOLVED IN PLANNING.

THE ECONOMIST WILL NEED TO ANALYZE LEVELS OF PROTECTION TO SHOW THE PUBLICS THE ECONOMIC EFFECTS OF EACH. THIS WILL HELP THE PUBLICS BETTER UNDERSTAND THE CHOICES WHEN SELECTING THE RECOMMENDED PLAN. WHEN AN ENTIRE PROJECT AREA IS LOW INTENSITY USE AS WELL AS THE PROBLEM AREA, WE WILL NEED EXTRA SUPPORT TO PROVIDE HIGH ENOUGH LEVELS OF PROTECTION FOR CHANGED LAND USE IN THE PROBLEM AREA. WE WILL NEED SUCH SUPPORT TO CLAIM ENHANCEMENT BENEFITS IN SUCH CASES.

LEVELS OF PROTECTION BECOME THE SUPPORT FOR ECONOMIC EVALUATIONS. WE NEED SUPPORT FROM PHYSICAL SCIENTISTS AS WELL AS PROJECT SPONSORS.

Attachment 3
Soil Conservation Service
Fort Worth, Texas
February 20, 1976

MAXIMIZATION OF NET BENEFITS [1/] IN WATER RESOURCE PROJECT FORMULATION

USDA PROCEDURES FOR PLANNING WATER AND RELATED LAND RESOURCES CALL FOR PLANS TO BE FORMULATED TO IMPROVE THE QUALITY OF LIFE BY MEETING CURRENT AND PROJECTED NEEDS AND PROBLEMS AS IDENTIFIED BY THE DESIRES OF THE PEOPLE. THEY SHOULD MAKE CONTRIBUTIONS TO SOCIETY'S PREFERENCES FOR NATIONAL ECONOMIC DEVELOPMENT AND ENVIRONMENTAL QUALITY.

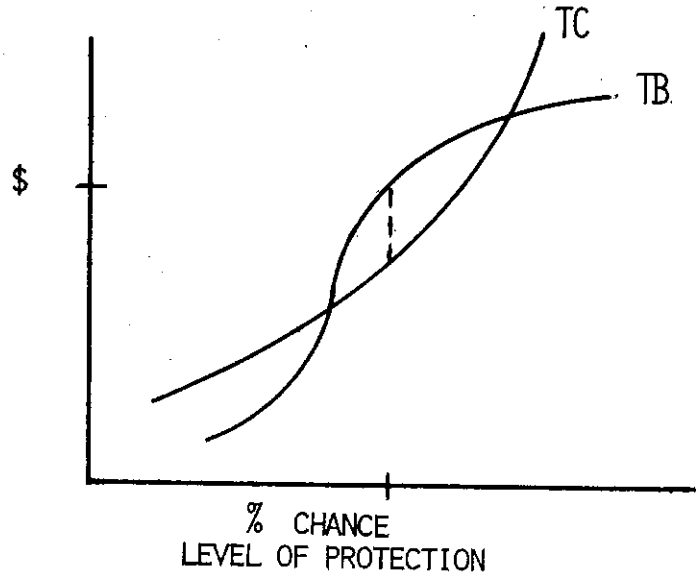
THE PROCEDURES ALSO CALL FOR THE ACCOUNTING OF BENEFICIAL AND ADVERSE PROJECT EFFECTS IN FOUR ACCOUNTS; NATIONAL ECONOMIC DEVELOPMENT, ENVIRONMENTAL QUALITY, REGIONAL DEVELOPMENT, AND SOCIAL WELL BEING.

TO ACHIEVE THE EXPLICIT PLANNING OBJECTIVES OF NED AND EQ IN THE PLANNING OF WATER AND RELATED LAND RESOURCES, AT LEAST ONE ALTERNATIVE PLAN MUST BE FORMULATED TO OPTIMIZE NATIONAL ECONOMIC DEVELOPMENT AND ONE TO EMPHASIZE ENVIRONMENTAL QUALITY. ALTERNATIVES TO THESE TWO PLANS REFLECTING TRADE OFFS, BY COMBINING COMPONENTS OF THE TWO OBJECTIVES

1/ Prepared for presentation by Thomas C. G. Hodges at the Economics' Workshop in Fort Worth, Texas, February 24-26, 1976.

ARE TO BE FORMULATED. ALL ALTERNATIVES INCLUDING THE NED AND EQ PLANS ARE TO MEET LOCAL, STATE, AND PROGRAM CONSTRAINTS (ITEM B IN "INFORMATION FOR IMPLEMENTING USDA PROCEDURES, ISSUED AS ATTACHMENT TO ADVISORY W-6, RB-7, RC&D-4, DATED FEBRUARY 6, 1975.") AND MUST SATISFY THE FOUR TESTS; ACCEPTABILITY TEST, EFFECTIVENESS TEST, EFFICIENCY TEST, AND COMPLETENESS TEST.

WITHIN THE PLANNING FRAMEWORK OF MEETING THE PROBLEMS AND NEEDS EXPRESSED BY THE PEOPLE, SATISFYING LOCAL, STATE, AND PROGRAM CONSTRAINTS AND SATISFYING THE FOUR TESTS, THE NED PLAN IS TO OPTIMIZE NATIONAL ECONOMIC DEVELOPMENT. EXPRESSED IN OTHER TERMS THE NED PLAN MAXIMIZES NET BENEFITS. THEREFORE, MAXIMIZATION OF NET BENEFITS APPLIES TO THE FORMULATION OF THE NED PLAN. MAXIMIZATION OF NET BENEFITS IS A FUNCTION OF BENEFITS AND COST WHERE BENEFITS EXCEED COSTS TO THE GREATEST EXTENT. GRAPHICALLY SHOWN:



STEPS FOR MAXIMIZATION OF NET BENEFITS ARE:

1. COMPILE NED COMPONENTS FROM THE LIST OF PROBLEMS AND NEEDS IDENTIFIED BY THE DESIRES OF THE PEOPLE.

2. EVALUATE WITHOUT PROJECT CONDITION.

3. DETERMINE WITH APPLICABLE SCIENTISTS, THE LEVELS OF PROTECTION AND OTHER CHANGES NEEDED TO ACHIEVE THE NED COMPONENTS.

4. FORMULATE AND EVALUATE ALTERNATIVE PLANS WHICH SATISFY NED COMPONENTS TO DETERMINE WHICH PRODUCES THE MOST NET BENEFITS.

5. MAKE APPLICABLE CHANGES IN THE PLAN THAT PRODUCES THE MOST NET BENEFITS TO MAXIMIZE NET BENEFITS.

THE DEGREE OF DETAIL INVOLVED IN EACH STEP DEPENDS ON THE REQUIREMENTS OF THE PROGRAM UNDER WHICH PLANNING IS AUTHORIZED. FOR EACH PROGRAM AN ANALYSIS IS NEEDED TO SHOW THAT THE NED PLAN MAXIMIZES NET BENEFITS IN ORDER TO MEET USDA PROCEDURES FOR PLANNING WATER AND RELATED LAND RESOURCES.

RIVER BASIN PLANNING IS GENERALLY BROAD IN SCOPE. INVESTIGATIONS AND ANALYSES ARE DIRECTED TOWARDS IDENTIFYING COMPONENT NEEDS FOR A REGION AND SUBREGION AND THE TYPES OF TREATMENT MOST SUITABLE TO PROVIDE THE COMPONENT NEEDS. MAXIMIZATION OF NET BENEFIT ANALYSIS MUST BE SCALED TO THE INTENSITY OF THE OVERALL STUDY.

PL566 WATERSHEDS AND RC&D PROJECT MEASURES ARE SMALLER; THEREFORE, COMPONENT NEEDS ARE IDENTIFIED FOR MORE DEFINED PROBLEM AREAS AND ARE STATED MORE SPECIFICALLY. PROBLEM AREAS ARE DIVIDED INTO EVALUATION UNITS AND THESE ARE DIVIDED INTO REACHES BASED ON LAND USE AND HYDROLOGIC AREAS. THE REACHES ARE MADE UP OF CROSS SECTION AREAS WHICH FURTHER SPECIFY PROBLEMS, NEEDS, AND EFFECTS. WITH THIS MORE DETAILED DATA, EVALUATION OF SPECIFIC PROBLEMS AND NEEDS AND EFFECTS ARE IN ORDER. WITH THE IDENTIFICATION OF SPECIFIC PROJECT MEASURES FOR IMPLEMENTATION ANALYSIS OF MAXIMIZATION OF NET BENEFITS IS MORE DETAILED THAN FOR RIVER BASINS.

RC&D PROJECT MEASURES ARE USUALLY DEVELOPED FOR A SPECIFIC COMPONENT NEED WITHIN A SMALL PLANNING AREA HAVING FEW OTHER COMPONENT NEEDS WITH LIMITED OR NO CONFLICTS. ALTERNATIVES ARE FEW; THEREFORE, ANALYSIS OF NET BENEFIT MAXIMIZATION IS USUALLY A LESSER TASK THAN FOR PL566.

MAXIMIZATION OF NET BENEFITS CALLS FOR THE EVALUATION OF ALL SIGNIFICANT NED EFFECTS ESPECIALLY THOSE THAT RELATE TO COMPONENTS AND COMPONENT NEEDS. IN ORDER TO MAKE THE SEVERAL NEEDED EVALUATIONS, IT IS NECESSARY TO SET ESTABLISHED LEVELS OF PROTECTION OR LEVELS OF DEVELOPMENT REQUIRED TO BRING ABOUT THE PUBLICS' DESIRED EFFECTS. SOME OF THESE EFFECTS ARE CHANGED LAND USE, MORE INTENSIVE USE, RECREATION DEVELOPMENT, MUNICIPAL AND INDUSTRIAL WATER SUPPLY, IRRIGATION EFFECTS, DRAINAGE EFFECTS, SEDIMENT AND EROSION DAMAGE REDUCTION, AND SAVINGS IN FUTURE COSTS. ALTERNATIVE PLANS MAY PROVIDE DIFFERENT LEVELS OF PROTECTION, AND THEY WILL NEED TO BE ACCOUNTED FOR IN THE BENEFITS ANALYSES.

FOR RIVER BASINS THE MAXIMIZATION OF NET BENEFITS ANALYSES MAY BE A COST ANALYSIS. IF THE DESIRED EFFECTS ARE REACHED BY DIFFERENT TYPES OF MEASURES THE LEAST COSTLY SYSTEM WILL YIELD THE MOST NET BENEFITS.

FOR WATERSHEDS AND RC&D PROJECT MEASURES, PHYSICAL AND ECONOMIC DAMAGES AND EFFECTS ARE REFINED AND LOCATED TO SUCH A DEGREE THAT DIFFERENCES BETWEEN ALTERNATIVES ARE MORE IDENTIFIABLE. USE OF COMPUTERS TO MEASURE AND EVALUATE THESE EFFECTS MAKES IT MORE PRACTICAL TO EVALUATE ALTERNATIVES.

FORMULATION AND EVALUATION OF ALTERNATIVES STARTS WITH THE MINIMUM LEVELS OF PROTECTION AND MINIMUM LEVELS OF DEVELOPMENT NEEDED TO SATISFY COMPONENT NEEDS. HIGHER LEVELS ARE ADDED UNTIL THE NEXT INCREMENT DOES NOT PRODUCE EQUIVALENT BENEFITS. THE NED PLAN WITH MAXIMUM NET BENEFITS IS ONE THAT PROVIDES COMPONENT NEEDS AND MEETS PROGRAM CONSTRAINTS, AND THE FOUR TESTS; ACCEPTABILITY, EFFECTIVENESS, EFFICIENCY, AND COMPLETENESS.

Attachemnt 4

EVALUATION OF DRAINAGE ON FOREST PRODUCT PRODUCTION

by

Robert J. Terry
Resource Planning Specialist
Southeastern Area, S&PF
Forest Service, USDA

This subject that we are about to discuss is probably one of the most controversial subjects today, outside of, maybe, clearcutting of our National Forests. There have been more research and studies undertaken over the past thirty years with less concrete facts learned than on any other subject. You can find research, and good research by outstanding researchers of industry and Forest Service, that will prove anything you might want to prove on this subject. The more you dig into drainage benefits, and the more you talk with knowledge people, the more confused you become--but this is understandable. Forest research takes several years to complete and management practices change in the meantime.

So, when you begin looking deeper into the research and comparing methods, sites, purposes, etc., you find many causes for confusion. Most research was done on natural stands of pine; many were done without regard to soil types or stocking rates. Very few studies have been carried out using superior seedlings and management practices that are used today. This will be discussed in more detail a little later.

What I am going to attempt this morning is to give you a little background in reasons for drainage, then attempt to explain the steps that I use, right or wrong, in evaluating drainage on forest lands.

My experience is limited mostly to the coastal area of Georgia, with some experience in Florida and South Carolina. Because of the competition for stumpage in south Georgia, prices are high and, therefore, management practices may be entirely different than in the states where you work. The examples that I use may not fit your situation. However, they may help you in identifying possible benefits to forest growth in your areas of work.

The southeastern states produce over half of the Nation's supply of pulpwood. A large percentage of this comes from the coastal areas. In 1974, there were 127 pulp mills in the southeast which used about 36 millions cords of roundwood, along with another 13 million cords of wood residues. This is a 4 percent increase over 1973, a 10 percent increase over 1972, and a 70 percent increase in the past decade. With additional mills added to the list each year, and with modernization and expansion of existing mills, the increase in demand will continue to climb.

Presented to STSC Area Economics Workshop on February 26, 1976, Fort Worth, Texas.

At the same time, the forest land base continues to shrink. More highways are being built, urban areas are expanding, dams are being built, and recreational areas, including second home developments, are being carved out of the forest. Most of these are encroaching on some of the most productive soil types. These changes in land uses are permanent, never to become forest lands again.

As food production becomes more important, farmers will clear more and more land for agricultural uses. Open space and wilderness areas also reduce the commercial forest lands.

Of course, what this leads to is that we must grow more fiber on less acres and we must also be able to increase our utilization of the products. All this means -- intensive management.

There are many practices available to us to manage more intensively, or to put it another way, "to make maximum utilization of the site in accordance with its potential productive capabilities."

Water management is one practice; others include planting superior seedlings, site preparation, optimum stocking, fertilization, control of competition, and protection from insect, disease and fire. Irrigation may become important in a few years.

Although each of these practices by itself has shown a marked increase in volume during the early years of rotation, one practice alone does not necessarily mean intensive management. By analyzing the site and determining the weak links, a forester can be in a better position to recomend to a landowner practices that will give him the greatest return on his investment. Water management alone may or may not correct the weak link.

In the coastal area of Georgia, long growing seasons together with good soil fertility and adequate moisture, make this an ideal area for growing timber. Competition between the mills for the forest product is keen and prices for pine pulpwood are high compared to most areas. During the last decade, forest products have probably been the most important resource in this area.

Now, before we go any further, let me say -- "We are not in any way advocating converting any hardwood swamp to pine." First, the necessary site preparation cost would be extremely high and, in most cases, would not allow an economic return, and second, the heavy organic content of these soils does not always allow good pine growth. Third - it would be contrary to our wildlife and environmental policies.

Where water continously runs through these swamps, they should remain in stands of swamp species such as gum-cypress. However, if the water only moves for a few days after rains and the rest of the time sits still, the water becomes stagnated, losses its oxygen supply, has a CO_2 build-up, and becomes

a pollutant to living trees. Most hardwoods under these conditions will develop base rot, or will gradually die off.

On these sites, excess surface water should be removed. Since these soils are still better suited to hardwood, they should remain in hardwoods, but on managed stands of sweetgum, sycamore, poplar and oaks. Under management, these sites will produce almost twice the volume of hardwoods as they now produce.

So. let's discuss soils that are suitable for growing pines.

After periods of heavy rainfall, the extremely slow rate of downstream movement of surface runoff, causes long periods of flooding in the pine forest. These long periods of "too much water," if occurring during the growing season, will--

--prevent the germination of seeds, unless a good seed crop occurs during a dry year, and seeds can become established.

--cause mortality of seedlings, especially newly established plantations.

--prevent access to forest stands for any management, harvest, or protection practice, except during dry periods.

--retard the growth of existing pine stands and some highly productive hardwoods species.

Naturally trees of all species need water. But, they also need a good root system and a good supply of oxygen. Too much water prevents both. By removing the surface water, the organic matter will break up faster, allowing many of the minerals to become available to new growth.

In the Southeast, there are some 37 million acres of wet forests. Ten million of these are classed as organic soil types with 27/m mineral soils.

Within recent years, many of these seasonally wet forest land acres, primarily industrial ownerships, have had water control systems installed. These control measures, generally a network of main and feeder "dug" channels, have caused a marked increase in the potential for economic return from timber production on the affected acres.

Many PL 566 projects and RC&D project measures have been proposed for the Coastal areas, with similiar terrain, vegetation, and water problems. The forest land benefits resulting from surface water control measures are often a major portion of the overall planned project benefits. The Forest Service, having responsibility for determining the forestland benefits on PL 566 projects, thus plays a major role in the formulation of alternatives for water management, and the eventual acceptance or rejection of a given project based on benefit analysis.

We know that on certain soils, there are benefits --but which soils will water management benefit and how much.

When we are asked to evaluate the forest land within a PL 566 project or an RC&D project measure, we begin with a soils map and determine where the wet forest soils are located, the acreages of wet soils, and determine where forest benefits are likely to occur. Then in the field, we determine the present site index on each of these soils, current market conditions, and current costs for establishing a stand of timber. We not only investigate the current situation, but also determine each of these under a drained condition.

Acreages for each soil are calculated for each evaluation unit within the watershed. Because every acre will not benefit from drainage, these acreages are then reduced for:

1. Soils that will have no benefit with drainage.

2. Other uses - roads, railroads, and power lines right of way.

3. Areas along roads already receiving drainage from road ditches.

4. Areas within certain wet soil groups not needing drainage, because of slight differences in elevation.

5. Areas within certain extremely wet soil groups impossible to drain.

The remaining acreages are considered to benefit from the proposed drainage, providing landowners take advantage of the outlets available to them.

We then determine both in the present wet condition and in a drained condition, the potential yields for each of the soil types. Volumes of wood, normally in cords of pulpwood, are based on site prepared, bedded and planted superior seedlings, with about 500 trees per acre at rotation.

Then the potential volume of wood on each soil, both with and without the project, is multiplied by the expected price of the product, discounted and amortized for the expected rotation age, and at the present interest rate. We have now determined the Average Annual Equivalent for the present situation and after drainage.

We now substract the cost AAE. The difference of AAE without drainage and with drainage is the benefit derived from drainage.

The total benefits are then determined for each evaluation unit by multiplying the acreage expected to benefit by the AAE. That's it. This procedure takes several days of field work, and usually about two to three days of office calculations.

In 1974, we initiated a study to attempt to gather information and develop techniques which would lead to a faster and more substantiated Forest Service contribution for these projects involving pine timber management on seasonally wet soils within the flatwoods of the Southeastern United States.

We started by making an extensive literature review and bibliography on surface water management for timber production. This is available.

The immediate objectives of this study were:

1. To secure reliable data on productivity levels of the various soils encountered, both with and without installation of surface water control measures.

2. To secure reliable cost figures for the varied cultural operations involved in timber managment, both with and without installation of control measures.

3. To secure reliable information on market trends and returns from sale of the various forest products.

4. To utilize this additional data to make a reliable forest budget which can be programmed for automatic data processing.

Results of the Study

Objective 1. This objective was an attempt to assign specific productivity levels for pine timber production to the more common seasonally wet soil series that occur within the flatwoods region. A field survey was initiated in the coastal area of Georgia. However, we ran into problems right off.

a. We didn't allot nearly enough time to the field survey. Areas were hard to find with plantations of bedded, superior seedlings on either drained or undrained lands. Most that were found were planted within the past few years.

b. We had the initial feeling that the producticity of a given soils series was fairly uniform. Variability within a single soil series was found to be great in some cases, indicating the need for more intensive sampling methods in order to achieve reliable productivity estimates for the individual soils.

c. There is a lack of adequate yield tables and site index curves for either natural or planted pine within the flatwood region. Land managers in the area and research groups are striving for tables which represent this area, with and without, surface water control, but they are not available as yet.

Objective 2. Consultation with forest managers, pulpwood dealers, researchers, and landowners yielded much information. Cost figures, however, were found to vary considerably by location even within the same general area. Cost figures were also found to vary considerably from season to season and from year to year. This study does not eliminate the need to gather cost information from the field prior to each planning effort.

Objective 3. Again market trends and returns were found to vary between general areas, and more specific data will be needed prior to each planning effort.

Objective 4. Data on productivity levels by soil series was inadequate to incorporate into a meaningful ADP budget analysis program. Therefore, a forestland budget catalog was made through ADP procedures, with site index comparison. The budget catalog substituted for soil series of parameters with varying values for each parameter. If we could have assigned a productivity level to each soil series, it would eliminate most of the field work and make our job much easier. But we can not at this time.

Parameters Used

1. Stand Establishment Costs per Acre (6 entries)

$15	$45	$75
30	60	90

2. Site Index (11 entries)

60	75	90	105
65	80	95	110
70	85	100	

3. Annual Costs (1 entry)

$2

4. Product Returns Given per Cord (20 entries)

$3	$15	$27	$45	$65
6	18	30	50	70
9	21	35	55	75
12	24	40	60	80

5. Interest Rates (6 entries)

6 percent	12 percent
8 percent	14 percent
10 percent	16 percent

6. Rotation (6 entries)

15	30
20	35
25	40

That's basically how the study was designed -- the result is a book of computer printout sheets showing the present Net Worth, Internal Rate of Return, and Average Annual Equivalents for 40,320 variables.

Let's see how this can be used....

AAE in Dollars

Site Index 70 - 30 Year Rotation 6 Percent Interest

Pulpwood Selling Price	Establishment Cost 15	30	45	60	75	90
$9	2.50	1.41	.32	-.77	-1.86	-2.95
12	4.36	3.27	2.18	1.09	0	-1.09
15	6.23	5.14	4.05	2.96	1.87	.78
18	8.09	7.00	5.91	4.82	3.73	2.64
21	9.95	8.86	7.77	6.68	5.59	4.50
24	11.82	10.73	9.64	8.55	7.46	6.37

Site Index 80 - 25 Year Rotation

9	3.93	2.76	1.58	.41	-.76	-1.94
12	6.30	5.12	3.95	2.78	1.60	.43
15	8.66	7.49	6.32	5.14	3.97	2.80
18	11.03	9.86	8.69	7.51	6.34	5.17
21	13.40	12.23	11.05	9.88	8.71	7.53
24	15.77	14.59	13.42	12.25	11.07	9.90

Site Index 90 - 20 Year Rotation

9	6.82	5.51	4.21	2.90	1.59	.28
12	10.20	8.89	7.58	6.27	4.97	3.66
15	13.57	12.27	10.96	9.65	8.34	7.04
18	16.95	15.64	14.33	13.03	11.72	10.41
21	20.33	19.02	17.71	16.40	15.10	13.79
24	23.70	22.40	21.09	19.78	18.47	17.16

The first example shows the AAE in dollars for site index 70 with a 30 year rotation at 6 percent interest using 6 different establishment costs and 6 different selling prices.

The second example is for site index 80 on a 25 year rotation, and the third example is for a site index 90 on a 20 year rotation.

Each example can be used to compare average annual equivalents for 36 variables of costs and returns, for a given site index and rotation. Or through water management, the site index can be increased, from 70 to 90 along with reducing the rotation from 30 to 20 years. If a cost of $60 and a return of $18 is compared, the AAE will increase from $4.82 to $13.03.

Getting a little more specific, let's see how we can determine benefits to drainage (already determined Parameters):

EXAMPLES

	Site Index	Rotation Years	Estab. Cost	Stumpage	AAE
Leon Soils (4w2)					
Present	65	30	75	15	0.77
Future	80	25	60	18	7.51
Bladen Soil (2w9)					
Present	80	25	75	15	3.97
Future	90	20	60	21	16.40
Bladen Soil (2w9)					
Present	70	30	75	15	1.87
Future	95	15	60	21	19.25
Portsmouth (1w9)					
Present	70	40	15	6	1.10
Future	100	15	75	21	21.40

1. Leon soil, a rather poor soil - typical pine site.

2. Bladen soil - another typical pine site but better potential.

3. Bladen soil again, but better than the last example - drainage is maybe a little deeper or maybe better lateral drainage installed.

4. Portsmouth - wet - probably a Type 7 wetland, but as an example of what could be done. Present condition is probably hardwood stand.

Going back to the previous slide, we can also use this as an indicator to a landowner to show him how much return he can expect if he grows trees, or he can compare trees vs. crops or pasture.

This is the computer program that is now available to us. It does not eliminate field surveys. But it does cut the required office time way down and enables us to evaluate many alternative budgets in only a few minutes.

Some of the coastal Georgia projects have been in the planning stage for several years. This catalog will let us re-evaluate benefits any time interest rates change, prices change, establishment costs change, or acreages change.

We are not including in our evaluations such things as fertilization, or increases in volume with utilization practices such as, full tree chipping, or root extraction. Some day we may. We are not evaluating additional production of gum naval stores or acres put into gum production. I don't even know of any studies on this.

The only thing we are presently evaluating is additional pine growth on pine sites; to some extent, hardwood on hardwood sites; and access to the stands. Each soil is evaluated for the species that is best suited.

1. Evaluation of high altitude, color infra red

2. To identify -- Forestlands vs. Urban or Agricultural, Forest types, and Wetland types

3. Evaluate pine sites needing drainage

Summary

Too much water during the growing season is detrimental to growing pines at the soil's full potential. It may prevent establishment of new stands of trees, or may retard the growth of established stands. It may also prohibit equipment from the site.

Removal of the extra water may help to establish and grow beautiful stands of timber. But it may not be the only limiting factor. Fertilization may also be necessary. Fitting seedlings that are grown from seeds with parents that live in wet areas may be necessary. Each site is different. We still have to go to the field.

We are developing techniques to better evaluate sites and benefits, to do a better job and to make our job easier. We will continue to improve.

Drainage is a hot issue both environmentally and politically. We can't overlook that. Mistakes have been made in the past that continue to haunt us. We, the Forest Service and the Soil Conservation Service together must do a better job in planning, design, and construction.

If timber growth and harvest keeps pace with demand, drainage of pine sites is going to be necessary. Just because it is a not issue, we can't just retreat and hide in our shells.

There are too many landowners and woods workers dependent on forest products for their livelihood. And everyone uses products made from our southern forest every day.

But, neither can we ignore the objections. We must involve these groups early in the planning and keep them involved. Together we can go forward.

Literature Cited

KNIGHT, Herbert A., McCLURE, and Joe P., 1974. Opportunities For Increasing Timber Supplies in the Southeast, USDA, Forest Service Resource Bulletin SE-28.

KLAWITTER, Ralph A., YOUNG, Keith K., CASE, and James M. Potential Site Index For Wet Pine Land Soils of the Coastal Plain.

WELLS, Carol G., CRUTCHFIELD, and Douglas M., 1974 Intensive Culture of Young Loblolly Pine.

BALMER, William E., WILLISTON, and HAMLIN L, 1975 Early Considerations in Pine Management.

MAKI, T. Ewald, 1974, Silvicultural Aspects of Forest Drainage.

USDA, Soil Conservation Service, 1970, Soil Survey Interpretations for Woodlands in the Southern Coastal Plain and Associated Areas.

BERTELSON, Daniel F., Southern Forest Experiment Station, 1975, Southern Pulpwood Production, 1974. USDA Forest Service Resource Bulletin SO-54.

Attachment 5

Soil Conservation Service
Fort Worth, Texas
February 20, 1976

ECONOMICS COMPUTER PROGRAMS [1/]

MY SUBJECT IS NOT NEW TO MOST OF YOU. COMPUTERS AND COMPUTER PROGRAMS FOR ECONOMIC EVALUATIONS HAVE BEEN IN USE FOR SOMETIME. I REMEMBER LISTENING TO HASKELL CRUISE DISCUSS THE MERITS OF USING THE COMPUTER IN PLANNING AT THE 1969 ECONOMISTS' WORKSHOP IN SOUTH CAROLINA. WHAT I WOULD LIKE TO DO IS SPEND SOME TIME REVIEWING SEVERAL PROGRAMS THAT MAY BE OF USE TO YOU IN YOUR ECONOMIC EVALUATIONS.

YESTERDAY WE DISCUSSED MAXIMIZATION OF NET BENEFITS FOR THE NED OBJECTIVE. EVEN WHEN WE NARROW DOWN THE NUMBER OF ALTERNATIVES TO BE CONSIDERED, THIS STILL COULD EVOLVE INTO A MONUMENTAL TASK WITH AN ALMOST UNENDING NUMBER OF MATHEMATICAL COMPUTATIONS IF WE TRY TO DO IT MANUALLY WITH A DESK CALCULATOR. HOW CAN WE REDUCE THE AMOUNT OF TIME REQUIRED TO EVALUATE SEVERAL ALTERNATIVES WHILE NOT SACRIFICING PROFESSIONAL INTEGRITY? ONE WAY IS BY USE OF THE COMPUTER.

1/ Prepared for presentation by Robert F. Rubel at the Economics Workshop in Fort Worth, Texas, February 24-26, 1976.

COMPUTERS USUALLY CONSIST OF LARGE BLOCKS OF EQUIPMENT (CALLED "HARDWARE") CONTAINING MANY TUBES, TRANSISTORS, OR OTHER BASIC COMPONENTS. MOST COMPUTERS ARE ORGANIZED, HOWEVER, INTO FOUR MAJOR UNITS: ARITHMETIC, STORAGE (OR MEMORY), CONTROL, AND INPUT-OUTPUT UNITS. THESE UNITS HAVE THEIR ANALOGIES IN ANY COMPUTATIONAL PROCESS. IN A SIMPLE MENTAL CALCULATION, FOR EXAMPLE, THE HUMAN BRAIN PERFORMS THE ARITHMETIC AND CONTROL FUNCTIONS; THAT IS, IT CALCULATES, REMEMBERS PARTIAL ANSWERS, AND DECIDES WHAT TO DO NEXT. THE INPUT IS, SAY, THE FAMILY GROCERY BILL, AND THE OUTPUT IS HOW MUCH YOU ARE OVER YOUR BUDGET. FOR A MORE COMPLICATED PROBLEM, PENCIL AND PAPER MAY BE USED AS AIDS. THE BRAIN STILL PERFORMS THE ARITHMETIC AND CONTROL FUNCTIONS, BUT THE PAPER SERVES AS THE STORAGE. WHEN A STANDARD DESK CALCULATOR IS EMPLOYED, THE BRAIN IS NEEDED ONLY TO EXERCISE THE CONTROL FUNCTION. AN AUTOMATIC DIGITAL COMPUTER, GIVEN PROPERLY PREPARED INPUT DATA, PERFORMS ALL FUNCTIONS. I WANT TO EMPHASIZE "PROPERLY PREPARED" INPUT DATA BECAUSE WHEN YOU PUT BAD DATA IN, YOU GET BAD DATA OUT.

COMPUTERS WILL ENABLE US TO DO A MORE THOROUGH JOB OF EVALUATING ALTERNATIVES. THEY PROVIDE MORE INFORMATION SO PLANNERS CAN DO A BETTER JOB OF PROJECT FORMULATION. THE COMPUTER PROGRAMS AVAILABLE FOR THE ECONOMIST TO USE IN PROJECT

EVALUATION USE THE SAME MATHEMATICAL PROCESSES THAT WE DO WHEN WE MANUALLY CALCULATE DAMAGES AND BENEFITS.

THERE ARE FOUR PROGRAMS CURRENTLY AVAILABLE AT THE TSC WHICH CAN PROVIDE US WITH BETTER INFORMATION TO FORMULATE AND EVALUATE ALTERNATIVES AND TO SELECT THE PROPER RECOMMENDED PLAN. THESE PROGRAMS ARE ECON 2, URB-1, LAND DAMAGE, AND VALUE OF AGRICULTURE PRODUCTION.

ECON 2 - VERSION 2 OF THE FLOODWATER DAMAGE PROGRAM FOR THE IBM 1130 WILL COMPUTE THE AVERAGE ANNUAL DAMAGES TO CROPS AND PASTURE, OTHER AGRICULTURE, ROADS AND BRIDGES, AND URBAN PROPERTIES WHERE FLOODWATER DAMAGES CAN BE RELATED TO FLOOD ELEVATIONS AND FLOOD FREQUENCIES. THIS IS AN ADAPTATION OF THE CENTRAL TECHNICAL UNIT'S ECONOMICS PROGRAM AND IS LIMITED TO (A) THE FREQUENCY EVALUATION METHOD, (B) DAMAGES RELATED TO DEPTH OF FLOODING, AND (C) A MAXIMUM OF 10 FLOOD EVENTS. THE NUMBER OF REACHES MAY VARY FROM 1 TO 100 AND A MAXIMUM OF 120 CROSS SECTIONS PER RUN. IF IT IS NECESSARY TO USE THE HISTORICAL EVALUATION OR DURATION METHOD, THE C.T.U. PROGRAM FOR THE IBM 360 IN NEW ORLEANS MUST BE USED.

THE PROGRAM DESCRIPTION IS FAIRLY SELF-EXPLANATORY, I WOULD LIKE TO HIGHLIGHT SEVERAL MAIN POINTS.

EACH OF THE CARD GROUPINGS IN ECON 2 HAS A CONTROL WORD. THIS PERMITS THE COMPUTER TO SEARCH THE DECK FOR THE PROPER CARD TO USE IN ACCORDANCE WITH ITS INSTRUCTIONS AND MINIMIZES THE CONFUSION THAT MIGHT ARISE FROM IMPROPER CARD SEQUENCE. IT IS VERY IMPORTANT THAT IF THE CONTROL WORD IS, FOR EXAMPLE, "XSECTN" THAT WE SHOW IT AS "XSECTN". THE SAME IS TRUE FOR THE NAME OF A PARTICULAR CROP. IF WE USE "SOYB" FOR SOYBEANS, THEN WE HAVE TO USE "SOYB" ANYTIME WE REFER TO SOYBEANS. IF NOT, THE COMPUTER WILL BECOME CONFUSED AND WILL PROVIDE INCORRECT ANSWERS OR NO ANSWERS.

YOU SAVE MONEY BY GETTING THE "XSECTN" INPUT DATA FOR ECON 2 FROM PUNCHED CARD OUTPUT FROM THE WATER SURFACE PROFILE PROGRAM. THE "FLOW-FREQ" INPUT DATA MAY BE OBTAINED FROM PUNCHED CARD OUTPUT FROM THE TR-20 HYDROLOGY PROGRAM. THIS MUST BE DONE AT THE TIME THESE PROGRAMS ARE PROCESSED.

AN "ADD ACRES" FEATURE IS INCLUDED IN THE PROGRAM TO PROVIDE FLEXIBILITY IN ADJUSTING ACRE INUNDATED INFORMATION ON FLOOD PLAINS HAVING UNUSUAL TOPOGRAPHIC CROSS SECTIONS ACCOMPANIED BY ZONED LAND USE. USING THIS FEATURE, ANY CONSTANT AMOUNT CAN BE ADDED OR SUBTRACTED FROM THE ACRES FLOODED LISTED FOR A PARTICULAR CROSS SECTION.

THE "XSECTN" HEADER CARD PROVIDES FOR DETAILED OR SUMMARY PRINTOUT. BY REQUESTING DETAILED PRINTOUT THE DATA WILL SHOW AN ANALYSIS OF EACH VALLEY SECTION RATHER THAN AN AVERAGE CONDITION FOR THE REACH. IN THIS WAY, ISOLATED PROBLEM AREAS CAN BE READILY IDENTIFIED.

IT WOULD BE HELPFUL IF A SIMPLE SKETCH SHOWING THE APPROXIMATE LOCATION OF TRIBUTARIES, VALLEY SECTIONS, EVALUATIONS REACHES, AND STRUCTURAL MEASURES IN RELATION TO THE MAIN STEM AND DIRECTION OF FLOW WERE INCLUDED WITH THE INPUT DATA. THIS MAY ENABLE THE ADP SECTION TO RESOLVE MANY QUESTIONS WITHOUT CONTACTING THE FIELD.

URB-1 - THE URBAN FLOODWATER DAMAGE ECONOMIC EVALUATION PROGRAM (URBI) WILL COMPUTE THE AVERAGE ANNUAL FLOODWATER DAMAGES TO URBAN PROPERTIES. THE PROGRAM INVOLVES DETERMINING THE PERCENT DAMAGES TO HOUSES AND CONTENTS OF A NUMBER OF REPRESENTATIVE TYPES OF HOUSES OR OTHER BUILDINGS, THESE ARE LOCATED BETWEEN CROSS SECTIONS BY MEANS OF STATIONING ALONG A COMMON BASE LINE AND BY ELEVATIONS AT WHICH DAMAGES BEGIN. THE DAMAGE TO EACH HOUSE SELECTED IS COMPUTED BASED ON ITS SECTION, ELEVATION, VALUE, AND TYPE OF HOUSE WITH RESPECT TO COEFFICIENT DAMAGE TABLE. (REFER TO EWP TECH GUIDE 21, DATED JUNE 10, 1968 AND SUPPLEMENT 1, DATED

NOVEMBER 18, 1970 FOR DATA THAT MAY BE USED AS A GUIDE FOR ESTIMATING DAMAGES BY DEPTHS. WHEN POSSIBLE, SAMPLE STUDIES OF URBAN DAMAGES SHOULD BE MADE AND CORRELATED WITH DATA CONTAINED IN THESE TWO GUIDES.)

DATA LIMITS ARE 100 CROSS SECTIONS, 30 BRIDGES, 50 REACHES, 10 COEFFICIENT DAMAGE TABLES, AND 10 STORMS. THERE IS NO LIMIT TO THE NUMBER OF HOUSES THAT CAN BE INCLUDED, OR THE NUMBER OF ALTERNATIVES THAT CAN BE EVALUATED. THE HOUSES, BRIDGES, AND CROSS SECTIONS MUST BE STATIONED ALONG A COMMON BASE LINE. THE BASE LINE STATIONING MAY BE EITHER UPSTREAM OR DOWNSTREAM, BUT THE CROSS SECTIONS MUST BE ENTERED IN ORDER BEGINNING WITH THE MOST DOWNSTREAM SECTION AND PROCEEDING UPSTREAM IN SEQUENCE TO THE MOST UPSTREAM SECTION. THE PROGRAM DESCRIPTION STATES THAT, "SINCE STATIONING FOR EACH ALTERNATE MUST BE ALONG A COMMON BASE LINE, TRIBUTARIES SHOULD NOT BE INCLUDED WITH THE MAINSTEM WITHIN AN ALTERNATE." WE HAVE FOUND THAT TRIBUTARIES CAN BE INCLUDED WITHIN THE MAINSTEM BY HANDLING EACH TRIBUTARY AS A SEPARATE REACH AND ADJUSTING THE STATIONING ALONG THE TRIBUTARY TO HAVE A SEQUENTIAL NUMBERING STARTING WITH THE STATION ON THE MAIN CHANNEL AT THE TRIBUTARY JUNCTION. (REFER TO EWP TECHNICAL GUIDE NO. 43, DATED APRIL 4, 1975.)

THE ELEVATION OF ZERO DAMAGE FOR EACH STRUCTURE ALLOWS USE OF ONE COEFFICIENT DAMAGE TABLE FOR ANY NUMBER OF THE SAME TYPE STRUCTURES EVEN THOUGH THEY MAY BE AT DIFFERENT ELEVATIONS. THE ELEVATION DAMAGE BEGINS ALLOWS CONSIDERATION OF STRUCTURES WHERE DAMAGE MAY NOT OCCUR UNTIL FLOODWATER HAS REACHED AN ELEVATION HIGHER THAN ELEVATION OF ZERO DAMAGE. FOR EXAMPLE, THE ELEVATION DAMAGE BEGINS COULD BE THE BASEMENT WINDOW ELEVATION, AND THE ELEVATION OF ZERO DAMAGE COULD BE THE BASEMENT FLOOR ELEVATION.

HERE AGAIN IT WOULD ALSO BE HELPFUL TO INCLUDE A SIMPLE SKETCH SHOWING THE APPROXIMATE LOCATION OF TRIBUTARIES, VALLEY SECTIONS, EVALUATION REACHES, ETC.

LAND DAMAGE ANALYSIS - THIS PROGRAM IS DESIGNED TO COMPUTE AVERAGE DAMAGES FROM OVERBANK DEPOSITION, SCOUR, AND SWAMPING IN TERMS OF LOSS OF PRODUCTIVE CAPACITY. THE PROGRAM ADJUSTS FOR DELAY IN RECOVERY OF PRODUCTIVE CAPACITY AS WELL AS FOR FAILURE TO FULLY RECOVER FROM THE DAMAGE.

UP TO 120 REACHES AND 10 CROPS MAY BE ANALYZED IN ONE JOB PASS. UPDATING FOR DIFFERENT SOLUTIONS IS ACCOMPLISHED BY CHANGING ONLY THE REQUIRED DATA. OUTPUT CONSISTS

OF AVERAGE ANNUAL DAMAGES FOR EACH REACH IN THE STUDY AND A SUMMARY FOR EACH ALTERNATE.

VALUE OF AGRICULTURE PRODUCTION - THIS PROGRAM IS DESIGNED TO COMPUTE FUTURE WITHOUT PROJECT RETURNS FOR VARIOUS CROPS AND COMPARE THESE WITH ALTERNATE CONDITIONS. AN ALTERNATE MAY REPRESENT ANY SITUATION SUCH AS CHANGED LAND USE, MORE INTENSIVE USE, RESTORATION, OR ANY COMBINATION OF THESE. IT CAN ALSO BE USED FOR DRAINAGE AND IRRIGATION EVALUATIONS. AN UNLIMITED NUMBER OF ALTERNATES MAY BE PROCESSED AND COMPARED. UNLESS OTHERWISE INSTRUCTED, THE SECOND AND SUCCEEDING ALTERNATES ARE COMPARED WITH THE FIRST ALTERNATE. (BY USE OF THE CONTROL WORD "SEQUENTIAL," EACH ALTERNATE WILL BE COMPARED TO THE ALTERNATE IMMEDIATELY PRECEEDING IT.)

UP TO 100 REACHES AND 10 CROPS MAY BE ANALYZED IN ONE JOB PASS. UPDATING FOR DIFFERENT SOLUTIONS IS ACCOMPLISHED BY CHANGING ONLY THE REQUIRED DATA.

OUTPUT CONSISTS OF A TABLE OF CROPS, ACRES, YIELDS, GROSS RETURNS, PRODUCTION COSTS, AND NET RETURNS FOR EACH REACH IN THE STUDY. A SUMMARY OF THE OUTPUT IS GIVEN FOR EACH ALTERNATE AND TABLES ARE PRINTED SHOWING THE DIFFERENCES TO BE EXPECTED. THE FIRST ALTERNATE ACTS AS THE CONTROL FOR THE STUDY.

WHEN YOU RECEIVE THE COMPUTER PRINTOUT FROM ADP, DON'T JUST GO TO THE SUMMARY SHEETS AND PULL OFF AVERAGE ANNUAL ACRES FLOODED AND AVERAGE ANNUAL DAMAGES. ANALYZE THE DATA. LOOK AT THE DATA FOR EACH CROSS SECTION. SET UP SOME TYPE OF DISPLAY SHOWING ACRES FLOODED, % CHANCE FLOODING BEGINS, AVERAGE ACRES FLOODED VS. TOTAL ACRES FLOODED, DOLLAR DAMAGES, ETC. ASK YOURSELF "ARE THESE ANSWERS LOGICAL?" BY COMPARING FUTURE WITHOUT PROJECT CONDITIONS WITH FUTURE WITH PROJECT CONDITIONS, YOU CAN POINT OUT TO YOUR STAFF LEADER, ASSISTANT STATE CONSERVATIONIST FOR WATER RESOURCES, OR OTHER STAFF MEMBERS WHAT THE ALTERNATE IS OR ISN'T DOING AND WHERE PROBLEMS MAY STILL EXIST.

SUMMARY

IN SUMMARY, THESE PROGRAMS ARE ONLY A TOOL TO AID US IN FORMULATING AND EVALUATING ALTERNATIVES AND SELECTING THE PROPER RECOMMENDED PLAN. YOU HAVE TO MAKE THE DECISION WHETHER THEY CAN BE OF VALUE TO YOU IN YOUR WORK.

Revised March 23, 1976
T. Hodges & R. Rubel

ILLUSTRATION OF COST ALLOCATION WITH PRINCIPLES AND STANDARDS

A. Project Data

NED Objective	Plan	Recommended Plan
Benefits 1/		
Flood Prevention	$ 6,500,000	$ 5,500,000
Recreation No. 1	5,100,000	5,100,000
Recreation No. 2	400,000	400,000
Total	$12,000,000	$11,000,000
Costs 1/		
Single Purpose		
Construction	$ 2,800,000	$ 2,400,000
Engineering	370,000	270,000
Land Rights	1,300,000	1,100,000
Relocation Payments	30,000	30,000
OM&R	500,000	400,000
Total	$ 5,000,000	$ 4,200,000
Multiple Purpose		
No. 1		
Recreation Facilities		
Construction	$500,000	$500,000
Engineering	30,000	30,000
Land Rights	300,000	300,000
Relocation Payments	10,000	10,000
OM&R	300,000	300,000
Subtotal	$1,140,000	$1,140,000
Reservoirs		
Construction	$530,000	$530,000
Engineering	50,000	50,000
Land Rights	75,000	75,000
Relocation Payments	5,000	5,000
OM&R	100,000	100,000
Subtotal	760,000	760,000
No. 2		
Construction	$500,000	$500,000
Engineering	40,000	40,000
Land Rights	65,000	65,000
Relocation Payments	5,000	5,000
OM&R	190,000	190,000
Subtotal	$800,000	$800,000
Total Multiple-Purpose Structures		
Construction	$ 1,530,000	$1,530,000
Engineering	120,000	120,000
Land Rights	440,000	440,000
Relocation Payments	20,000	20,000
OM&R	590,000	590,000
Total	$ 2,700,000	$2,700,000
GRAND TOTAL	$ 7,700,000	$6,900,000
NET BENEFITS	$ 4,300,000	$4,100,000

1/ Capitalized Values

B. Allocation of NED Costs Among Objectives

1. EQ Allocated Cost

NED Objective	Selected Plan with Service to EQ Deleted	Recommended Plan "B"	Difference
Benefits	$ -0-	$11,000,000	$ -0-
Costs	$ -0-	$ 6,900,000	$ -0-
Net Benefits			$ -0-

Thus:	Gross incremental NED costs	=	$ -0-
	Minus gross incremental benefits	=	$ -0-
	Net incremental cost allocated to EQ (Net Benefit foregone)	=	$ -0-

2. NED Allocated Cost

Total Recommended Plan Cost	=	$ 6,900,000
Minus Cost Allocated to EQ	=	-0-
Equals Cost Allocated to NED	=	$ 6,900,000
Less Land Rights Costs in Multiple Purpose Recreation Developments 1/	=	440,000
Adjusted NED Costs		$ 6,460,000

1/ Allocated by Handbook Instructions

In this example two single purpose floodwater retarding structures were deleted from the NED Plan to formulate the Recommended Plan. Since no features were added to serve EQ, no costs are allocated to EQ.

C. Allocation of NED Costs Among Components of the NED Objective

1. Separable NED Costs for NED Components

Total NED Costs 1/	Recommended Plan	Recommended Plan With Flood Prevention Omitted	Recommended Plan With Recreation Omitted
Single-Purpose Structures	$ 4,200,000	$ 0	$ 4,200,000
Multiple-Purpose Structure			
No. 1			
Recreation Facilities			
Construction	$ 500,000	$ 500,000	$ 0
Engineering	30,000	30,000	0
Relocation Payments	10,000	10,000	0
OM&R	300,000	300,000	0
Subtotal	$ 840,000	840,000	0
Reservoir			
Construction	$ 530,000	$ 450,000	$ 500,000
Engineering	50,000	45,000	40,000
Relocation Payments	5,000	5,000	2,000
OM&R	100,000	100,000	35,000
Subtotal	$ 685,000	$ 600,000	$ 577,000
No. 2			
Construction	$ 500,000	$ 450,000	$ 400,000
Engineering	40,000	35,000	35,000
Relocation Payments	5,000	5,000	5,000
OM&R	190,000	190,000	35,000
Subtotal	$ 735,000	$ 680,000	$ 475,000
Total	$ 2,260,000	$2,120,000	$1,052,000
GRAND TOTAL	$ 6,460,000	$2,120,000	$5,252,000

Separable NED Costs	Flood Prevention	Recreation
Single-Purpose Structures	$ 4,200,000	$ 0
Multiple Purpose Structure		
No. 1		
Recreation Facilities		
Construction	$ 0	$ 500,000
Engineering	0	30,000
Relocation Payments	0	10,000
OM&R	0	300,000
Subtotal	$ 0	$ 840,000
Reservoir		
Construction	$ 80,000	$ 30,000
Engineering	5,000	10,000
Relocation Payments	0	3,000
OM&R	0	65,000
Subtotal	$ 85,000	$ 108,000
No. 2		
Construction	$ 50,000	$ 100,000
Engineering	5,000	5,000
Relocation Payments	0	0
OM&R	0	155,000
Subtotal	$ 55,000	$ 260,000
Total	$ 140,000	$1,208,000
GRAND TOTAL	$4,340,000	$1,208,000

1/ Includes allocated NED costs for single-purpose structures and total NED costs for multiple-purpose structures.

2. Remaining Joint NED Costs of NED Objective	
Total NED Costs Allocated to NED Objective 1/	$ 6,460,000
Single Purpose Structures	4,200,000
Multiple Purpose Structures	
No. 1	
Recreation Facilities	
Construction	$ 500,000
Engineering	30,000
Relocation Payments	10,000
OM&R	300,000
Subtotal	$ 840,000
Reservoir	
Construction	$ 530,000
Engineering	50,000
Relocation Payments	5,000
OM&R	100,000
Subtotal	$ 685,000
No. 2	
Construction	$ 500,000
Engineering	40,000
Relocation Payments	5,000
OM&R	190,000
Subtotal	$ 735,000
Less Total Separable NED Costs for NED Components	$ 5,548,000
Single Purpose Structures	$ 4,200,000
Multiple Purpose Structures	
No. 1	
Recreation Facilities	
Construction	$ 500,000
Engineering	30,000
Relocation Payments	10,000
OM&R	300,000
Subtotal	$ 840,000
Reservoir	
Construction	$ 110,000
Engineering	15,000
Relocation Payments	3,000
OM&R	65,000
Subtotal	$ 193,000
No. 2	
Construction	$ 150,000
Engineering	10,000
Relocation Payments	-0-
OM&R	155,000
Subtotal	$ 315,000
Remaining Joint NED Costs of NED Objective	$ 912,000
Single Purpose Structures	-0-
Multiple Purpose Structures	
No. 1	
Recreation Facilities	-0-
Reservoir	
Construction	$ 420,000
Engineering	35,000
Relocation Payments	2,000
OM&R	35,000
Subtotal	$ 492,000
No. 2	
Construction	$ 350,000
Engineering	30,000
Relocation Payments	5,000
OM&R	35,000
Subtotal	$ 420,000

1/ Excluding Land Rights in Recreation Developments.

Allocation of NED Costs among components of NED objective - cont.

3. NED Cost Allocation - - Separable Cost Remaining Benefits

	NED Components			
	Flood Prevention	Recreation No. 1	Recreation No. 2	Total
1. Benefits	$ 5,500,000	$ 5,100,000	$ 400,000	$11,000,000
2. Alternative NED Costs	5,600,000	1,769,000	740,000	8,109,000
3. Lesser of 1 & 2	5,500,000	1,769,000	400,000	7,669,000
Less Land Rights Adjustment 1/	12,000	368,000	60,000	440,000
Benefits Limited	$ 5,488,000	$ 1,401,000	$ 340,000	$ 7,229,000
4. Separable Costs	4,340,000	948,000	260,000	5,548,000
Single Purpose Structures	4,200,000	0	0	4,200,000
Multiple Purpose Structures				
No. 1				
Recreation Facilities				
Construction		$ 500,000		$ 500,000
Engineering		30,000		30,000
Relocation Payments		10,000		10,000
OM&R		300,000		300,000
Subtotal		$ 840,000		$ 840,000
Reservoir				
Construction	$ 80,000	$ 30,000		$ 110,000
Engineering	5,000	10,000		15,000
Relocation Payments	0	3,000		3,000
OM&R	0	65,000		65,000
Subtotal	$ 85,000	$ 108,000		$ 193,000
No. 2				
Construction	$ 50,000		$ 100,000	$ 150,000
Engineering	5,000		5,000	10,000
Relocation Payments	0		0	0
OM&R	0		155,000	155,000
Subtotal	$ 55,000		$ 260,000	$ 315,000
5. Remaining Benefits (3-4)	$ 1,148,000	$ 453,000	$ 80,000	$ 1,681,000
%	68%	27%	5%	100%
6. Remaining Joint NED Costs	$ 620,000	$ 246,000	$ 46,000	$ 912,000
Single Purpose Structures	0	0	0	0
Multiple Purpose Structures				
No. 1				
Recreation Facilities	0	0	0	0
Reservoir				
Construction	$ 210,000	$ 210,000		$ 420,000
Engineering	18,000	17,000		35,000
Relocation Payments	1,000	1,000		2,000
OM&R	17,000	18,000		35,000
Subtotal	$ 246,000	$ 246,000		$ 492,000
%	50%	50%		100%
No. 2				
Construction	$ 312,000		$ 38,000	$ 350,000
Engineering	27,000		3,000	30,000
Relocation Payments	4,000		1,000	5,000
OM&R	31,000		4,000	35,000
Subtotal	$ 374,000		$ 46,000	$ 420,000
%	89%		11%	100%

3. Ned Cost Allocation - - Separable Cost Remaining Benefits - continued

	NED Components			
	Flood Prevention	Recreation No. 1	Recreation No. 2	Total
7. Total Allocated NED Costs	$ 4,960,000	$1,194,000	$ 306,000	$ 6,460,000
Single Purpose	$ 4,200,000			$ 4,200,000
Multiple Purpose Structures				
No. 1				
Recreation Facilities				
Construction		$ 500,000		$ 500,000
Engineering		30,000		30,000
Relocation Payments		10,000		10,000
OM&R		300,000		300,000
Subtotal		$ 840,000		$ 840,000
Reservoir				
Construction	$ 290,000	$ 240,000		$ 530,000
Engineering	23,000	27,000		50,000
Relocation Payments	1,000	4,000		5,000
OM&R	17,000	83,000		100,000
Subtotal	$ 331,000	$ 354,000		$ 685,000
No. 2				
Construction	$ 362,000		$ 138,000	$ 500,000
Engineering	32,000		8,000	40,000
Relocation Payments	4,000		1,000	5,000
OM&R	31,000		159,000	190,000
Subtotal	$ 429,000		$ 306,000	$ 735,000

1/ Land Rights Costs in multiple purpose recreation developments were allocated according to Handbook procedures and were excluded from the Separable Cost Remaining Benefits Allocations.