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**US Army Corps  
of Engineers**

Engineer Institute for  
Water Resources

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# **HUMAN COSTS ASSESSMENT-**

# **THE IMPACTS OF FLOODING & NONSTRUCTURAL SOLUTIONS**

**TUG FORK VALLEY  
WEST VIRGINIA & KENTUCKY**

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HUMAN COSTS OF FLOODING  
AND  
IMPLEMENTABILITY OF  
NON-STRUCTURAL DAMAGE REDUCTION  
IN THE  
TUG FORK VALLEY  
OF WEST VIRGINIA AND KENTUCKY

IWR RESEARCH REPORT

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U.S. Army Corps of Engineers  
Institute for Water Resources  
April 1980

## FOREWORD

This study of the human resource costs of flooding, and the capacity of local publics for effective participation in an alternative housing opportunity program, has been done by IWR with the assistance of contractors at the request of the Huntington District. The objectives of the study were to assist the District with the development of methods to formulate and evaluate innovative strategies for the solution of long-standing flooding problems in the Tug Fork River Basin of West Virginia and Kentucky.

The Tug Fork River Project Study is atypical, if not unique, in several of its physical, economic, social and political parameters. The Tug Fork River Basin has suffered through several major floods during the past two decades and the capital assets of the area, which are the traditional basis for flood damage prevention benefits, have depreciated to an extent that conventional methods for justifying flood damage reduction measures are inadequate. Because of the physical characteristics of the basin, conventional flood protection measures have consistently been considered inadequate as complete solutions to the flooding problem.

Innovative solutions are clearly required, yet many persons have believed that unique social and cultural characteristics of the study area would constrain the implementability of certain types of solutions, such as flood plain evacuation. Consequently, the thrust of this study was to explore the viability of alternative solutions to the flood problem. At the same time, the research team has been aware of the need to maintain a strict conservative adherence to the full intentions of regulation and guidance pertaining to Corps planning. This has been an extremely difficult "tight-rope" to walk; however, I am convinced that the research team has been largely successful.

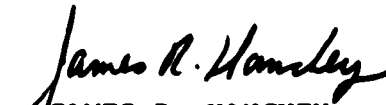
The quantification of heretofore intangible damages toward justification of the cost of project action in the National interest has long stood in ER 1105-2-921 as an invited contribution to cost/benefit calculation. This study has developed one path for achieving closure on that ideal. Social effects need not, in the Tug Fork case, be only those "intangibles" which appear as negative impacts of plans. They may, in several measurable forms, also be converted to economic consequences and counted among the damages "without a project." Through that conversion they can contribute to the justification of preventive action, on behalf of both economic development and the maintenance of human well-being as a productive resource for achieving that development.

I wish to commend the exemplary interdisciplinary teamwork and standards of service shown by the 11 members of the Institute and Contractor staff who carried this assignment to sound completion in less than one year. Dr. Lloyd G. Antle and Mr. Charles Edward Simpkins in the Research Division of the Institute served, respectively, as General Project Manager and Research Manager, as well as contributing to the substantive research.

Drs. David Allee and Barbara T. Osgood of Cornell University contributed research designs on psychological trauma costs and housing preference and opportunity analysis. They were assisted by Ms. Barbara Sherman and Ms. Sharon Trerise, graduate students at Cornell. Drs. Annabelle Bender Motz and Austin Van Der Slice of American University, contributed work on community adaptation potential and social profiling. Dr. William Westbrook of Marshall University served admirably under difficult conditions as Field Director of Survey Research. He was supported in his execution of the field phase by Messrs. Robert Losey and Robert Burroughs, graduate students at Marshall who conducted the interviews.

On behalf of the study team and for the Institute. I am pleased to provide this study to the Huntington District in support of its project planning mission.

Sincerely,

  
JAMES R. HANCHEY  
Acting Director

Institute for Water Resources

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EXECUTIVE SUMMARY

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Human Costs of Flooding in the Tug Fork Valley

- I. Background: Flooding in Central Appalachia
- II. Findings of the Human Resource Costs Approach
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- IV. Conclusions

## T. Background: Flooding in Central Appalachia

The Williamson Daily News headline of 5 Mar 79, "Tug Fork Problem May be the Worst in U.S.", summarizes a complex reality. Central Appalachia represents a large share of the nations coal resources, it is founded on the geological results of the Pleistocene age, subsequent upheaval of the earth's surface and consequent erosion. Harry Caudill describes the landscape as "wrinkled. . .intricately comparted, affording isolation for decades and the illusion of isolation for more than a century." Hills with about 1,000 feet of relief, sharply dissected and characterized by alternating layers of limestone, sandstone, shale and coal, support an economy founded on coal, timber and marginal agriculture. The same hills offer fundamentally poor foundation conditions, so building is essentially limited to valleys or hilltops. When the Central Appalachian area went through its most rapid settlement and development period (late 19th Century and early 20th Century) with the coming of railroads and paved highways, the settlement and development pattern clung to the protected valleys. Highway and rail beds are in the valleys.

Overlay this wrinkled landscape with a human landscape founded by Scotch-Irish and English settlers, who were looking for isolation, estranged from organized society, mostly Protestant and white. Caudill writes of sustained migration into the Kentucky mountain wilderness following the Revolutionary War until about 1812 when the flow declined.<sup>2</sup> Subsequently, waves of development beginning in the late 19th Century to harvest timber and coal were facilitated by the coming of the railroads and the buildup of the nation's industrial sinews. Rail, coal and timber are capital intensive industries, requiring management, capital access and organization far removed from the isolated independent character of the human landscape. Ownership, control and management were vested in the corporate structure required to facilitate capital intensive technology. This control extends to surface and mineral rights, resulting in mostly outside ownership of the land and to the political and economic power of interests far removed from Central Appalachia.<sup>3</sup> These trends are visible in every part of the American economy from agriculture to health services as the logical institutional outcome of capital intensive technology. Therefore, they are only repeated here to help describe these influences in an unexpected corner of human experience.

1. Harry Caudill Night Comes to the Cumberlands, Atlantic--Little Brown Books, 1963 p. 19.
2. Caudill, p. 10.
3. See John Fetterman, Stinking Creek, Dutton Paperback (1970), for an intimate description of a small mountain community in Appalachia, and Rebecca Caudill, My Appalachia, for a personal reminiscence. Miss Caudill writes of "her childhood, when the snow was clean, before the mines came, before the bitterness and bloodshed began, when poverty was a book word, when poor didn't know they were poor and in Appalachia pride and dignity filled a half empty stomach."

Settlement in the valleys, ownership of land by outside interests and the wrinkled landscape combine to form a peculiarly difficult set of problems resulting from a natural component of the hydrologic cycle. Water evaporates to the atmosphere and returns as rain. Rainfall varies from gentle showers to raging downpours. After a raging downpour Central Appalachia suffers floods. If the people were not there, if the coal and timber were not there, if the railroad and highways were not there, and if cities and villages and strip settlements were not there, periodic floods would only affect the ecology of Appalachia. Because all of these are there floods bring havoc, suffering and heavy damages.

One way out would be to declare that all development and habitation relocate to flood free sites. Another is to contain and control floods. Both solutions entail heavy costs and difficult problems of implementation. Even worse, the "do nothing" choice, entails even more difficult and intractable costs. The coal, timber and other natural resources of Central Appalachia fuel America's economic process. The nation has, however, successfully obtained the benefits of these resources without paying the whole bill. A result is that Central Appalachia contains a disproportionate number of the nation's defeated people, a scarred landscape, piled with refuse, an expensive and mounting bill of flood losses, a festering conflict between management and labor and between the haves' and have nots, a miserable level of housing and therefore lower capability to meet the nation's pressing energy needs.

Flood containment and control brings additional problems, if reservoirs are sought, due to heavy relocation costs (people, homes, transportation routes and other inpristructures) and displacement of access to coal reserves. Other structural solutions (flood walls, flood proofing buildings by sealing and elevation) bring not only costs due to construction, but potentially serious difficulties resulting from flood events which exceed the design criteria.

A response to the flooding problem then entails a sophisticated requirement for design and implementation. The research reported here, undertaken by the Institute of Water Resources and several contractors attempts to add an assessment of the human costs due to flooding in the Tug Fork Valley of Central Appalachia, an assessment of potential impacts if voluntary relocation is undertaken, and finally, an assessment of the social nature of the communities which are affected by floods and from which flooded residents might voluntarily relocate.

#### The 1977 Flood

In the time of year when the redbuds and dogwoods are blooming, and the leaves unfolding to canopy this wrinkled landscape, on April 4, 1977, 45 counties in four Appalachian States were struck by flooding. These 45 counties produced over 162 million tons of coal in 1974, reporting 54.7 percent of production of the four states and 41 percent of coal production in the Appalachian region. The 45 counties contained a population of 1.47 million people and this population is increasing due to expanded coal production.

Of the 45 county disaster area, the Tug Fork Valley suffered the most serious impacts. Within 30 hours, up to 15 inches of rain were dumped by a series of cloud bursts on frozen ground near the headwaters of Tug Fork. As the deluge moved down the valley flood crests exceeded known records. Williamson West Virginia had a flood crest of 52.3 feet, more than 25 feet above flood stage. Flood losses exceeded \$100 million in Mingo County, an amount larger than the total personal income earned by Mingo County residents in the entire year of 1973. Total losses in Tug Fork Basin approached \$200 million.

Tug Fork is located within 7 counties of West Virginia and Kentucky. Coal is king in the the Tug Fork Valley. Daily, 16 unit trains laden with coal exit the valley moving north, west, and east. Thirty thousand people reside in the valley and 10,000 live in the flooded area. Over 100 communities or places (none over 4,000 population) are scattered in a linear fashion along the Tug River.

#### Previous Attempts to Alleviate Flooding

A large regional flood in 1957 brought survey studies by the Corps in the Upper Kentucky, Upper Cumberland, Upper Lilty, Big Sandy and Tug Fork Basins. A reservoir system was authorized and subsequently constructed in the Big Sandy Basin. A major cut off project is under construction to alleviate flooding in Pineville, Kentucky, and to provide a new transportation corridor and to facilitate community renewal. The project is managed by the Kentucky Department of Highways with Corps of Engineers and other agency participation. In the Tug Fork, local protection by flood walls was installed at Williamson in 1963 and later for the Appalachian Regional Hospital in West Williamson. Reservoir sites were found to entail very heavy costs, difficult implementation, and limited effectiveness in the Tug Fork, and therefore, none have been constructed. A path-breaking analysis of non-structural flood damage reduction management (through flood proofing by elevation of existing structures in Matewan) was conducted by Huntington in 1970. Meanwhile, the Tug Fork Basin has experienced four major floods since the 1957 event climaxing with the April 1977 flood. That flood topped the flood wall at Williamson by several feet and created the disaster that not only resulted in \$200 million in damages but also a \$150 million disaster recovery program primarily financed by the Federal government. With the exception of about 600 homes which were completely destroyed by the flood, the disaster recovery operation fundamentally placed people back in the same situation that they were in before the 1977 flood. The Appalachian Regional Commission has moved to implement a region-wide flood warning and evacuation system, which will serve to reduce the threat of flooding to loss of human life and can partially reduce flood damages.

#### The IWR Study

The Huntington District was engaged in a restudy of the Tug Fork flooding problems when the 1977 flood occurred. Following the flood recovery efforts, the District moved (by legislative directive) to develop a comprehensive solution to the flooding problems. That is, the solution should

be uniformly effective valleywide. A small part of that effort found its way to this study. IWR proposed to conduct a study with five major elements:

1. Human Cost of Flooding
2. Housing Analysis
3. Community Analysis
4. Social Profile
5. Evaluation of Impacts of Flooding on Coal Mining Productivity

The studies were conducted by IWR staff and through a contract with Cornell University. Economists and sociologists worked together to generate the data base and analysis which would satisfy study objectives. The purpose of this study was to develop a broader assessment of the human costs of flooding and to facilitate implementation of voluntary relocation. Both flooding and the solutions to flooding involve real economic, social, environmental, and political costs. The challenge is to find solutions which are rational, implementable, and practical.

## II. Findings of the Human Resource Cost Approach

### A. Quantifying Human Resource Damages

Three forms of human resource costs are documented as damages of flooding in this study. These costs involve impairment of individuals and households which reduces their capacity for productive participation in the economy. The impairment processes are: (1) psychological trauma, (2) attrition of household financial asset position which reduces financial capability and changes outlook, and (3) reduction in productivity of coal miners. The economic consequences of psychological trauma and reduced coal mining productivity are estimated. The process of household financial asset attrition and adjustment response behavior are quantitatively traced, but the economic loss is not estimated. This would have required substantial additional research which could not be fitted into this study frame.

#### 1. Psychological Trauma

Responses to survey questions from people who were in the 1977 flood reflected twenty-two factors indicating the psychological impact of the flood. Adverse psychological impacts were then rated in terms of severity and were summed for each surveyed household. The scores, then arrayed into a three-level scale comparable to levels corresponding approximately to the American Medical Association three-level scale of psychological impairment, results in the following distribution:

Level I - 1 to 9 points (39% of households);  
Level II - 10 to 12 points (32% of households);  
Level III - 13 to 20 points (29% of households).

The assignment of household trauma score levels to individuals in those households was accomplished in the following way:

Level I - 84 households = 181 individuals;  
Level II - 114 households = 369 individuals;  
Level III - 80 households = 291 individuals.

The levels of psychological trauma measured in the survey of 1977 flood victims and matched to the three levels of AMA psychological impairment scale, were then set to corresponding Veterans' Administration disability compensation payments for comparable median percentages of impairment. The annual compensation values, multiplied by numbers of individuals at each trauma level of impairment, were as follows:

Level I - 181 individuals x 0 compensation = \$0  
Level II - 369 individuals x \$1326.60/yr = \$489,515.00/yr  
Level III - 291 individuals x \$4315.20/yr = \$1,255,723.00/yr  
Total Compensation = \$1,745,238.00/yr

The 225 households of Levels II and III are representative (based on sample characteristics) of the 5300 residences actually damaged by the 1977 flood. The estimate of \$1,745,000 per year for psychological damages averages \$8,966 per household.

How long did the trauma effects persist at the levels measured? Indicators for the trauma scale were directed to any time or duration within the interval between the 1977 flood and the survey. Some of the effects reported by respondents lasted even less than the first year, and many people had recovered by the end of the second year. However, many effects were still active at the time of the survey, slightly over two years after the flood, and may continue indefinitely. The response to a question on "Back to Normal?" confirmed such continuing effects.

If the rates measured are applied strictly for two years (thus assuming that effects of shorter and longer duration cancel out) the total of \$18,000 trauma costs per household is substantially larger than the approximate \$9000 per residential structure of property damage incurred in the 1977 flood. Applying the \$18,000 to the 5300 homes damaged or destroyed, there is a total psychological trauma damage amounting to \$95,000,000. These losses exceed total residential property losses by about 50 percent, and compare with total property losses of 127 millions, business losses of 45 millions, and emergency/recovery costs of 26 millions.

Two alternative approaches to valuation give quite consistent results. They were developed independently of the above estimate. First, the approach used to allocate the Buffalo Creek out-of-court settlement for a flood caused by a dam failure was adapted to Tug Fork. The result for the 1977 flood was \$93,000,000. Second, evaluation was made based upon a Life Event Social Readjustment rating scale and workers compensation awards which produced a range of estimates from 18 million dollars to 164 million dollars - midpoint 91 million dollars.

## 2. Coal Productivity Loss

The objectives of this study unit were to estimate the adverse impacts of flooding on coal mining productivity - that portion of the variation in coal produced per coal miner when other major sources of variation are accounted for. The direct disruption arising from physical damage to mines, equipment, and coal transport systems was included in property losses. Other, more pervasive impacts on productivity stem from the long-run attrition in housing quality, diminishing availability of public services, and lowered quality of life. The productivity costs of the latter impacts alone are at issue here.

Analysis. The impact of flooding on coal mining productivity was evaluated by means of a regression model of productivity data from 43 Appalachian counties. Output per employee was compared with flood damages per capita for the record flood in each county and the percent of coal produced by surface mining. Productivity is much higher in surface mining than in deep mining. The model was calibrated from data for 43 Appalachian counties which produced at least one million tons in 1975 (an averaged 5.4 million tons. The following table shows the summary statistics.



Flood of Record Effects on Coal Production in 43 Appalachian Counties

	<u>Tons Produced, '75</u>	<u>Employment</u>	<u>Tons/EMP</u>	<u>(PCSURF) % Surface Mining</u>
Average	5,451,791	2,350	2,333	52.5
Standard Dev.	588,941	307	1,432	4.9

	<u>1970 Pop. Affected by Flooding</u>	<u>*Damages from Record Event</u>	<u>(FLCAP) *Per Capita Damage of Record Flood</u>
Average	7,653	\$4,087,000	\$ 534
Standard Dev.		\$4,886,000	\$1,255

\* 1975 Dollars

Two measures of association were attempted, both show modest relationships in the proper direction.

Correlation Coefficients

Per Capita Flood Damage	- .18451		
Tons	- .25820	.23025	
% Surface	.50538	- .02738	- .48151
	Tons per Employee	Fl. Damage per Capita	Tons

One interesting thing about the data is that the largest coal producing counties show a negative correlation with productivity. Higher productivity is associated with the percent of surface mining and negatively correlated with flood damages per capita. Regression results are about as expected. The per capita flood damage variable shows a coefficient of the correct sign with a modest degree of significance (a coefficient which rejects the null hypothesis at a .90 probability).

The regression format is as follows:

Tons per employee =  $f$  (annual tons produced, per capita flood damage from record event, and percent of coal produced from surface mining).

The statistically significant variables are abbreviated in the summary below:

	Average Value	Standard Dev.
TON/EMP = 1,926 - .002 (FLCAP) (1.4)	$X_1 = \$534 \text{ FLCAP}$	1255
F = 3.97 + 2.1 (PCSURF) (3.0)	$X_1 = 52\% \text{ SURF}$	32

The regression using flood damage per capita shows a stronger statistical relationship than does regression on total flood damages and emphasizes a need to reduce the flood hazard in the most severely affected areas. The elasticity of the flood damage per capita coefficient is  $-.03639$ , indicating that a one percent reduction in flood damage per capita would result in a 3/100 percent increase in productivity per employee, or an average increase of 9 tons per employee, worth about \$20 a ton or \$180 per year. In the average county this would amount to \$428,000 additional product per year.

If these results are applied to the Tug Fork counties, the potential impact of flood damage reduction in improving coal mining productivity is 17,103 tons per year for each percent decrease in flood damages. Since the flood damage variable is based on the record flood, reduction of the 1977 flood by 75 percent would result in extra production of 1,282,725 tons per year worth an excess of \$25 million annually. Since this extra production can be achieved without additional inputs, the value of the product is a net increase in national output and income.

Conclusion. That much of the coal production loss estimated in this study is attributable to impairment of miners as a human capital resource is strongly suggested by arguments and results of both the study of trauma damage and the study on household disruption, which provide a context for this estimate.

The Tug Fork area has natural environment problems coupled with the "boom to bust" cycle of an extractive economy which have, together, led to a harmfully low level of living for its people. Although they contribute a fundamentally necessary and valuable resource which supports the standard of living of Americans elsewhere, citizens of this valley must live in communities that provide sub-standard public services (or none). Many of them also live in houses which fail to meet national standards of decent, safe and sanitary. One third of them live in locations at flood risk. Their ability to move is rigidly constrained by housing supply, topography, shortage of flood-free sites, unavailability of land, and their own low incomes.

Five severe floods in the last 20 years have been one of the major cumulative factors working on attrition in housing quality and quantity, in public facilities infrastructure (lost or not developed) and in the human resource capacity of labor and the population at large to participate productively in the economy toward self-maintenance and regional development.

The communities cannot fully recover from successive floods and maintain a high quality and variety of public services conducive to their own productivity unless State and Federal governments act to help create a minimum stable base of housing and basic public amenities once and for all free of flooding destruction. Their need, present mitigative costs and an inequity across geography and income classes, can be solved by a non-structural strategy which combines genuine relocation opportunities in decent housing with comprehensive flood damage reduction.

## 2. Household Financial Disturbance Results

The purpose of this unit of investigation is to identify the extent to which the ability and willingness of households to participate productively in the economy is affected by flooding experience and to derive some logically expected human capital resource and dependency consequences of those effects which may recur to the national economy. This unit also furnishes some description of data distributions and relationships underlying the findings reported in the investigation units on psychological trauma and labor productivity in coal mining.

Flood experience variables including damages to home, whether forced to leave home, time out of home, depth of water in home, and loss of sentimental objects -- were related to psychological and physical variables on family's state of mind, charges in health, specific stresses, and family health score. These experiences were already shown to have had moderate to strong impacts on respondents' perceptions of their families' well-being.

Assuming the established psychological impact content of the flood experiences, those flood experience indicators were then related to household financial response variables -- including savings level, credit obligations, purchasing behavior, changes in forms of insurance, and requests for services and financial assistance from private and public organizations and programs. With the exception of purchasing behaviors (where results were negligible or equivocal) a number of adjustive financial responses imposed by the flood were moderately or strongly indicated. There is sufficient suggestion in these data to warrant future systematic investigation into the aggregate effect on the economy of the imposed changes on households glimpsed in this probe.

As a summary check on effects persisting two years beyond the flood, well after property damages, business losses, and emergency recovery costs had been tallied, survey respondents were asked if their families were "back to normal". The question was intended to encompass both the psychological self-assessments and the household economic indicators in a general estimate

or outlook. The negative responses indicating that households had not returned to "normal" are shown below as they are related to the major flood experiences:

Table 7: Effect of Four Experiences on "Things Back to Normal"

Damage to Home	Back To Normal	
	No	Yes
None	9.7	90.3
Little	0.0	100.0
Moderate	23.5	76.5
Severe	38.0	62.0
Ruined	52.4	47.6
	Gamma = -.52 at .000	

Forced to Leave Home		
	No	Yes
	22.9	77.1
	38.2	61.8
	Gamma = -.35 at .12	

Time Out of Home		
	No	Yes
1 Day or Less	11.1	88.9
2 Days to 1 Week	20.5	79.5
1 Week to 1 Month	36.1	63.9
1 Month to 6 Months	43.8	56.3
Over 6 Months	11.1	88.9
Permanently	55.3	44.7
	Gamma = -.42 at .0003	

Loss of Sentimental Objects		
	No	Yes
	12.1	87.9
	42.3	57.7
	Gamma = -.68 at .000	

In summary, there is implication in the data of this study unit (supported by the psychological trauma damages estimate) to suggest quite strongly that human resources impairment persists long after public program monies have been spent for emergency services and "recovery". The effective capacity of people for normal participation in the economy may slowly decrease, following deterioration in the private property base and social infrastructure through which they must act to achieve productive ends. In short, with successive floods there is strong suggestion of a downward "ratchet" effect, a cumulative decline in the human resource capacity of individuals. There is reinforcing confirmation for this in much general data on the valley over the last twenty years of flood history.

A downward drift in wealth, psychological outlook, perception of opportunity, and economic choice follows recurring severe floods, even as government and privately supported flood recovery costs mount. This situation indicates a substantial federal advantage for investing funds either to control floods or to assist the resettlement of flood-threatened households to flood-free locations.

There is some specific point in judgmental concensus (if not in precise measurement allowed by study time and funds) where the recovery cost of floods becomes a welfare burden on behalf of an increasingly depleted human resource, and ceases to be an investment in genuine recovery. Investment in a permanent state of recovery is necessary to establish the productive capacity of a viable, confident, and capable socioeconomic system of people able to achieve and maintain living conditions which approach at least minimum national standards of well-being.

B. Non-Structural Plan Implementation

1. Relocation Opportunity Housing Analysis

The objectives of the housing analysis study unit are to provide information on the housing stock, housing preferences, and propensity of people to move.

It is assumed that a major component of adjustment to flood risks will be met by providing new housing in the valley which would enable residents in the floodplain who are at greatest risk to have the choice of moving to a new location where risk is reduced or eliminated.

The information provided should enable Corps planners to make some inferences about future non-structural approaches and provide basic data for some of the necessary planning decisions. Most critically, data on housing type preferences and the specific aspects of willingness to move will allow identification of those kinds of households likely to respond to new housing opportunities, thereby guiding plan implementation resources to those segments of the population where effectiveness will be maximum.

Current Housing Stock. The recent history of housing in the Tug Fork River Valley is one of frequent flood damage and destruction of a diminishing supply of housing that stands in contrast to the history of housing policy in the United States at large. There is a critical shortage of decent, safe, and sanitary housing that meets national standards and fundamental policy.

Forty-eight percent of the housing in the sample for this study (stratified by frequency zone) is in the zone where flooding has an expected recurrent interval of once in 20 years, or more frequently. Another 20 percent is in the 50-100 year zone and 28 percent is in the 500-year zone or above. This reflects the historical fact that individual initiative alone - against topographical problems of site development and pattern of corporate land ownership - rarely has any option but to build on the valley floor. As the data indicate, nearly three-fourths of residences are within the 100-year floodplain.

Four attributes of housing quality (beyond condition of structure and materials) were tested for relationship with flood frequency zones. Tenure (owner-renter), number of rooms and presence of bathroom were all found to vary by zone, although they are not linearly related to zone. The fourth characteristic - lot size - does seem to be nearly linearly related. Lots are smaller (therefore housing density higher) in the higher-frequency zones,

while more lots larger than one-half acre are located in the lower frequency zones. The design of both public information efforts and effective incentives for voluntary, self-selective relocation should take into account these and other zone-specific differences.

About 70 percent of floodplain residents are home-owners and 33 percent presently have mortgages. Many mortgages are rather short-term (10 to 12 years) because valley residents tend toward inability to maintain the value of their home at parity with their mortgage balances. Bankers also report that the average loan-to-value ratio is 20 to 30 percent.

There are a number of clearly identifiable factors responsible for the critical deficiency in both supply and quality of this housing inventory. Interviews with more than 50 officials in both the public and private sectors converged on the following obstacles and problems:

- Lack of suitable and available land for individual purchase;
- High site development costs due to (1) topography, (2) lack of infrastructure, (3) corporate land ownership;
- Absence of even a small building industry, and lack of skilled construction workers;
- Lack of long-term mortgage financing mechanisms;
- Lack of adequate transportation routes for movement of materials;
- Government regulations which the area cannot meet because of topography, economic, and labor constraints.

At present, the only alleviation of the housing situation described here is the modest expectation of less than 2,000 units. These are being provided by the efforts of HUD under Section 8, and by FMHA under Section 502, with the supplementary assistance of the West Virginia Housing Development Fund and the Kentucky Housing Corporation. Distributed across two states, few will be in the Tug Valley.

Housing Preferences. A number of indicators concerning satisfaction with present homes and neighborhoods were assessed. Present homes were considered ideal by 26 percent of the residents. Another 32 percent expressed a need or desire for a more elaborate home in some respect, while 14 percent replied that their ideal was simply a "decent" home. Eight percent stated that, ideally, they wanted a home safe from flooding.

Neighborhood attachment was examined in a number of facets to help interpret responses of stayers and movers. Aspects of neighborhood orientation asked about included:

What does it mean to you?  
How satisfied are you?  
How often do you talk with neighbors?  
Would you miss it if you moved?  
Would you want neighbors to move too?

The total content of responses indicated that neighborhood ties are quite strong. But about half of the 66 percent of the valley residents willing to move are indifferent as to whether any of their neighbors might move with them. Apparently it is neighboring relations - not particular neighbors - that matter to them, whether in their present locations or in new ones.

The specific house type preferences expressed included one dominantly expected result and one surprise contradiction of conventional wisdom (held by some local officials as well as outsiders) about the area. About half of the respondents' first choices were for a small, one-story, single-family, detached house. This simply affirms what is typical for the area and for non-metropolitan Americans at large. About one-fourth chose a rustic, A-frame, mountinside house which is not presently common in the area. About 15 percent rejected all five house types shown to them. The surprising result was that only 3 percent chose the mobile home. This may be a strong indication that they (and perhaps residents of other valleys) do not like living in "trailers" as is often asserted. This finding indicates that the present abundance of mobile homes is an outcome of unavoidable necessity, not free choice. Both garden apartments and high rise structures were also nearly completely rejected.

Propensity to Move. Respondents in the 278 households of the survey were asked this question: "If decent, affordable housing were available to you outside the floodplain, would you be willing to move?" More than 66 percent answered "yes." Why this majority contradiction of the pervasive myth that people living in the floodplain are not willing to move out of it? It is mostly due to the absence of affordable housing in flood-free sites, so they haven't frequently moved. Behavior is heavily constrained by obstacles, but preferences are not. What most of the people want - are willing to do - is blocked off by three major obstacles. Small and dwindling supply of housing, especially outside the floodplain, has already been discussed and its six primary causes identified. A second obstacle to individual action is low family incomes, a pervasive constraint against many inclinations to self-betterment besides decent housing in the region. And third, there is a lack of long-term mortgage financing available, partly because of earlier-mentioned federal regulations which often make qualification difficult in this area.

Conclusion. It is clear that the housing realities of the valley show many dimensions of both need and opportunity which might be successfully met by voluntary relocation and other non-structural measures. It is equally apparent that no single agency has the sole ability to bring housing and flood

control policy together. The Corps of Engineers has both the opportunity and the lead capacity for developing an innovative organizational arrangement with the Appalachian Regional Commission and housing agencies and organizations at all levels (public and private) to plan and administer a long-term housing development and relocation assistance plan which would greatly reduce long-term flooding risks and re-house an area long suffering from very poor housing.

## 2. Community Analysis

Objectives: The specific objectives of the community analysis for the valley were: (1) to assemble an inventory of populated places which are predominantly too small to be described in U.S. Census sources; (2) to develop a social profile consisting of several factors each of an economic, social, political and historical kind; (3) to identify the formative influences of present community organization and (4) to assess adaptability and capacity to respond to government assistance for flood damage reduction through a non-structural, voluntary relocation opportunity plan. The general objective of this study unit, like that of the housing analysis unit, is to provide planners with information which will help them to identify both feasible components and constraints toward development of a voluntary relocation plan.

Residential Place Inventory. By a research procedure of intersecting various maps, aerial photos, field inspection, and interviews, 103 named residential places were identified. They are distributed with a fairly even density in a strip development throughout the 130 miles from Ft. Gay to Welch, at an average interval of two and one-half miles, comprising a population of about 10,000 persons within the outer limit of the floodplain. Most are unincorporated and few have public facilities and services.

Social Profiles. In the social profiling process, some widespread image points about "Appalachia" were confirmed for this valley in particular: Labor participation is about two-thirds the national average, median family income is correspondingly depressed, and educational attainment level is low.

The Dun & Bradstreet credit limit, aggregated for rated firms in 22 towns in West Virginia and nine in Kentucky amounts to per capita availability of \$36,238 in the former and \$4,906 in the latter. In West Virginia six towns alone account for 99.4 percent of credit and in Kentucky two towns absorb 92 percent. Among listed "D & B" businesses in the Valley 20 percent are coal mines, 12 percent are manufacturing or construction, 15 percent are wholesalers, 40 percent are retailers and 10 percent are service providers. Most businesses are branch and not locally owned. In this context, local firm turnover (starts and failures) is rapid. Most businesses are also overwhelmingly sited in the floodplain.

Historically Formative Influences. One of the major influences which has shaped community and social organization as well as perspectives on life in the valley is the single-industry dominance of coal mining. It began to effectively shape the physical and social arrangement of the valley during World War I, when the



industrial production of Eastern cities generated a vast demand for coal. The dominance of the coal companies created a number of realities which remain as greater or lesser residues today.

First, in response to the national market demands large firms bought a large portion of mineral and surface rights on the land. The resulting ownership in large blocs limits its development for housing. Second, the coal industry offered high wages but erratic employment, because the industry has been characterized by frequent sharp cyclical downturns. Third, the coal companies - whether to provide infrastructure for maintaining a viable labor force or to control and exploit a vulnerable population - as one wishes to interpret history - often built company towns providing housing, goods and services. Benign or malignant, it induced dependence.

Cyclical employment, living conditions, work requirements and safety problems also generated a violent era of the labor movement - and yet another contact with large-scale organization in the form of unions. Railroads created another experience of dealing with large organizations controlled outside the valley.

More recently, the people of the valley have had other experiences of a post- industrial kind in common with more metropolitan Americans everywhere. The Kennedy/Johnson social welfare programs brought federal funds, new organizations, and a small share of wider American prosperity to a small but active segment of the local population. The lasting effect of those experiences has been rising expectations about many aspects of local life not presently at parity with minimum national standards.

The weight of these experiences since World War II, not so different from that of more affluent metropolitan Americans, is evidence squarely against a major dimension of the Appalachian stereotype. Despite the material conditions and economic depression of the area, it is not an isolated backwater of unsophisticated "hillbillies." The people can organize to assert their interests on specific issues, as they did in early unionization, and as they have with greater frequency and variety in the last 20 years. However, they have not, and cannot alone, overcome the intersecting problems of nature, history, and structural problems of industry, economics, and community which extend into and originate in American society at large.

Capacity to Respond to Assistance and Change. This study unit evaluated adaptability to change and capacity to respond to the complexities of planning and development in a constructive, participating manner. Two empirical generalizations result which reassure prospects for success of the extensive interaction necessary to plan and implement a voluntary non-structural program. One generalization is that people are attached to the Tug Fork Valley, not to their particular locale or community of residence. The other is that there are potential resources in individual characteristics and organizational experience adequate to implement a voluntary relocation strategy.

People are not attached to the immediate community or site of residence for a number of reasons. First, they commute long distances to work, in large

numbers; and they live at such remote locations because the scarcity of housing makes residential change hard to achieve. Hence they often don't live where they do because they wish to stay. Commuting also diffuses their familiarity across many communities. A second reason for diffuse attachment is that civic orientation and political decision-making have historically been focused at the County level, rather than the community level. A third reason is that business, professional, fraternal and religious organizations do not coincide with municipal or community boundaries.

The resources for local leadership assistance and organizational competence are also suggested by several clear indicators. One indication of response capability is the residents who are identified as "cosmopolitans" in this study. They are professionals and managers who either belong to long-established families of the area or have migrated in as branch employees of non-local firms. Many corporate policies encourage employee civic responsibility. This may be especially likely in the Tug Fork area if an opportunity to improve community facilities and services is perceived. "Cosmopolitans," in short, are a pool of potential local talent.

Another indication which suggests response capability is the experience of people who have interacted with Federal, regional, and State governments to implement welfare and development programs during the last 20 years. Above the municipal or community level, the area actually has a fairly dense system of formal organization and professional expertise. A fully designed strategy of coordination would probably be a sound administrative investment.

Conclusions. This assessment has evaluated the characteristics of residents, organizations and institutional bases and communities. Historically shaping experiences show the potential for positive response and adaptation to change. They suggest several opportunities and constraints for planners. First, contrary to physical community appearances, most of the population have extensively experienced the process of urbanization. They are very much linked into national American culture through coal, unions, Federal programs, large educational sector, migrant professionals, and TV. This fact means that a voluntary relocation program should be perceived as collaboration in common goals, not as outside intervention.

Second, most of the floodplain residents would move to an affordable flood-free location. This is a double-edged truth. Providing safe and affordable housing along with a reasonable system of supporting community services is a formidable objective.

Finally, there is a constraint stemming from the understandable focus on the potential of coal mining to solve most problems toward achieving the good life. When the aftermath of a flood has been cleared away and the losses accepted, not many people have developed an insight into the role that cumulative flooding costs actually play in blocking wealth accumulation and trends toward a more diversified economy.

The wider, more complex linkages among single-industry oscillation, flood losses and threat, depressed income, and lack of public infrastructure for "take-off" must be locally understood if help is to be received in a partnership working toward change.

### III. Implication of Findings

This study has produced estimates of flood damages due to the psychological trauma experienced by persons exposed to the flood, and damages due to reduced coal mining productivity. The estimated \$95 million loss due to psychological trauma shows the serious human consequences of the 1977 flood. To put this in perspective, residential property losses were estimated at slightly over \$40 million. Forty-seven hundred homes were damaged, 600 of them totally destroyed. Property losses of \$9,000 occurred to houses which averaged only \$11,000 in value. Therefore, the cost due to psychological trauma exceeded residential losses. Physical losses to all categories of property totalled \$126.6 million. We believe that this analysis establishes a logical argument that non-property flood damages are a significant component of total damages and that they should be evaluated.

Our analysis of the impact of flooding on coal mining productivity shows that elimination of the flooding would result in a net increase of about \$25 million in coal output from the valley. The Tug Fork Project damage survey showed 500 workers were out of work for periods from two weeks to eight months due to the flood. Two mines have not reopened. Our estimates of adverse productivity impacts are cast in the context of long run differentials in productivity, since we used data from years in which there was no major flood or strike.

Thus flooding has substantial adverse economic impacts in excess of property losses and emergency costs. In the Tug Fork case, there is another category of impacts for which no estimates have yet been made. That is the cumulative impact of five major floods in 20 years on the local public sector's ability to deliver public services. There is a negative reinforcing cycle working back from the very low property values in the flood plain which tend to limit revenues to local government, and on the other hand the special additional cost which the community must bear because of their flood prone location and the occurrence of frequent major floods. One example, for instance, is that the health services office put in operation at Materwan just a year before the 1977 flood. The facility required a heroic effort by the City Council and Mayor to obtain funds, build a building and recruit health service proposals to the community which had no other comparable health facilities. Yet the building was lost in the flood and two years later no replacement had been implemented. This is a small example of a large problem. One of the results is that the Tug Valley has a very low level of locally provided public services--a deficiency which results in no solid waste management program and pervasive dumping of waste material along the roadside and stream banks.

The second major element of the study was to evaluate the feasibility and impacts of voluntary relocation and rehousing programs. Here we found that a substantial majority of the residents were willing to participate in voluntary relocation. The problem may be, under what conditions? Since the Huntington District is identifying flood free alternative sites and costing out development costs, there is evidence that this type of strategy is physically feasible. Public action to acquire the sites (which are in large

part owned by outside firms) is likely to be necessary. However, there are several examples where large mining companies, businesses and other groups have found a way to provide housing sites. Then the problem is to find site developers and housing firms. This will require either outside firms or development of the capability in the valley. Given housing, the next problem is financing. Again, significant structural changes must be made to move to the position of available, long-term low down payment and reasonably low interest loans. Next, people living in \$11,000 houses are not likely to be able to afford even modest new houses in new sites which are likely to cost in excess of \$50,000 for the house and the site. However, there are many housing assistance programs available from HUD which, along with relocation assistance payments may close the gap in financial feasibility. Finally, if the new homes are built to subdivision standards and a full set of public services required, local taxes are going to have to increase substantially. Some HUD programs may mitigate this problem but clearly it could become a major stumbling block. If the rehousing program is a success, not only will there be a sharp reduction in flood losses, but the Tug Fork Valley community will begin to achieve some parity in housing quality with other comparable communities of the United States. Housing benefits may ultimately exceed flood damage reduction benefits.

Since the Tug Valley housing is located in a linear strip along the river, many types of communities are evident. After Williamson, the largest community of about 4,000 population, and Matewan, about 1,200 population, community size quickly declines to a great number of very small communities with place names. There is limited tradition of active local decision making at the town level -- because of a history of county level decisions the preponderance of outside large-scale organization influences, i.e., the coal companies, the unions and federal programs. People commute long distances to work. Political organizations seem to focus on Valley rather than town issues. All of these factors suggest that people can relocate without a strong sense of community loss.

These studies suggest some guidelines for implementing mixed structural and non-structural plans. First, a project of this magnitude will involve the best that Federal, State and local government have to offer. It will test some of the program criteria (which tend to be written without areas like Tug Fork in mind). Tug Fork has a limited record of accomplishing complex public objectives by its own leadership. That leadership must be stimulated and developed. Rehousing 2,000 families is a job which directly affects about 20 percent of the Valley population. New communities and a new community support mechanism will have to be developed. The Federal and State governments must work as partners with local communities. If the rehousing can be accomplished, substantial improvements in the quality and quality of life in Tug Valley would be likely. The Valley would be more productive and competitive. Environmental quality and life quality will improve. Communities will be able to more nearly master their own destiny. The Nation will gain more coal and reduce a dead weight drain for resources to supply social support services to people who cannot compete. Central Appalachia can assume a positive role in national development.

## V. Conclusions

The human costs of flooding are large and have been quantified. In the Tug Valley they are almost double losses to residential property. Flooding can also increase the long term requirements for social service support by the Federal and State governments. These expenditures are necessary and unavoidable given the needs, but seldom act to change peoples ability to compete.

Voluntary relocation is one of the potential solutions to the Tug Fork flooding problem. Benefits are due to reduction of flood damages and to improvements and housing. An important byproduct will be communities which can finance and deliver a more comprehensive set of public services and thereby maintain cleaner, safer communities. We have found that voluntary relocation can be implemented. A large majority of the people are willing to move away from the flooding hazard. They can form new communities without a great sense of loss of the old community. Tug Fork residents have moved--from the hollows to the highways--and from Tug Fork to industrial cities and return. Therefore, voluntary relocation cannot have serious adverse impacts.

Rehousing 20 percent of the Tug Fork community is a large task. The Valley is not now equipped with the kind of development, financing, and house building industry to accomplish the task. Development of this capability, largely from Valley resources (people and managerial capacity) should be an important element of the implementation strategy. Many program regulations will have to be altered to rationalize this rehousing strategy. Rules written without Tug Fork realities in mind will have to be revised. But regulatory flexibility in this case of humane and national interests would be both prudent and efficient.

PART I  
PRIVATE HUMAN COSTS OF FLOODING

## ACKNOWLEDGEMENTS

### Task I and IV

Field work reported here was done by a number of persons other than the authors. William Westbrook of Marshall University directed a team of interviewers and deserves thanks for the careful development of the household survey data. Barbara Sherman conducted some of the key informant interviews and was particularly important in cleaning up the household interview data and pushing forward many of the coputer runs. Sharon Trerise Stachowski developed much of the language in Task III and also assisted in data clean up and in key informant interviews. Sharon will be offering a Master's Thesis based on this material to the Graduate School of Cornell University.

Mabel Jennings assisted in some of the programming. Anne Johnson applied her editorial skills to Task II, and with salutary effect. And Sue Bryant introduced us to the world of word processing.

No one will know how much this project depended on the resourcefulness, patience, wit, good humor, nimble fingers and editorial skills of Linda Schempp.

A last word of recognition has to go to the sympathetic team that was assembled under the leadership of George Antle to conduct this study. Charles Simpkins and Annabelle Motz, as well as George, stimulated our thinking at many points. John Justice, the Project Manager in the Huntington District of the U.S. Army Corps of Engineers was always supportive, helpful and cool in the face of fire.



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## PREFACE

The study organization for the Tug Fork Project of the Institute for Water Resources, included the following tasks:

- Part I: To estimate the private human costs due to impairment caused by the physical and psychological impacts of flooding.
- Part II: To develop an estimate of the impact of flooding on coal-mining productivity.
- Part III: To estimate the public human costs due to impairment caused by the physical and psychological impacts of flooding.
- Part IV: To develop an analysis of the housing economy and industry in the Tug Fork area.
- Part V: To develop the relationship between community cohesion and flooding (and damage mitigation.)
- Part VI: To develop a socio-economic profile appendix.
- Part VII: To produce a final report.

The tasks were performed by a study team composed of George Antle, IWR (Director); Charles Simpkins, IWR; Annabelle Motz, American University; and David Allee and Barbara Osgood, Cornell University.

The following pages contain the results of the analysis of data for Tasks II and III. The primary source of these data was a survey of 278 households conducted in the Tug Fork River Valley during the summer of 1979. (For a more complete description of the survey, see Appendix I.) Additional data were obtained from key informant interviews (Appendix III) and secondary sources such as U.S. Census Data, state publications and special studies. (See References.)

### The Housing Analysis Task (Part IV)

The objective of the housing analysis task is to identify the following:

1. the status of current housing in the Tug Fork Valley,
2. housing preferences of Tug Fork residents, and
3. propensity to relocate on the part of Tug Fork residents.

The purpose of setting such an objective is to provide an analysis of housing opportunities that will meet the needs and preferences of local residents.

A major component of adjustment to flood risks could be met by providing new housing in the Tug Fork Valley. It could enable residents in the flood plain who are at greatest risk -- and others, as well -- to have the choice of moving to a new location where flood risk is greatly reduced or eliminated. Such an approach to flood-plain management is based on voluntary actions of residents. Therefore, sufficient incentive must be provided so that a change of location is seen as a highly desirable choice.

An assessment of current housing in the Tug Fork Valley provides basic information on tenure patterns, housing quality, population density, debt burdens of homeowners and renters, and location of structures in relation to flood frequencies. An assessment of government activity in the housing sector of the Valley identifies existing programs that have affected, or can be expected to affect the housing market. Together, these assessments provide an overview of the status of housing in the Tug Fork Valley. This should enable Corps planners to make some inferences for future directions in nonstructural approaches, and to provide basic data for future planning decisions. (For example, if a high proportion of housing in the 20-year flood plain is found to be substandard, the provision of "decent, safe and sanitary" housing to flood plain residents is justified in terms of the fulfillment of a national housing goal.)

The success of the "housing options" approach to minimizing flood risk depends on voluntary actions of flood-plain residents. They must find new housing opportunities so appealing that they would be willing to make a change of residence. Propensity to move data help identify kinds of households most likely to respond to new housing opportunities and toward which such opportunities can be directed. Public and private groups interested in producing new housing are more likely to be successful if they make use of information on housing preferences for type, cost and location in their planning processes.

#### The Private Human Costs Task (Part I)

The objective of the private human costs task is to add the non-property costs of flooding borne by households to the traditional property oriented cost-benefit methodology used by the Corps of Engineers to evaluate flood mitigation projects.

The traditional approach to flood risk evaluation has focused on property damages and the related monetary losses that occur as a result of various levels of flooding. The human dimension of flooding has not gone unrecognized. However, social factors such as loss of well-being due to psychological trauma, and community disorganization, have not been included fully in quantitative evaluation of flood risk management plans. The failure is partly because a creditable methodology and data base to permit monetary estimates of such losses has not been developed. The time is propitious for the acceptance of such methodology.

Basic to the traditional evaluation of flood loss reduction is the estimation of repairs and, where necessary, replacement of structures damaged. Losses in employment and commerce are included in damage estimates. Actions considered include changing flows and changing building

elevations, changing locations horizontally in the flood plain, or otherwise reducing the flood susceptibility of a structure or activity. Damage estimates for various flood elevations are combined with frequency of occurrence estimates to produce a damage-frequency function. These are then associated with the changes in a project to obtain the benefits that can be attributed to the project. Compared to much public planning, this has been a sophisticated approach that lends itself to systematic use by public agencies.

In water resources planning the feasibility of considering broader definitions of benefits is well established. Social well-being is still defined as an account, rather than an objective of Federal Water Resources programs. But no one can argue that flood control policy is related as much to social as to economic disruption. Likewise, the courts and other public planning and program areas have been shifting to broader, more social components of valuation. Highway planners have moved beyond avoiding property damage and narrow definitions of physical injury in their evaluation of improvements. This mirrors the shifts in the bases of damage evaluation by the courts. Similarly, worker's compensation awards for injuries suffered on the job have moved well beyond compensation for lost employment due to the physical injury alone. Interesting differences between jurisdictions exist in the extent to which awards — and the policies and analyses that undergird them -- differ in the recognition of trauma. Adjustment to physical disability and the need for compensation for physical pain have been augmented in some states by a recognition that traumatic experiences lead to mental disabilities. These are reflected in absenteeism beyond the physical recovery period, marital and other family disruptions, emotional disorders, and the need for counselling, etc.

If nonproperty damages are to be evaluated on a par with property damages, the weakest link appears to be a creditable basis for estimating "willingness to pay" to avoid them. Expenditures that would be made to repair or replace a building can be observed or simulated. While a few owners of flooded property might agree to the amounts involved, their self-interest colors their perspective of value. Thus, their agreement is less crucial than that of others involved in the planning process. Likewise, it is this broader sense of creditability that is necessary for nonproperty damage estimates. If convincing linkages can be made between nonproperty damages where compensation is paid and similar damages in flood situations, then the amounts paid can be used to estimate "willingness to pay."

This information should provide guidelines to planners who are engaged in the task of balancing gains and losses in order to determine a course of action. In the Tug Fork River Valley, human costs of constant and frequent flooding should be added to standard estimates of property costs. This would provide a more accurate measure of the benefits of both structural and non-structural approaches to flood risk management.

The Tug Fork River Valley has been cited as one of the most flood-prone areas in the United States, with a significant flood almost every year. For many households in the valley, therefore, flooding is a regular occurrence. While loss of life has not been high, the effect of this constant flooding has been the deterioration of housing, displacement of residents and a consistent decline in quality of life. The selection of this valley for a comprehensive study of flood risk abatement seems particularly appropriate.

Part I

PRIVATE HUMAN COSTS OF FLOODING

I. TRAUMA AND THE TRADITIONAL BENEFIT-COST FRAMEWORK

Benefit-cost analysis, as traditionally applied to water resources planning, is an instrument for evaluating project alternatives to facilitate decision-making. This requires thorough assessment of costs and benefits relevant to each project alternative.

This discussion will primarily focus on identification and valuation of human benefits of flood control. These are typically omitted from benefit-cost analysis. Benefits are subdivided into two general categories — tangible and intangible. Tangible, or market benefits, are those given monetary values through observation of market processes or estimates of proxy values. Market proxies for intangible values are rarely sought.

Typically in flood control projects, tangible benefits are both direct and indirect. Direct benefits are the costs of physical or property damages that can be averted by flood control. These are calculated based on repair and/or replacement costs of rehabilitation. (James and Lee, 1971) Indirect benefits are net economic losses that could be averted by flood control. (Eckstein, 1961) These are usually with values included in a national income calculation.

Intangibles, on the other hand, "cannot be assigned a monetary value, but should be considered in the project decision." (James and Lee, 1971) James and Lee cite as examples: the saving of lives, improvement of health, and a sense of security when floods cease. Intangibles are typically presented in qualitative terms in the benefit-cost analysis. Tangibles are



quantified and entered directly into the calculation of the benefit-cost ratio.

Our intent is to extend benefit-cost methodology to include an "intangible" -- the human costs of flooding. Specifically, we wish to establish a rationale and procedure for identifying and quantifying values associated with social factors. These include loss of life, psychological trauma, physical injury, and the effect on the individual of community disorganization. The objective is to establish values comparable to market proxy values now used for property damage.

It is important to note the nature of flood control benefits before a basis for their evaluation can be established. Flood control is considered a collective good rather than a market good. (James and Lee, 1971) That is, the good or service being supplied is consumed collectively; everyone in the protected area benefits from flood control regardless of who pays for it. Thus in determining the economic demand for flood control, benefits must be evaluated indirectly. This means estimating the amount an individual should be willing to pay, based on potential losses, to prevent the damage from occurring. (Eckstein, 1961, James and Lee, 1971)

Eckstein (1961) describes the willingness-to-pay concept as follows:

The benefit of a commodity is simply its value to the consumer. But in equilibrium the consumer will spend his income in such a way that the marginal rates of substitution are equal to relative prices ...Thus, benefit is a measure of value and reflects consumer's willingness to allocate income to the purchase of the commodity.

To evaluate benefits associated with the human dimension of flooding, we must determine how much individuals are willing to pay to avoid another flood. To what degree have previous floods impacted their lives and affected physical and mental wellbeing? Based on this, what additional

amount, beyond recovery of property damages, is it worth to be spared another flood?

The value a person places on something will vary, depending on income. For example, consider what someone might pay to receive flood protection as opposed to what payment he/she might accept to give it up. Willingness to pay in order to receive a good may be constrained by current levels of income. Willingness to be paid to give it up may more closely approximate the value of the change at issue. Willingness to pay is closer in concept to typical exchange values in the economist's image of a perfectly competitive market. Willingness to be paid recognizes at least part of the consumer's surplus created in any market and is particularly significant in evaluation of a non-priced public good. (Krutilla and Fisher, 1975)

#### Rationale for Incorporation of Human Costs Into the Traditional Framework

There is considerable debate in the research community in regard to the long-term impacts of disaster. However, there is support for the view that there are, at least for some groups, some psychological and social effects of disaster. According to a U.S. Senate report (1974):

"The chaotic living conditions and distressing personal experiences often accompanying severe major disasters may cause unusual mental stress and lead to psychological disturbance..Expert observers have noted a definite increase in mental health problems attributable to several recent catastrophes..Under these circumstances it is not uncommon to find increased anxiety, a great fear of subsequent disasters, intense feelings of depression, helplessness, irritation, anger, grief, despondency or even guilt...and stress induced physical illness" (US Senate, 1974)

A concrete example of the significance of flood trauma is the case of Buffalo Creek, West Virginia. In 1972, this valley was virtually destroyed when a dam burst without warning and sent a wall of water racing through the small communities located there. In addition to the immense loss of

property, 125 people were killed and many others were severely affected psychologically by the experience. In a subsequent legal action against the coal company that had constructed the dam, flood victims were awarded monetary damages. These were not only for loss of property, but also for the trauma they suffered as a result of their involvement in the flood.

The human dimension of flooding has not gone unrecognized by economists. Eckstein (1961) sees the prevention of loss of life as one of the most important benefits of flood control. However, little has been done to include these benefits in the benefit-cost framework for assessing flood control projects.

The idea of human costs of flooding has been approached from several angles. James and Lee refer to a feeling of insecurity due to the uncertainty of flood occurrence. They further explain this "uncertainty cost" as an amount above the value of expected damages. This is an amount "individuals are willing to pay to avoid a flood loss pattern that is highly variable and occasionally reaches catastrophic proportions." (James and Lee, 1971)

Robert Lind (1966) speaks indirectly of the benefits of reduced flood risk to floodplain occupants:

public goods may be of immense value and if each individual were accurately to reveal the value to him of having this good, total benefits would far exceed costs.

Bob Buehler (1975) has promoted incorporating human costs of flooding within the benefit-cost framework. He was prompted by the study of a flood-prone area in Tennessee. From this he concluded that,

.... preventable property damage, though considerable, falls far short of justifying the high cost of a flood control project. Preventing flood-caused death and injury would be the principal project benefit.

To quantify human benefits, human worth was measured in preventable lost lifestream of earnings. The results of Buehler's study suggested that human values would account for 80 percent of the benefits of a flood control project.

Other studies have been done which emphasize the human impacts of floods. Ruth Mack (1974) in a flood control study initiated by the New England River Basins Commission, established a framework for analyzing social impacts of such projects. Social impacts are estimated on a personal utility scale, based on the following categories:

1. Material comfort
2. Stability, safety and reasonable continuity between present and future
3. Physical and mental health
4. Well-being of spirit and mind
5. Intimacy and family relationships
6. Social belonging and participation
7. Competence and mastery
8. Self elevation and influence
9. Freedom to choose

This technique revealed social impacts to be about two-thirds of economic impacts if both were converted to a similar scale. (Mack, 1975)

It seems evident that the social impacts of flooding are substantial enough that they should be given unbiased consideration in a benefit-cost framework. To accomplish this, we need to place them in the same context as traditional property oriented economic impacts. Social impacts must be monetized, combined with economic or property impacts, and entered into the calculation of the benefit-cost ratio.

The Need for This Extended B-C Framework in the Analysis of Flood Control Measures in the Tug Fork Valley

The Tug Fork Valley is typical of Appalachia in that it is made up of a severe terrain of hills and narrow valleys. Because of the shortage of flat land on which to build, the floodplains have been extensively developed. Income levels limit the quality of housing structures; for example, there is frequently no foundation or floodproofing. Thus, property losses in the event of a flood are substantial because numerous dwellings are destroyed or severely damaged.

The crux of the problem, however, is that costly flood protection cannot be justified based on property damages. This is because structural values on much of the housing are very low. This can be attributed in part to recurring floods in the Tug Fork Valley. In April 1977 residents experienced the magnitude of a 500 year flood. Following this experience, they are reluctant to invest in major repairs and replacements due to the uncertainty of another flood. Many cannot make property improvements due to the financial constraints of cleanup and rebuilding efforts.

Therefore, under the present framework, homes deteriorate. Property values fall. The benefit-cost ratio drops. And the quality of life for people in this valley declines. It is a self-defeating cycle. Residents of the Valley are unwilling to upgrade their homes and property, given the constant threat of flooding. And implementation of flood control measures cannot be justified based on the value of preventable property losses.

Coal is increasingly important in our economy. Appalachia is a major coal-producing area. A high percentage of the work force in Appalachia is employed in coal mining and related industries. Maintaining the quality of these people's lives is important to increase production. And increased

production is important to reasonably meet our national demand for energy resources. Thus, it is eminent that the problem of continued severe flooding be solved so an agreeable residential habitat can develop.

To satisfy economic requirements for flood control measures, we need more complete benefit value, based on benefits to individuals of reduced flood risk. This means reduced potential of physiological and psychological impacts of flooding. We need to give adequate representation in the analysis of flood control projects to the real resources of the area - the people.

#### Techniques for Valuing Life and Health

There have been many attempts at valuing life and health. Basically, the techniques developed are of two types. The first, and most commonly used technique, attempts to value life and health as a function of expected future earnings. The second concept is willingness to pay or be paid.

#### **Expected Future Earnings**

This approach is based on the theory that a lost or impaired life causes society to lose that portion of its productivity which the individual would otherwise have contributed. To measure this lost production, the expected future earnings are discounted and used as a representative value of that individual to society. If injury reduces those expectations, the loss is the change in present value of the earnings. Although this approach is advocated by many (Buehler, 1975; Rice and Cooper, 1967; Weisbrod, 1968), it has also been severely criticized by others.

The main criticism is that the present value of expected future earnings does not capture a person's full worth. The approach presumes that the value of saving life or preventing an injury has an upper limit

equal to the sum of discounted future earnings. Schelling (1968) criticizes the concept of human worth as a function of income by posing the question:

Is there some expectable or rational relationship between what a man earns and what he would spend, or willingly be taxed, to increase the likelihood of his own survival or the survival of a family member?

Or, stated another way, is there any reason to assume that the person who earns ten times the salary of another values his life ten times more. Likewise, we might ask if the value of a housewife to her family and the nation is reasonably approximated by her injury's impact on her husband's earnings.

Benefit-cost analysts have been criticized for using this approach to determine the expenditure that can be justified to save people in different segments of the population. This approach, as Rhoads (1979) emphasizes, implies a "crude materialism" among benefit-cost economists who use it. It not only limits the worth of human life based on earning capacity but also ignores costs such as pain and suffering. These criticisms need to be recognized since they reflect the prevailing attitude among the people of the Valley.

#### Willingness to Pay

The concept of willingness to pay is best expressed by Mishan (n.d.):

any expected loss of life or saving a life, any expected increase or reduction in suffering in consequence of economic activity is to be evaluated for the economy by reference to the Pareto principle; in part, by reference to what each member of the community is willing to pay or to receive for the estimated change of risk.

The problem now arises of how to determine a value for willingness to pay or be paid.

One approach is to analyze the risks themselves by probabilities of occurrence. However, often people are not capable of dealing with the concept of risk or probabilities applied to large events. (Schelling, 1968; Zeckhauser 1975) It is difficult to associate a monetary value with an event of low probability and costly consequences. And as Schelling points out, it is even more difficult if the risk is large enough or vivid enough to cause anxiety in assessing the risks. Zeckhauser (1975) and Schelling (1968) go on to explain that anxiety associated with an event is separate from the impact itself. There is no direct relationship between the amount that would be paid to avoid anxiety and the probability of occurrence. Thus, to estimate the value of reduced risk and therefore relief from anxiety, we need to assess the anxiety in addition to probability of occurrence. And one may have no bearing on the other.

Personal experience helps to recall anxieties, but people have difficulty when asked to assess an event, given a certain probability of risk. Evaluating perceptions of risk has been tried (J. Acton in Rhoads, 1979; Schelling, 1968) by presenting individuals with hypothetical risk situations. Their response is based on their perception of the risk involved. The reliability of this procedure is questionable when testing people of relatively little education who would have some difficulty in assessing hypothetical probability situations. Also, it is likely that the chance of occurrence and the magnitude of painful events will be under-perceived and that of joyful events over-perceived.

Another approach to determining willingness to pay for reduced risk is presented by Zeckhauser (1975). He suggests estimating benefits of eliminated risk based on the amount people in high risk occupations or living in high-risk areas charge to assume these risks. Examples are higher wages



for mine workers and lower real estate prices for floodplain housing. This is a logically sound approach from an economic standpoint. However, it functions on the assumption of full knowledge among buyers and sellers in the market place. This is not always -- indeed, may rarely be -- the case. Many decisions are made daily in the market place without being aware of the risks involved. In the Tug Fork situation it is not lack of information which weakens the idea, but lack of alternatives from which to choose. For example, in the Tug Fork Valley, real estate suitable for housing is extremely limited; so land within the floodplain is in great demand. Thus, prices on floodplain property reflect the land scarcity problem rather than the flood risk. However, this should be testable to some degree. Flood risk levels do vary greatly in the Valley and in the sample. Taking both these factors into consideration, a valuation of risk based on decisions made in high risk situations would tend to be biased downward.

In summary, for purposes of flood control, an analysis of the risks is incomplete. It will be applicable for assessing the deaths resulting from an event, but may have "little relevance to choices involving fear, anxiety, and relief." (Schelling, 1968)

Another approach to valuing willingness to pay is to examine situations where compensation is paid for injuries, illnesses or death. From our definition of willingness to pay, we can express the compensation approach as that amount society is willing to pay and the individual is willing to accept to offset losses he has incurred.

There are several institutions which use the concept of compensation. Our courts system awards compensation to victims of wrong-doing. In determining awards, the court system not only considers the real costs of injury such as medical care and foregone earnings. It also considers the human

costs of pain and suffering. Therefore, reviewing court awards would seem appropriate to quantifying monetarily the human costs associated with the physical and psychological impacts of flooding. However, there are a few flaws in this procedure.

First, court awards suffer from the fact that there is no political evaluation and approval of the process. Project evaluation does receive such a test. Second, there is little consistency across time or jurisdictions in determining financial awards for damages. (Zeckhauser, 1975; Goldstein, 1979) The procedures for determining awards in cases of mental suffering are not well developed or precedented at this time. But there does seem to be an increasing willingness among juries to compensate for mental stress. (Goldstein, 1979) However, until more precedents have been established, no reliable estimates for psychological damages can be derived based on the average of court awards.

This brings up the point that most court awards are granted as a lump-sum figure. They incorporate compensation for physical injury and property losses along with mental suffering. In such cases there is no legal basis for separating the total award into its components to establish a precise figure for mental suffering. This was true of the Buffalo Creek flood. In this case, the plaintiffs, as a group, were awarded a lump-sum of \$35.5 million to cover property as well as psychological damages.

There is a device which provides some aid to solving this problem. It is a multiplier for establishing total awards based on the extent of physical injury. In West Virginia, personal injury cases are settled for approximately three times the amount of injury treatment costs, i.e., hospital and medical costs. This is to compensate for mental suffering associated with the injury. (B. Butler, 1979) Cochrane (1975) states that

court awards are approximately two or three times the average health care costs when all factors are considered. Thus, there may be some credibility to breaking down awards this way if more consistency across jurisdictions could be established.

A final flaw in analyzing court awards was pointed out by Bradway Butler, one of the attorneys involved in the Buffalo Creek disaster case. Although jury decisions and award amounts are public record, settlements made out of court are not. Thus, court records may be misleading of average compensation figures for victims of wrongful acts.

Studies which have attempted to review and aggregate court awards to establish trends mostly in physical injury compensation (Kelley, etal, 1961; Belli 1954). In addition, for most of the injury types reviewed, no clear trends in awards could be established. Once again, this emphasized the variability of jury decisions over time and jurisdictions.

Other institutions which grant compensation for injuries are Workers' Compensation and the Veteran's Administration. Both reimburse individuals for earnings lost due to work-related injury or disease. Both are reviewed by the political process. In addition, both systems base compensation on the extent of the disability as it affects earning capacity.

The main difference in procedures for establishing compensation is the role income plays in calculating benefits. Workers' Compensation is based on the level of income a worker would have earned had the injury not occurred. That is, he receives an award proportional to his present income. Therefore, he derives a proportional level of personal utility during the injury period (assuming constant marginal utility of money). This concept of income maintenance to replace some portion of the earnings lost through

disability is based on three points. It establishes a benefit level that:

a) maintains an adequate standard of living related to the one that would have been experienced in the absence of injury or illness; b) accounts for reduced living costs while not incurring daily expenses of working; and c) provides incentive for the worker to engage in rehabilitation and seek reemployment when possible. (White Paper on Workers' Compensation, May 13, 1974).

The rate of compensation benefits established in New York State is based on two-thirds of the income loss during the injury period. The injury period for scheduled injuries is predetermined and used throughout the state for calculating minimum and maximum allowable awards for specific injuries.

In contrast to this, Veterans' Benefits for disability are fixed amounts for various levels of impairment, regardless of the injured worker's potential income. That is, veterans across the country receive the same awards for similar injuries regardless of their earning capacities.

As with the expected future earnings approach, is it ethical to compensate a high wage earner more than a low wage earner for the same injuries? Is one person's life or health more valuable than another's?

From a purely economic standpoint we may be able to generalize and say that those who earn higher wages are contributing more to overall economic development. They assume high risk jobs or contribute knowledge and expertise to further national development. However, from a (moral) viewpoint, how far could national development progress if the "blue collar workers" didn't carry out the ideas of "white collar workers". They play equally important roles in society. Thus, perhaps they should be treated equally in determining their worth as members of society. In this respect, the VA procedures for rating disabilities are less biased. They are based on

average impairments of earning capacity resulting from such injuries in civil occupations. (Veteran's Administration, 1979) This average figure is somewhat arbitrary - "expressing not physical effects but reflecting the cultural forces or pressures of the nation at large." (Kessler, 1970) But it does provide a system of rating all individuals based on impairment relative to each other, rather than relative to incomes.

Based on these conclusions and the nature of injuries to be evaluated in this paper, procedures established by the Veterans' Administration will be used. They provide the most appropriate approach to estimating a value of compensation for physiological and psychological impairment. Imputing the willingness-to-pay concept, it can then be hypothesized that we would pay up to the compensation amount to reduce or prevent the chances of such an injury or disability.

#### Incorporation of Human Benefits into the Benefit-Cost Framework

The benefits of reduced flood risk and thus reduced physiological and psychological impairments, should be considered legitimate social benefits. Thus, they should be included in the traditional calculation of the B-C ratio of flood control projects. Incorporating these additional social or human benefits would increase the benefits and boost the benefit-cost ratio.

In economic terms the human benefits of a proposed flood control measure are expressed as the flood trauma or human costs avoided in the with-project case. Graphically, the addition of human costs of flooding will have the effect of increasing the area under the flood damage curve, thus shifting the curve upward.

To extend the benefit-cost framework to include human benefits of reduced flood risk, individual damage curves for each household would be modified to include both factors of economic value and flood trauma potential. The flood trauma potential may be expected to vary with the number of people in the household, soundness of the housing structure, presence of a flood warning system, age and sex of household members, household income, previous flood experiences and impact on the neighborhood and community. These modified curves will relate flood severity to total damage potential for each structure.

Aggregating these individual flood damage curves will yield a total flood damage curve representative of the entire floodplain. The additional benefits will enter into the benefit-cost analysis procedures as do any benefits based on damages prevented for the with-project case.

#### Generalization of the Model

The purpose of estimating human costs of flooding is to establish a figure representing the benefits of reduced flood risk. Thus, if it can be established that there are indeed human costs associated with flooding, and that these costs can be documented, results can be extrapolated and applied to similar situations. To do this, we must establish correlations between flood events which will allow us to estimate the social or human impacts of potential floods in other areas. A set of indicators must be developed for judging the severity of impact a flood has on a given community.

A number of flood characteristics and community characteristics have been identified which will potentially affect the trauma levels likely to be experienced in the event of a flood. The flood characteristics indenti-

fied were: depth of flood waters in each housing structure, the amount of warning time, and the physical condition of a structure.

Cochrane (1975) points out the importance of these characteristics in his analysis of disaster events. He has determined that the ratio of deaths to the total number of dwellings destroyed is influenced by the degree of natural warning. That is, how quickly disaster strikes and, thus, how much time people have to prepare for it in terms of getting to a safe location. According to Cochrane, the rate of injury is also related to the number of structures totally destroyed. From this, we may hypothesize that factors which have been bearing on the number of structures likely to be destroyed will also be related to the number of injuries and level of trauma. These include depth of flood waters and condition of the structure.

Demographic and community characteristics identified as indicators of potential trauma were age, sex, income and previous flood experience.

Cochrane (1975) concluded from his studies that

lower income groups consistently bear a disproportionate share of the (disaster) losses; receive a smaller proportion of disaster relief, are least likely to be insured (health, life or property); and live in dwellings of poorest construction and therefore are most subject to damage.

This is an indication that low income households will be forced to bear a larger burden in the aftermath of a disaster and are therefore likely to suffer greater trauma. The Red Cross identifies age as an indication of potential disaster trauma. Their studies have concluded that of all disaster victims, those over 65 suffered a proportionately greater level of

fatalities. (Cochrane, 1975) Studies currently being conducted on the psychological effects of the Buffalo Creek Flood suggest that sex has some bearing on the impacts experienced (Bonnie Green, 1979). It is shown that women are more distressed by the flood and its consequences than men. Previous flood experiences and an understanding of risk may also influence trauma associated with a disaster. Schelling (1968) points out that

"anxiety may depend on the absolute level of risk and the frequency and vividness of the stimuli ... (it) may depend on whether the risk is routine and continuous or concentrated in episodes.

This seems to mean that those who experience regular flooding may have been able to adapt their lifestyles and homes to such events. Thus, they will experience less disruption from another flood than someone who has never experienced such an event.

On the basis of this previous research, although the data are not substantial, it should be possible to identify a list of factors that are likely to contribute to the development of flood trauma, and to arrange them in the form of a "trauma scale." Data on household response to these trauma factors can then be used to estimate the severity of impact on each household and locate it on the trauma scale.

The same indicators can be used to describe other flood-prone areas and to derive estimates of the social impacts of floods of varying magnitudes. These estimates can be translated into monetary values through the quantification procedure. This will produce a figure representative of benefits to floodplain inhabitants of the trauma avoided by reduced flood risk.

A chart depicting the model which has been described in this chapter is shown on the next page.



Model for Development of Estimates of Social Benefits  
Tug Fork Project

Household Survey Data

1. general health status
2. physical injury
3. psychological impairment
4. hassle factor

(Case Study Approach)

Trauma Scale

- based on severity of individual sample cases and can be translated into percent of impairment

Flood Characteristics

1. depth of water
2. warning time
3. condition of housing structure (by individual household)

Demographic & Community Characteristics

1. age
2. sex
3. income
4. previous flood experience

(Generalized Approach)

Trauma Indicators

- regression coefficient to indicate the validity of using flood and community characteristics as indicators of the expected level of trauma

Compensation Schedule

- assignment of monetary compensation values based on percent of impairment (physical and psychological)

Estimates of Social Impacts

- estimates of human impairments caused by physical and psychological impacts of flooding

Qualification of Social Benefits

- assignment of monetary values to various levels of trauma suffered

Extended Benefit-Cost Analysis

- B/C to include benefits to floodplain occupants of reduced flood risk

## II. THE MEASUREMENT OF FLOOD TRAUMA

A substantial body of literature reports on the efforts of psychologists, psychiatrists, and sociologists to study the impacts of various types of disasters. Much of the effort has focused on evidence of long-term impacts. Years later, are people who suffered a traumatic experience in a disaster different from others? Are communities where these events occurred different because of the disaster? Much of the result of this research is a testimony to the adaptability of humans, both individuals and groups. Individuals and communities adjust so that such disasters leave little to distinguish victims from non-victims in the long run. And this is just as true of property values. The point of project evaluation is to determine short run effects, in many short runs. Whether a project is to change the flow of water and thus the degree of flooding, or the people and property at risk in the flood plain and thus the degree of impact from the same amount of flow, what will be the result? How much more, in physical and psychological resources, will it take to adjust to a flood without the project as with it? And what is the opportunity value of those resources that should be set against the costs of the project to see if it is worth doing?

Little research on disasters is directly useful in project evaluation, in part because it does not consider differences that are the substance of choices involved in project design. For example, in a very few cases is what happened to individuals or communities indexed in relation to the severity of the event. Property damage has been clearly tied to the level and/or velocity of flooding. Structural solutions to flood problems can manipulate those levels and thus change the property damage that results.

While measures of trauma have been successfully developed for flood victims, these need to be linked to physical measures of flood severity actually experienced.

#### The Relationship of Social Factors and Life Events to Illness

It is a hypothesis of this and other studies that individuals will respond to disaster trauma differently because of differences in social support and previous experience. In other words, characteristics of the community, neighborhood and social set affect the individual's ability to adjust. Likewise, income, education and past experience with this event affect the degree and speed of adjustment. Sorting these factors may be important to extending the results obtained from the 1977 flood to other floods in Tug Fork and to other valleys and their pattern of flooding. In other words, simply relating trauma measures to severity of the flood will not be sufficient.

Note that this study is limited to one flood. Differences between trauma experienced by individuals should be accurately tied to differences in severity of the event each family faced and differences in community and individual characteristics. Then results can be adjusted to fit different floods and different valleys. If such linkages are not evident but are felt to be important, studies of other events and/or other communities will be necessary to establish these relationships. In property damage, this kind of research and data gathering is far from being as complete as many would wish. But it has been actively pursued since the Flood Control Act of 1936 said projects should be undertaken only when benefits exceeded costs to whomsoever they may accrue.

Various kinds of evaluation scales have been used for disaster events and a number of other purposes to measure stress. These scales are developed based on data obtained from personal interviews. In some cases research has been done by clinical psychologists and psychiatrists. The cost per observation is very high, but validity is also high. In other cases, knowledgeable interviewers with lesser credentials have applied questionnaires developed for the purpose. The cost per observation is much less, and the number of observations can be larger for the same cost but at some sacrifice in validity.

Table 24 provides an example of such a rating scale. More social readjustment is required for death of a spouse than another family member. Each is more stressful than a personal injury or change in health of a family member, etc. Many of the life events listed are commonly the result of a flood. The mean value listed is an attempt to provide a scale that indicates the relationship of one event to another. For example, getting a mortgage over \$10,000 (pre-1967 dollars) was twice as stressful as a fairly severe change in sleeping habits. Relative stressfulness was determined by asking individuals to make allocations similar to the way an economist imagines an individual allocating income among opportunities to spend it. If this parallel were accepted and, if these relative values are correct for the use intended, finding a dollar value for any one of these events would provide a comparable dollar value for each of the others. This cannot be determined with great confidence in this case but is indicative of material produced by this line of research.

Table 25: SOCIAL READJUSTMENT RATING SCALE

Rank	Life Event	Mean value
1	Death of spouse	100
2	Divorce	73
3	Marital separation	65
4	Jail term	63
5	Death of close family member	63
6	Personal injury or illness	53
7	Marriage	50
8	Fired at work	47
9	Marital reconciliation	45
10	Retirement	45
11	Change in health of family member	44
12	Pregnancy	40
13	Sex difficulties	39
14	Gain of new family member	39
15	Business readjustment	39
16	Change in financial state	38
17	Death of close friend	37
18	Change to different line of work	36
19	Change in number of arguments with spouse	35
20	Mortgage over \$10,000	31
21	Foreclosure of mortgage or loan	30
22	Change in responsibilities at work	29
23	Son or daughter leaving home	29
24	Trouble with in-laws	29
25	Outstanding personal achievement	28
26	Wife begin or stop work	26
27	Begin or end school	26
28	Change in living conditions	25
29	Revision of personal habits	24
30	Trouble with boss	23
31	Change in work hours or conditions	20
32	Change in residence	20
33	Change in schools	20
34	Change in recreation	19
35	Change in church activities	19
36	Change in social activities	18
37	Mortgage or loan less than \$10,000	17
38	Change in sleeping habits	16
39	Change in number of family get-togethers	15
40	Change in eating habits	15
41	Vacation	13
42	Christmas	12
43	Minor violations of the law	11

Source: Thomas H. Holmes and Richard H. Rahe.

Other research in scaling trauma includes current work on the data base developed for the Buffalo Creek disaster. A mining company believed to be negligent was sued by the surviving residents of Buffalo Creek. Both the litigants and the company commissioned psychiatric evaluations of victims to determine the level of trauma that resulted. Researchers are currently quantifying the completed questionnaires used; several theses and one book are in progress.

In this case, the experience of each individual is being rated and scaled. Included are such factors as the degree of life threat involved, bereavement, extent and duration of trauma and displacement behavior. Indicators of anxiety, depression and aggression are being used.

A number of aspects of the Buffalo Creek study are of interest. For example, those residents who helped in the clean-up process suffered less illness (both physical and psychological) than those who did not. Earlier retirements were associated with severity of the experience. Location in the valley was determined by division into thirds, and there was a correlation between severity and location using this rough measure. The top third of the valley experienced a twenty to thirty foot wall of water. Each successive third experienced a lesser event as water and valley spread out. Degree of pathology was not tested against location, although the data would lend itself to such a comparison. Bereavement and displacement scales were related to location, and differences in the directions expected were found. (Green, 1979) A fruitful follow-up to the Tug Fork Study would be the summarization of the Buffalo Creek data into comparable elements and a comparison of the two.

### Analysis of Household Survey Variables

The first step in the analysis of trauma in Tug Fork was to identify experiences of flood victims and determine effects the event had on their lives. A household survey questionnaire<sup>1</sup> was chosen for this purpose. It was administered through personal interviews at the homes of floodplain residents. A total of 278 responses were obtained.

In developing the questionnaire, four general categories were used to identify factors potentially contributing to flood trauma. These categories include: general health, physical injuries resulting from the flood, psychological effects, and a hassle factor. The term "hassle factor" was coined to sum up the inconveniences and disturbances a household underwent during and immediately following the flood. Questions covering the "hassle factor" centered around such things as forced evacuation, lack of basic living necessities, clean-up, and financial burdens imposed.

These categories were intended to draw out information not only about immediate trauma of the flood experience, but also the continuing effects. These include fears the experience has instilled in residents, changes in lifestyle that may be associated with the flood, and changes in relationships with family and friends.

Within each category several factors contributing to potential trauma were identified, based on previous research and literature on stress. These contributing factors are discussed briefly to outline the basis for evaluation of the degree of trauma for each household.

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<sup>1</sup> See Appendix A -- Household Survey Questionnaire

### General Health

It was hypothesized that there may be detriments to the general health of individual flood victims. No major diseases or ailments resulting from the flood were reported. However, it was felt that the additional strain of dealing with property losses, major clean-up, sickness and minor injuries may have led to exhaustion or general degradation of health. This may be especially true of the elderly who seem to have less energy to deal with major events. Whether or not individuals were medically less healthy was not the point of questioning in this category. We were seeking respondents' perceptions of changes in health they feel were caused by the flood and which would contribute to its impact on them. These would indicate experiences which others might find reasonably compensatable. Thus, they could be included in project justification.

### Physical Injury

The 1977 flood in the Tug Fork Valley was not considered a flash flood, and the velocity of the water was relatively slow, so there were no deaths or major injuries as a direct result. However, the flood was in early April, so low temperatures caused many without homes or utilities to contract respiratory and other exposure related disease. Most injuries such as sprains, backaches and broken bones are suspected to be related to the clean-up period. Other problems such as high blood pressure, heart attacks, stomach ailments, nervous tension, and depression could have had a variety of causes. But again the important aspect is the respondents' perception that their lives were further complicated by a physical ailment resulting from the flood. The intensity of the effect these illnesses had



on each household was measured by the duration of the injury period and number of household members suffering illnesses.

#### Mental Stress

Several factors were identified which would affect flood victims' ability to cope with the stress of the flood situation.

1) It was hypothesized that those who received and heeded a warning would have had more opportunity to prepare themselves mentally, as well as preparing their homes and families. The majority of respondents reported no warning and therefore had very little time to secure possessions or prepare for the time they would be homeless.

2) Prior flood experience or experience in other natural disasters may have reduced the stress of the situation. Knowing how to secure possessions or being aware of the destruction and clean-up to follow may reduce the shock of the total disaster picture.

3) Deaths attributable to the flood have a strong bearing on its psychological impact. No deaths resulted directly from the 1977 Tug Fork River flood. But there may have been deaths from heart attacks, etc., especially among the elderly, which some believed to be flood-related.

4) Changes in relationships with family and friends were also reported as a result of the flood. As Kai T. Erikson (1976) observed of Buffalo Creek, many of these changes may be attributed to undesirable relocation housing. Neighborhoods were split up when families were evacuated from their homes. Living conditions in many relocation sites, such as trailer parks set up by HUD, were considered far from ideal. In addition, discontent and distrust within relocation neighborhoods were common feelings.

There could be considerable impact on family relationships due to fears and stresses related to the post-flood disruptions in lifestyle.

5) Those suffering severe property damages might logically experience greater emotional impact than those with minor damages. Not only the financial loss contributes to the impact; in the Tug Fork Valley many people have very strong inheritance or family ties to their homes and land, so those who completely lost their homes or incurred substantial financial burdens to repair or replace them are expected to have suffered greater trauma or hardship.

6) Another contributory factor is the loss of sentimental possessions. Those most often cited were pictures, Bibles and other books, special collections, and possessions of deceased family members. Strong religious and family ties express the meaningful nature of such possessions. The loss of those memoirs may contribute substantially to the emotional impact of the flood.

7) General state of mind or emotional stability was approached in a very open way in the questionnaire. As a result, there was a wide variety of responses and also a fair number of respondents who did not understand the question. Despite this, there were many who spoke of fear and sleeplessness when it rained or a general worrisome state at the prospect of another flood.

This set of contributing factors, the mental stress factors, probably has the greatest influence on the level of trauma individuals suffered because of the flood. They either directly express emotional or psychological effects or indirectly indicate the degree of individual success in coping with the flood experience.

### Hassle Factor

The hassle factor was briefly described earlier in this section. To expound upon this, the contributing factors considered for this category were: forced evacuation and length of time out of homes; whether relocation was permanent; lack of basic living necessities during and after the flood; extent of clean-up and problems associated with it; work missed; and compensation, if any, for lost time. All these factors have the effect of increasing or reinforcing the trauma of the flood experience.

### Extended Effects

Other factors contributing to flood trauma are revealed by answers to questions indicating that impacts of the flood are still present. These factors are indicated by: preferences for moving out of the flood plain, whether relocated households find their new locations to be better or worse, feelings as to whether their household has returned to normal since "the" flood, and feelings toward the government or other agencies who were involved in post-flood activities. Opportunity was also provided for respondents to voice their feelings on the possible beneficial effects the flood had on their lives.

### Household Survey Results

An examination of the frequency of these factors among Tug Fork households, as determined by the survey, gives a general indication of the severity of the damages resulting from the '77 flood. First, looking at physical or property damages, responses indicate that 89 households or 32 percent of the sample population reported that their homes were completely

ruined by the flood. Another 83 households or 30 percent considered their damages severe. Nineteen percent had moderate damages, and approximately 16 percent reported little or no damages to their homes. Presumably, as a consequence of incurring such damages, 154 households or 55 percent of the sample reportedly took measures to acquire flood insurance. Only 12 percent reported to have been insured prior to the the flood.

Other property damages included loss of possessions with sentimental value. Such losses were reported for 73 percent of the households surveyed. Additional financial losses were incurred for those whose businesses were damaged or destroyed by the flood or who were out of work due to access problems, injuries, or whose place of work was temporarily out of business. Lost work time for any of these reasons was recorded for 156 respondents or 56 percent of the sample households.

During the period during and immediately following the flood, many people were displaced from their homes. Specifically, of the households surveyed, 233 or 84 percent were forced to leave their homes. In addition, 74 percent of the people were out of their homes for more than one night. Due to lack of adequate shelter, many (18 percent) of those displaced stayed either on the hillside or in their cars during at least part of the time they were away from home. Most, however, found shelter with relatives, friends, or neighbors. Approximately 30 percent of the respondents surveyed were never able to return to their homes due to severe property damages. Another 15 percent of the respondents were unable to return home for more than a month.

For those who did return home, cleaning, rewiring and replumbing, and purchasing new furnishings were activities most commonly cited as needing

to be done to make the house livable again. For those who reported having problems during cleanup, most were over financial concerns.

Damages in terms of bodily illness or injury were also examined. Forty-nine households or about 18 percent responded that there had been injuries or illnesses among household members as a result of the flood. Of the injuries and illnesses reported, a large portion of them were colds. This probably was due to the cold weather prevailing during the time when people were displaced from their homes and during cleanup. Other injuries reported less frequently were sprains, backaches, high blood pressure, nervous tension, and depression. In an overall view of changes in physical well-being as a result of the flood, over a third, 36 percent, felt their health had worsened due to the flood. In contrast, less than one percent felt their health had improved since the flood, and approximately 60 percent reported no change in their physical well-being as a result of the flood.

Although most respondents were reluctant to comment on their own mental well-being after the flood, they often would comment on the mental well-being of other household members. In both cases, however, fear of subsequent floods and tension and fear during rain storms were most frequently cited as detriments to a healthy mental state. Relationships with friends and neighbors suffered in some cases and improved in others. Approximately 10 percent of the respondents felt that relationships had worsened because of the flood. Often this was the case for displaced families who were living in a new neighborhood or in HUD trailer parks, where they were among strangers and trying to adjust to an unfamiliar setting. Very few households reported worsening relationships among family

members because of the flood experience. Within both family and neighborhood relationships, there was a slightly higher percentage of respondents who felt that the flood had helped to improve relationships because people were brought together in a common cause. In aiding each other through the crisis in various ways, this may have helped create stronger, more appreciative relationships within neighborhoods.

Although officially there were no deaths attributed directly to the flood event, there were some people in the valley who did link the flood to subsequent deaths. Thirteen percent of the households interviewed associated one or more deaths with the flood. Based on information volunteered by respondents, these deaths were primarily among the elderly. Regardless of the actual cause of death, the mental association of deaths with the flood will make it appear to be a more powerful force, one to be feared, and thus contributing to the traumatic nature of the experience.

As an indication of the duration of flood effects, respondents were asked if their lives had returned to normal since the experience. Approximately two years after the event, responses indicated that about a third of those surveyed felt their lives had not gotten back to normal. About half of this group attributed the lack of normality to house-related factors. That is, many who lost their homes are unhappy with their current housing and/or a new neighborhood. And many, due to financial constraints, have not been able to repair their homes which were damaged during the flood.

### Constructing the Flood Trauma Scale

The first step in quantifying flood effects involves grouping responses to various questions to get an overall picture of the flood impact on each household interviewed. In doing this, the trauma scale, as described previously, was derived. To obtain this scale, several factors identified as potentially contributing to the overall trauma experienced by flood victims were examined for each household surveyed. Each contributing factor was given a rating of 0 or 1 to indicate an experience which was not likely to contribute to the overall trauma of the flood experience or an experience which would add to the severity of the situation, respectively. (See a listing of contributing factors in the Appendix.) Twenty-two factors were examined for each household. A twenty-third factor was also looked at which gave respondents the opportunity to speak of the positive effects, if any, that the flood may have had on their lives. This factor was rated -1 and had the effect of reducing the respondent's trauma level if the response indicated that the household did benefit in some way from the flood. For example, some comments were that the flood helped bring neighbors closer together because of the concern displayed over one another's safety and the generosity toward those who had been left homeless.

Tabulation of these factors involved grouping responses to sets of questions to establish a rating on severity of flood impact. The ratings are designed to designate those factors which did contribute to the trauma of the event for each household. Thus, a yes (rating = 1) indicates the respondent experienced the trauma-contributing event. A no (rating = 0) indicates the respondent experienced minimal or no negative effects from

the contributing factor being considered. These ratings were then aggregated for each household by summing them. This gave each household an overall rating, placing at a specific point on the continuum of the scale. The scale ranged from a low of -1 to a high of 20. (See Figure 4)



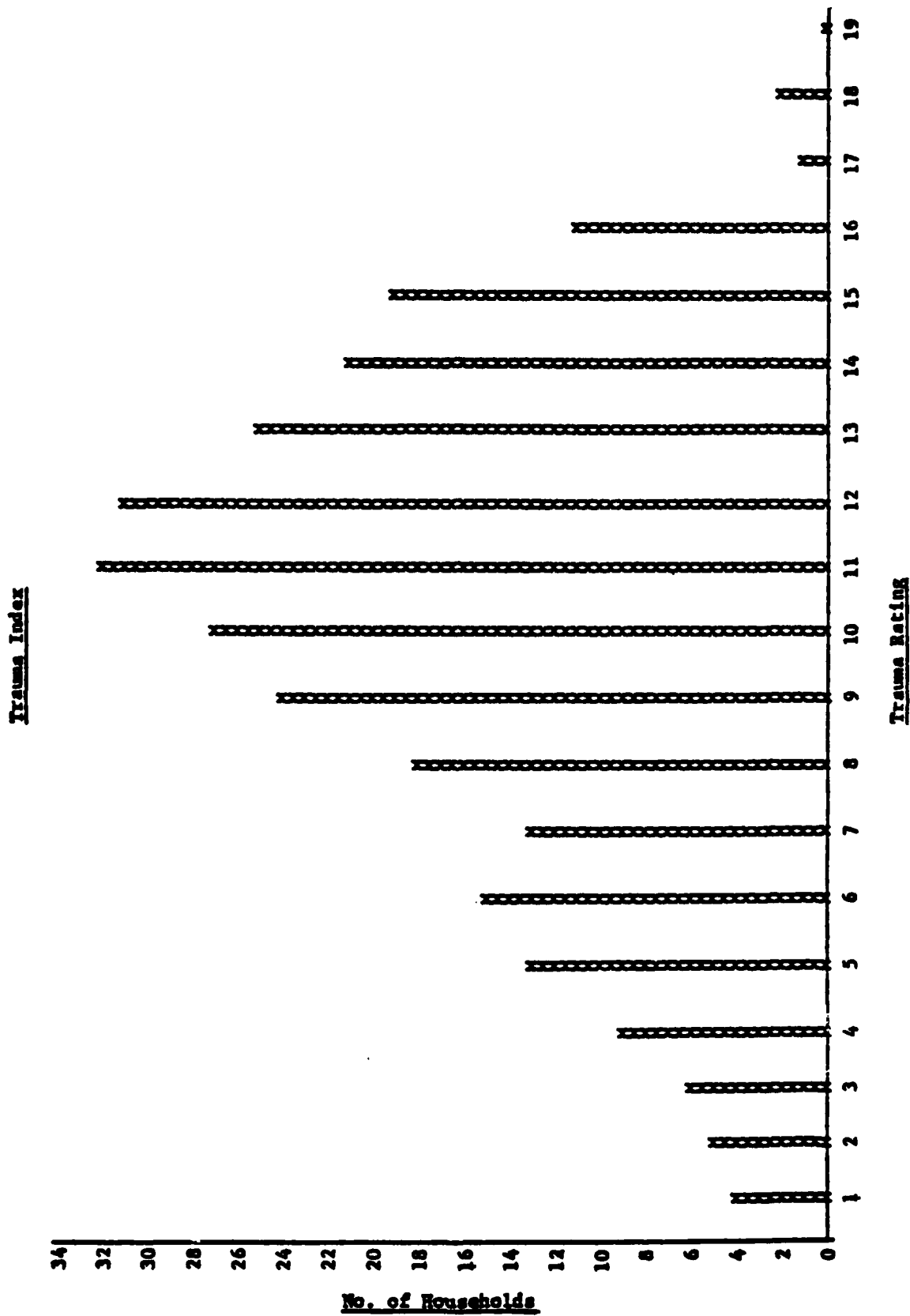


Figure 4: Trauma Index

The highest trauma rating possible under this rating procedure was a 22. However, the highest rating on the households surveyed was a 20. The median level of trauma was 10.6 and the distribution is skewed slightly toward the left. A third of the households, 33 percent, were positioned between the 10th and 12th steps of the scale which is the middle range of the total possible trauma points.

The scale by number of households and with number of persons per household is presented in Table 25. Note that households with higher ratings tended to have more persons in the household, as would be expected.

Due to the ordinal nature of the scale which has been constructed here, many statistical tests have little validity. That is, an ordinal scale defines the relative position of individuals with respect to, in this case, flood trauma, but distances between points on the scale have little meaning. It is merely a ranking procedure.

#### Establishing Levels of Human Impairment

To provide for evaluation of human benefits the trauma scale must be further defined. It should correspond to what American Medical Association (AMA) terms "percent impairment of the whole man". A rating or percent of impairment is determined by an evaluating physician. It is an "appraisal of the nature and extent of the patient's illness or injury as it affects his personal efficiency in one or more of the activities of daily living".

(AMA, 1977)

Table 26: Trauma Rating vs. Size of Household

Trauma Index	<u>No. of Persons per Household</u>											Total No. Households	
	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>7</u>	<u>8</u>	<u>9</u>	<u>10</u>	<u>NR</u>		
-1	1	-	-	-	-	-	-	-	-	-	-	-	1
0	-	-	-	-	-	-	-	-	-	-	-	-	0
1	1	1	2	-	-	-	-	-	-	-	-	-	4
2	-	3	-	1	-	-	-	1	-	-	-	-	5
3	1	2	1	-	-	1	-	-	-	-	-	1	6
4	2	2	2	1	-	-	-	1	-	-	-	1	9
5	4	7	1	1	-	-	-	-	-	-	-	-	13
6	4	3	6	1	-	-	-	-	-	-	-	1	15
7	3	8	1	-	-	1	-	-	-	-	-	-	13
8	8	4	2	2	-	-	-	-	-	-	-	2	18
9	6	3	7	4	2	2	-	-	-	-	-	-	24
10	3	7	9	5	2	-	-	1	-	-	-	-	27
11	4	8	3	10	3	2	2	-	-	-	-	-	32
12	7	5	6	3	3	2	2	-	2	-	1	-	31
13	2	9	2	4	4	-	1	2	-	1	-	-	25
14	1	8	5	1	3	1	-	1	-	-	1	-	21
15	2	3	5	4	2	1	1	1	-	-	-	-	19
16	1	3	2	1	2	1	-	-	1	-	-	-	11
17	-	-	-	-	-	1	-	-	-	-	-	-	1
18	-	-	1	-	-	1	-	-	-	-	-	-	2
19	-	-	-	-	-	-	-	-	-	-	-	-	0
20	-	1	-	-	-	-	-	-	-	-	-	-	1

NR - No response; information not available.

The majority of contributing factors identified as potentially influencing the degree of trauma were psychological rather than physiological. Therefore, the AMA criteria for evaluating permanent impairment due to psychoneuroses was chosen to define the trauma scale ratings. Trauma scale levels derived from the household survey were then correlated with ranges of percent impairment described by the AMA.

The AMA classifies loss of function due to psychoneuroses are described in specific medical terms. These reflect six "psychoneurotic reactions" -- anxiety, depressive, phobic, psychophysiologic, obsessive-compulsive, and conversion. Ratings determined by the AMA include not only the illness itself, but social and economic consequences as well. The intent is to evaluate the impairment in terms of loss of physiological, psychological, personal, or social adjustment due to flood trauma.

The three classes of impairment are summarized below, listing those AMA descriptive statements which apply most directly to responses received on the household survey.

Class I -- Impairment of whole man = 0 to 5 percent:

- Mild anxiety episodes, are predominantly in response to stress situations, requiring little or no treatment, and seldom associated with clear-cut subjective suffering.
- Usual activities of daily living can be accomplished but are associated on occasion with lack of ambition, energy and enthusiasm for the current situation.
- Self-limiting reactions to passing stress, eg., gastrointestinal upsets.

Class 2 -- Impairment of whole man = 10 to 45 percent:

- Moderately severe anxiety and apprehension.
- Depressive reactions leading to disturbances of sleep cycle and eating habits, loss of interest in customary personal and social activities.
- Fear-motivate behavior which interferes in a mild to moderate way with the activities of daily living.
- Episodes of loss of physiological function.

Class 3 -- Impairment of the whole man = 50 to 95 percent:

- Severe states of foreboding, tension and apprehension.
- Depressive reactions display a marked loss of interest in the usual activities of daily living, such as eating or self-care.
- Severe phobic patterns of adjustment occur that behavior becomes bizarre and disruptive.
- Loss of physiological function occurs frequently.

#### Relating the Flood Trauma Scale to Human Impairment

Examining each step of the scale individually, in terms of trauma factors present at each step, gives some indications that there may be an ordering of the factors which come into play as the scale progresses from -1 to 20. That is, those factors which are common to those households at the lower end of the scale are characterized by: not having received any warning; having to leave their homes during the flood; having to perform some repairs on their homes; and believing that they had met a great challenge through the flood experience. (There were things such as clothing and heat that they had to do without during the flood.) This lower range extends from -1 to 3 on the trauma scale.

At a rating of 4 through 8, other factors come into play, such as: a general worsening in health; a rating of the damages to their homes; loss of possessions of sentimental value; indications that the flood had some negative effects on the overall mental well-being of family members and upon the respondents' mental state; indications that these households had been displaced from their homes for periods longer than one day; and had household members who had missed work due to the flood.

The range 9 to 12 on the trauma scale brought in the highest concentrations of factors, with the addition of such factors as: illnesses caused by the flood; deaths attributed to the flood; changes in relationships with friends and neighbors; additional evidence that the mental well-being of the household head as well as family members has been in some way affected; financial, physical and psychological problems which arose during cleanup; households permanently displaced due to severe damages, and a feeling within households that their lives had not yet returned to normal since the flood.

The next step on the scale brings in the remaining factors and shows a concentration of these between the scale points of 13 to 16. As well as the above mentioned factors, households in this range show: illnesses and injuries of the household head which fell into the categories of heart problems, high blood pressure and psychological distresses; and changes in family relationships that were attributed to the flood.

The last grouping on the scale, covering points 17 to 20, shows a scattering of households across almost all factors. Summarizing this breakdown, it shows a five step scale as follows:

-1 to 3 ...temporary displacement, home repairs, lack of basic living necessities, feeling they had met a great challenge.

4 to 8 ... above factors plus general worsening of health, reported structure damages, loss of sentimental possessions, negative impacts on mental well-being of family, missed work.

9 to 12 ... above factors plus flood related illness, changes in relationship with neighbors, additional negative effects on mental well-being of the family, problems during cleanup, permanent displacement, lack of feeling of normalcy within the households.

13 to 16 ... above factors plus serious flood-related illnesses and injuries, changes in relationships with the family.

17 to 20 ... almost all factors reported.

Preliminary attempts to scale the contributing factors through the Guttman scaling technique did not support our tentative hypothesis that the scale was cumulative. That is, that as the level of trauma increases, it follows the same pattern for each respondent. (e.g. Two households with a trauma rating of 10 will have experienced the same flood effects in order to have been placed at the same point on the trauma scale.) The coefficient of reproducibility was .81, with 6 percent improvement. (A coefficient of reproducibility greater than .9 would indicate a valid scale.) Further manipulation of the variables, i.e. withdrawing some variables from the scale and/or regrouping the variables, may improve the results of the Guttman scale.

If further attempts were to prove successful, the resulting set of contributing factors could be used as predictors for a single household's response pattern. That is, if reliable data for scalable contributing factors were obtained, the resulting index would be an accurate picture of the trauma level experienced by each household in relation to every other household on the index.

The five-part breakdown of the trauma scale was done by analyzing the responses identified as contributing to the overall flood trauma. Further aggregation of the trauma factors reduces the scale to a three-level breakdown. Looking at the AMA classes of impairment, descriptions for rating impairment are given for three levels. So, to accurately group respondents into an impairment rating, the scale steps will be reduced to a three-part scale matching respondents' descriptions with impairment rating categories.

First an even breakdown of the index into thirds by percentile is examined. This results in:

- Level I = 1 to 9 points (39 percent of households)
- Level II = 10 to 12 points (32 percent of households)
- Level III = 13 to 20 points<sup>2/</sup> (29 percent of households)

Another approach would be to include those households within plus or minus one standard deviation about the mean. This results in:

- Level I = 1 to 6 points (19 percent of households)
- Level II = 7 to 13 points (61 percent of households)
- Level III = 14 to 20 points (20 percent of households)

---

2/ A point between two steps on the scale has little meaning so allowances are made in the percentile breakdowns so that cutting points fall on the whole number.



With this procedure approximately two-thirds of the sample falls within the middle category.

Referring again to the step-by-step picture of households at each point on the trauma scale, we see that factors which appeared in the upper position of the scale are most heavily clustered within the 13 to 16 point range. For example, of the household heads reporting serious illnesses caused by the flood, almost 70 percent fall within the 13 to 16 point range on the trauma scale. Likewise, for those reporting changes in relationships among family members, 74 percent fell within this same range. Additionally, nearly 60 percent of the households reported illness among family members. Almost 50 percent of those households felt their lives had not gotten back to normal since the flood. Forty-seven percent of households who reported that their family's mental well-being had suffered and 41 percent who felt their state of mind had been adversely affected also are within the 13 to 16 point range. Compared with the percentage of the total sample within the range, 27 percent, this suggests that given the apparent ordering of the trauma contributing factors, the households in the range from 13 to 16 points and higher reflect those which experienced the greatest impact from the flood. Thus, this group of households should be placed in the Level III category which the AMA has defined for rating impairment.

Looking at the lower end of the trauma scale and at the AMA ratings for impairment suggests that those households which fall from -1 to 8 on the trauma scale may be placed in the Level I rating for impairment. This group would be indicative of those households which were least affected by the flood. That is, this group experienced what we have termed hassle

factors as well as some factors which may have contributed to the mental stress of the flood experience. However, most of those factors identified as mental stress factors, physical injury and general health status, as well as extended adverse affects, are not present in this group of households. Thus, in comparison with groups of households at other levels on the scale, this group would be most fairly categorized as the least affected group.

This brings the final breakdown of the trauma scale to be:

Level I = -1 to 8 points (representing 30 percent of sample households)

Level II = 9 to 12 points (representing 41 percent of sample households)

Level III = 13 to 20 points (representing 29 percent of sample households)

#### Adjusting the Trauma Scale for Frequency and Magnitude of Flooding

Little information is available on the duration of the psychic impairment caused by flood experiences. But the history of flooding in this area of Appalachia suggests that the frequency and magnitude with which floods occur may be the key factors to examine. Flood zone locations were available for 156 of the households surveyed. The three households which fell at 17 or above on the trauma scale were located below the five year flood frequency line at the time of the flood. The one household positioned at -1 on the trauma scale was located in the SPF frequency zone at the time of the flood. Using the 156 households as a subsample for which flood frequency data is available, we positioned the remaining households on the

upper level of the trauma scale (representing one-sixth of the total households surveyed). Thirty-two percent of the households were within the five year flood line and another 32 percent were within the 20 year flood line. This suggests that those suffering the greatest trauma as it has been defined here were indeed those located in the high frequency flood zones and those who are also most likely to be victims of subsequent floods within their lifetimes. In addition, another 32 percent of those households on the highest level of the trauma scale were located between the 20 and 100 year flood lines. From this it may be inferred that the compensation allocated to those individuals on Level III of the trauma scale will vary little for floods of 100 year magnitude or less. This may be so for those on the middle level of the trauma scale as 81 percent of sub-sample households rated Level II on the trauma scale are also located below the 100 year frequency line.

Information on the depth of flood waters was obtained for a group of 122 households. A cross-tabulation of the trauma scale with depth of flood waters for each of the households in this subset is shown in Table 26. The five-part breakdown of the trauma scale described earlier in this section is used since it displays the most accurate descriptive breakdown of individual households.

Table 27: Trauma Rating vs. Depth of Flood Waters

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	Total Households
<u>Trauma Scale Rating</u>	33%		33%		33%		33%		33%		33%		33%		33%		33%	
-1 to 3	-	1	-	-	1	-	-	-	1	-	-	-	-	-	-	-	-	3
4 to 8	* 31%		4 5 2		28%		2 4 3		5%		3%		8%		36		(100%)	
9 to 12	25%		1 3 8		* 31%		7 2 6		23%		17%		2%		2%		48	
13 to 16	9%		1 2 -		19%		2 3 1		* 41%		19%		6%		6%		32	
17 to 20	-		-		-		-		-		100%		-		-		3	
<b>Total Number of households</b>	<b>6</b>	<b>11</b>	<b>10</b>	<b>12</b>	<b>11</b>	<b>9</b>	<b>8</b>	<b>14</b>	<b>12</b>	<b>8</b>	<b>4</b>	<b>2</b>	<b>1</b>	<b>11</b>	<b>5</b>	<b>5</b>	<b>1</b>	<b>122</b>

Regression analysis showed no significant correlation between position on the trauma scale and depth of flood waters in the housing structure. However, the data does display some tendencies toward increased trauma with increasing flood depths. This tendency can be seen by examining the percentage of households at each level on the trauma scale, moving down a single flood-depth group. For example, the percentage of households with less than 3 feet of flood waters surrounding their homes ranged from 33 percent on the low end of the trauma scale to 0 percent on the high end. Similarly, if we examine peak concentrations of households for each trauma level, the depth of waters for the highest percentage of households increases from low trauma rating to high. (Note \*'s) This simple analysis is useful in that it suggests that a relationship between flood trauma and depth does exist. However, the data does not statistically support the relationship.

Other variables were also examined as potential trauma indicators. These are factors readily identified for a flood plain population which could be used as predictors of the trauma level likely to be experienced by each household in the event of a flood. These variables included: years of schooling completed by household heads, sex and age of household head, income, type of family unit, (i.e. single individual; husband-wife, no children; husband-wife with children; extended family group; etc.), as well as flood frequency zone location and depth of flood waters.

Thus far, none of these variables have proven statistically valid indicators of potential flood trauma. Therefore, at this point trauma predictions for other flood events would be unprecedented. Reviewing the procedures used to develop the trauma scale and identify potential trauma

indicators suggests that additional research of this type on other flood events is needed.

Can we conclusively say whether "trauma indicators" can be related to such factors? To apply the methodology used in this research to other flood events, some modifications in the approach need to be examined. The evaluation instrument is an extremely important link in the procedure for developing the trauma scale. Knowing the sorts of responses that may be expected from various types of questions suggests that revision of the questionnaire would help to refine the results of the scaling procedures. Additionally, the accuracy of the data used as household trauma indicators, such as depth and income, is very important so that statistical analysis will be more conclusive.

Further research on other floods would not only be useful for clarifying and concluding the results presented here. It would also be useful in analyzing the degree of impact of a flood on its victims by comparing characteristics of the flood itself, as well as those of the flood plain and its population.

III. VALUATION OF FLOOD TRAUMA FOR THE  
1977 FLOOD IN THE TUG FORK VALLEY

Three approaches to estimating the social willingness to pay or be paid for flood trauma are presented. The first follows the approach discussed in the previous section, applying the three step version of the flood trauma scale which was felt to reflect the impairment levels of the American Medical Association. In turn, these are related to the compensation rates used by the Veteran's Administration.

Two alternative approaches have intrinsic merit and provide a measure of confirmation. The first utilizes the procedures followed in the allocation of the funds among the litigants in the Buffalo Creek suit. The method of estimating differences in trauma is of interest in this case. The second utilizes a widely cited scale that measures different degrees of social readjustment due to various life events. These are then valued by applying average Worker's Compensation rates.

Valuation of Flood Trauma Scale by VA Compensation Rates

The Veteran's Administration has no currently recorded precedence for granting compensation for what is referred to as war trauma. In addition, psychological disturbances are described in VA ratings only as they pertain to "industrial adaptability", i.e., earning capacity. (VA Proposed Revision of Schedule for Rating Disabilities, 1973) Ratings involving psychiatric disabilities are described in terms of time lost from work and the decrease in work efficiency. "Social inadaptability" -- poor relations with others -- is recognized as an indication of emotional illness. But it cannot be

used as the sole basis for any specific percentage evaluation. Thus, there will be no direct correlation between ratings established for psychoses or neuroses in the VA system and ratings used here to describe flood disaster trauma.

For this reason, the AMA criteria for evaluating impairment due to psychoneuroses will be used for rating human impacts of flooding. The physiological and psychological impairment due to flooding is summarized in the trauma scale.

To apply values to this scale, we must establish compensation rates for various levels of impairment descriptive of each step. Table 27 lists the compensation payable for varying percentages of disability under the VA system.

Table 28: Compensation by Veterans Administration by Percent Disability

Degree of Disability	Monthly Compensation
Percent	
10	\$ 44
20	80
30	121
40	166
50	232
60	292
70	346
80	400
90	450
100	890

Source: New York State awards, 1979 dollars



To assign values to the ranges established by the AMA for each classification, the median value of each range was determined and multiplied by the percentage rate of compensation at that level. The resulting values are:

Class 1 - 0 to 5 percent impairment  
no compensation

Class 2 - 10 to 45 percent impairment  
\$110.55 per month or \$1326.60 per year  
(median = 27.50 x \$4.02)

Class 3 - 50 to 95 percent impairment  
\$359.60 per month or \$4315.20 per year  
(median = 72.50 x \$4.96)

Since there is one to one correspondence between the AMA classes and the levels of the trauma scale, quantifying the trauma scale is fairly simple. It involves simply multiplying the number of individuals at each level of trauma by the value established. Summing these amounts over each level of trauma yields a total value representative of the willingness to pay to avoid the risk of trauma (in this case, through flood prevention) for a one year period.

The following quote from the AMA (1977) expresses the attitude taken in developing criteria for evaluating percent of impairment:

Individuals differ greatly in the manner and degree with which they react to the stresses of day-to-day problems and life situations. The marshaling of the body reserves, the

use of ego-protection devices, and the resort to regressive techniques are reactions used by everyone to varying degrees in his adjustment to reality. The degree to which these mechanisms are used furnishes a useful but imperfect basis for distinguishing between individual(s).

By accepting the AMA criteria as descriptive of the trauma scale, the inference may be that respondents in the Tug Fork Valley are being judged as permanently impaired. This was not our intent. Rather, we use the AMA criterion as a guide to determine reasonable compensation for what is probably a transitory, short term effect in most cases. We expect these to vary with severity of the flooding experienced.

It was not possible in these early stages of research to have the household survey responses evaluated by a qualified psychologist. This would ususally be done in order to use such information for actual compensation. Classification based on computer analysis of responses may be somewhat arbitrary but is similar to that done in studies by psychologists. However imperfect, this process does provide a basis for ranking flood victims from least affected to most affected.

Referring back to the previous section describing AMA ratings for impairment, it can be seen that each of these classes has been represented by a percentage impairment based on the state of mental well-being. Now, the original levels of trauma can be expressed in terms of percents of psychic impairment which can readily be translated into monetary compensation amounts based on Veteran's Administration awards for disability.

Using the trauma scale in which each level represents approximately a third of the household sample, compensation will be calculated as follows:

Trauma level:

Level I = 84 households = 181 individuals

Level II = 114 households = 369 individuals

Level III = 80 households = 291 individuals

Compensation:

Class 1:

181 individuals x no compensation = \$0

Class 2:

369 individuals x \$1326.60/yr. = \$489,515/yr.

Class 3:

291 individuals x \$4315.20/yr. = \$1,255,723/yr.

Total Compensation            \$1,745,238

How does the value of non-property damage estimated here compare with the property damage estimates developed by the Corps of Engineers shortly after the flood? We can assume that the 194 households in Class 2 and 3 above are representative of residences damaged by the 1977 flood. There will be a slight over-representation of households which suffered complete loss of their homes due to the unadjusted inclusion of the HUD trailers sample. However, this is probably balanced off by the choice of the more conservative distribution toward the Class 2 level of compensation in this example. Thus, we have an estimate of \$1,745,000 per year for the non-property damages or \$8,966 per household.

But how long did such trauma effects continue at this rate? Indicators for the trauma scale were identified for any time during the two years between the flood and the survey. It is likely that some of these effects of the flood lasted even less than the first year, and that many were well adjusted to by the end of the second year. But if this rate is applied for only two years, the total (\$18,000) is substantially larger than the almost

\$9000 per residential structure of property damage found after the flood. If this rate is applied to the more than 5300 homes damaged or totally destroyed, we have a total trauma damage level of over \$72 million. This compares total physical damage of \$126.60 million, business losses of \$44.9 million and emergency costs of \$25.8 million.

#### Valuation of Trauma by Comparison with Payments in Buffalo Creek

One way of assigning a dollar value to a particular level of trauma is to look for values that have already been established in similar past situations. For example, awards are frequently made in automobile accident cases for "pain and suffering" and other psychological effects of the experience. An empirical analysis of this kind of data appears impossible, however, because reliable figures cannot be obtained. While court records of accident awards are kept, many accident cases involving trauma are settled out of court and the awards involved are unrecorded. In addition, there appear to be no widely-used guidelines for establishing the value of trauma for litigation purposes. Awards are sometimes based on a multiple of provable losses. In West Virginia, for example, personal injury cases are settled for three times the amount of "specials" -- the cost of treatment as documented in hospital and physician's bills. In other cases, such awards are simply a dollar figure that is found acceptable in the negotiation process between the parties involved in litigation.

There is one situation, however, in which payments for trauma suffered during a flood event have been well documented. This is the case of the disaster at Buffalo Creek, West Virginia in 1972, where 125 persons died and thousands were left homeless. As a result of this disaster, more than 600 residents of the Buffalo Creek Valley took legal action against

the coal company believed to be responsible for the flood. They did this in order to obtain remuneration not only for property losses, but also for the psychological effects of the experience. Represented by the legal firm of Arnold and Porter in Washington, D. C., the residents of the valley were eventually paid a sum of \$35.5 million in damages. As in past cases of a similar nature, there was no concrete basis for this specific amount -- it seemed reasonable in the light of the damages suffered, and it was a sum that could be agreed upon out of court by the parties involved.

The \$35.5 million in damages was distributed among the litigants on the basis of three steps:

Step 1: Awards to each household for actual possessions lost, as established by detailed inventories.

Step 2: Awards to homeowners, either for the loss of the house or for repair of damages.

Step 3: Award of remaining money on the basis of psychological damages established by accumulating "Personal Impact Points."

It is this third step in the allocation of damage payments that is of interest in relation to the current study of Tug Fork. In both situations there is an attempt to measure the trauma experienced by flood victims. In the case of Buffalo Creek, this trauma is measured by a "Personal Impact Point Scale", and in the case of Tug Fork it is measured by the "Trauma Index". In both situations there is also an attempt to attach some kind of dollar value to the trauma. In Buffalo Creek, for the purpose of distributing a cash award equitably among the victims, and in Tug Fork, to establish a value for trauma that is relevant to cost-benefit evaluation of flood mitigation measures.

The Personal Impact Point Scale consisted of three categories in which points were awarded on the basis of the amount of trauma suffered. The first category allocated from 0 to 4 points on the basis of "immediate disaster involvement". For example, an individual who was in the flood water and in danger of losing his or her life would receive 4 points, while another individual who was away from the valley at the time of the flood would receive none. The second category contained 10 points for "loss of community". In the Buffalo Creek case, all of the litigants received these 10 points. This may have had the effect of reducing the variability in the awards as compared to the range of trauma actually experienced. In the third category, 0 to 4 points were awarded on the basis of a psychiatric evaluation that rated psychological impairment resulting from the flood experience. According to Stern (1976):

These ratings of psychological impairment were based on (1) psychological symptoms (such as anxiety, depression, phobia, other mood disorders, sexual dysfunctions, and sleep disturbances); (2) somatized, or what laymen would call physical, disturbances (headaches, gastrointestinal complaints, backaches, fatigue and other bodily complaints with a psychological basis); and (3) personality problems (alcoholic addiction, developmental deviation). The severity of the psychic impairment was determined, in part, by an estimate of the persistence and entrenchment of the symptoms of personality change.

Because all of the individuals received 10 points for loss of community, and many had experienced "immediate disaster involvement", the point scale scores of all the litigants varied very little, and the majority (80.9 percent) received payments between \$8,465 and \$9,674.

It is obvious from descriptions of events that the flood experiences in Buffalo Creek and Tug Fork were very different. The Buffalo Creek flood was sudden, violent, unexpected, and resulted in a high loss of life and property. In Tug Fork the water rose more slowly, and while property

damage was enormous, there was no loss of life that was officially attributed directly to the flood. Some of our respondents did believe there were deaths attributed to the flood experience. However, other than the overall comparison of flood characteristics in the two events, there is no way to make a detailed comparison of individual flood trauma between the two groups of victims in order to establish orders of magnitude or variations in trauma. It is impossible, therefore, to be sure that Buffalo Creek trauma was either more or less than Tug Fork, or that the range of variation was broader or narrower.

A method used here to compare the amounts of the different payments made for flood trauma in the Buffalo Creek case with the Tug Fork Trauma Scale was to determine the percentage of distribution of each payment category and match this to the scale values for the same percentage in the sample (see Table 28). Once the distribution is established for the cases in Buffalo Creek, the same distribution is applied to the cases in Tug Fork experiencing various levels of trauma as indicated in the Trauma Index. In this way, an award from the Buffalo Creek case can be equated with the corresponding step or steps in the Trauma Index. Note that the "spread" in the Trauma Index is much greater than for the Buffalo Creek payment.

Table 29: Distribution of Buffalo Creek Trauma Payments (N - 392)

Amount	No. of Payments	Percent of Total Payments
\$10,883	1	.3
10,279	19	4.9
9,674	118	30.1
9,069	159	40.6
8,465	40	10.2
7,860	16	4.1
7,255	13	3.3
6,651	3	.8
6,046	1	.3
0	<u>22</u>	<u>5.6</u>
	392	100.0

Median payment = \$9,069

Mean payment = \$8,608



Table 30: Correlation of Buffalo Creek Trauma Payments With Tug Fork Trauma Index

Amount	Buffalo Creek Percent	Corresponding Trauma Index	Tug Fork Percent
\$10,309*	5.2	16-20	5.4
9,674	30.1	12-15	29.0
9,069	40.6	8-12	41.7
8,465	10.2	6-7	10.1
7,860	4.1	5	4.7
7,077**	4.4	4	3.2
0	5.6	-1-3	5.8

\* Weighted mean of payments \$10,883 and \$10,279

\*\* Weighted mean of payments \$7,255, \$6,651 and \$6,046

If the mean payment in the Buffalo Creek case (\$608 per person) is applied to the 5,882 residence units at 3.02 persons per unit in Tug Fork, the result is nearly \$153 million. However, if the personal impact point (PIP) system used in Buffalo Creek is applied to the three categories of damage experienced, our estimate is over \$93 million. Based upon the experiences found in the interviews, it is felt that the maximum damage households (2,522 residence units) would have been awarded about two points for "immediate disaster involvement", on the average. Loss of community comparable to Buffalo Creek would have been similar for this category. Psychiatric evaluations would probably have awarded three points, on the average. The moderate damage group (1,944 residence units) might have earned one, five and one points, respectively, on the average in these

these three categories. At \$600 per PIP the \$93 million estimate results as follows:

	<u>1</u>	<u>2</u>	<u>3</u>	<u>Total</u>
Maximum damage (2522)	2	10	3	15
Moderate damage (1944)	1	5	1	7
Minimum damage <u>(1416)</u>	0	0	0	0
5882				

(Approx. value/Buffalo Creek PIP) X (Probable PIP's for Tug Fork) X (number of households) X (Median # of persons per households) = Value of Flood

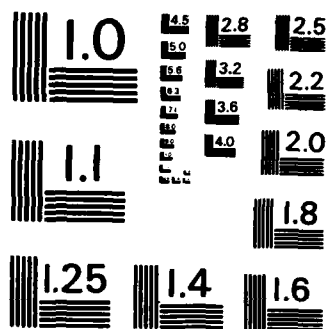
Trauma for Tug Fork Valley.

Maximum risk zone: \$600 X 15 X 2522 X 3.02 = \$68,547,960  
 Moderate risk zone: \$600 X 7 X 1944 X 3.02 = 24,657,696  
 Minimum risk zone: \$600 X 0 X 1416 X 3.02 = 0  
 \$93,205,656

Valuation of the Trauma Scale Factors Using the Social Readjustment Rating Scale and Worker's Compensation Awards

Of the many scales that reflect the problem that individuals face in adjusting to stress, few attempt to provide more than ordinal rankings. As noted above, Holmes and Rahe (1967) offer a scale that appears to provide some measure of the degree of difference between events such as death of a spouse or a major personal injury or illness. Questions asked of the Tug Fork householders identified some flood related approximations to the Holmes and Rahe life events. Judgment had to be used to cumulate the answers to several questions or to identify cutting points in a continuum of answers to a single question to match the events of the households of Tug Fork in 1977 to the individual life events in the Social Readjustment Rating Scale (SRRS).





MICROCOPY RESOLUTION TEST CHART  
NATIONAL BUREAU OF STANDARDS-1963-A

Items in the Trauma Scale were grouped into minor, intermediate and major mental stress and hassle factors, plus a group for health and physical injury. Each group is related to a range of mean values in the life event evaluation by Holmes and Rahe. The first inclusion in a category, it was judged, was not sufficient to earn the full mean value of the scale available for that group. Subsequent inclusions added fewer mean value points than early inclusions. This was based on the judgment that diminishing returns operate for stressful events. Total mean value points that could be earned in a category were limited to the total for a life event further up the rankings. No household could experience more than 198 mean value points -- comparable to the death of two spouses. The highest actually registered was less than this.

Mean value SRRS points were derived from the health and injury elements of the trauma scale by starting with the 53 points shown for personal injury or illness. In the Tug Fork sample, 100 respondents said health was worsened as a result of the flood; 49 had one or more family members injured or made ill during the flood itself. A few reported high blood pressure, heart problems and psychological disorders. We assigned the full 53 points to 10 cases, 44 points to 50 cases and 18 points to 50 cases, for a total of 3630 SRRS points.

Minor mental stress and hassle included trauma scale items for: no warning, warning not early enough, no previous flood experience, knowledge of a death, sentimental losses, family state of mind, the respondent's state of mind, problems during clean-up and other flood related problems. Some of these were in fact indicators of quite severe trauma; thus it would be conservative to say that two of these items for a household should mean

11 to 16 SRRS points. At an average of 6 points per item, 7794 points were allocated to this group.

Intermediate stress factors were each felt to be worth 16 to 20 points on the SRRS. They included the worsening of relations with friends and neighbors, and with family members (28 households), damage to the home of less than \$10,000 (about 95 households), the purchase of new furnishings, etc., missed work. While one of these might be worth 16 points, it is probable that two would be closer to 28 than 32, for example. And three in one household is more likely to be the equivalent of 38, rather than 48. On this basis, 12 SRRS mean value points were assigned to each item for a total of 4980 in this category.

Major factors were assumed comparable to 23 to 31 points on the SRRS. They included damage to the home over \$10,000, more than one day forced to live away from home, never returned to the home and a feeling that things haven't returned to normal two years after the flood. Under the same diminishing returns logic, 16 points were assigned for each of for a total of 8176 SRRS points.

The total number of points assigned to the experiences of those interviewed was 24,580 or an average of 88 per household, or 29 per person. Thus, on the average the procedure suggests the flood was as traumatic as trouble with in-laws, a son or daughter leaving home, or a change in responsibilities at work on the basis of the Holmes and Rahe scale. This is not an overstatement of the severity of the event, by any means.

In the Holmes-Rahe scale "death of a spouse" was rated at 100 mean value. In 1975, the average workman's compensation award for the death of a spouse was \$31,600 or \$316 per mean value point. This provides an upper bound for the compensation value to be computed in this way. A lower bound

is provided by the compensation paid for the average personal injury (\$2,463) which corresponds to the sixth ranked item on the scale, "personal injury or illness". This was given a scale score of 53 or \$46.47 per mean value point. As might be expected, the degree of difficulty of readjustment and value of fair compensation do not provide similar common denominators. Thus, bounding by the exchange rates at the two points where the two "scales" intersect is necessary.

If we assume that these rates should be applied to the 4466 housing units that suffered major and moderate damage, this provides a range between \$18 and \$125 million. Applied to the full 5882 units, the range is \$24 to \$164 million. The mid point between \$18 million and \$164 million is \$91 million.

#### Summary of Trauma Valuations

The three approaches to valuation give quite consistent results. In fact, each was calculated separately from the others, even up to the point of applying the final dollar weights. The results seem reasonable and reinforce each other. They are summarized below:

- 1) Valuation of the flood trauma scale by Veteran's Administration compensation rates — \$95 million.
- 2) Valuation of trauma by comparison with payments in Buffalo Creek — \$93 million.
- 3) Valuation based on the Social Readjustment Scale and Workman's Compensation awards — \$18 to \$125 million and \$24 to \$164 million, with a mid point of \$91 million.

## CONCLUSIONS AND RECOMMENDATIONS

How fast can we expect change? Tug Fork has not been growing rapidly in population. If future productivity in the mines improves as expected, it probably will not grow rapidly in the future in spite of expanded coal output. Thus, with no housing program attuned to cutting flood risk, new units of housing and other development can be expected to add to the already significant burden of flood losses. Flood-free sites are simply too few and unavailable. Those that exist are either held for their potential usefulness in future mineral exploitation or do not now have adequate potential for water, waste disposal and other services.

Yet the willingness to move is high, particularly in the high-risk zones of the flood plain. Experience in other programs, notably those of the Tennessee Valley Authority and the Pennsylvania Department of Community Affairs, suggests that for now the rate of movement to lower floodrisk housing will be largely determined by the rate at which housing supply is enhanced.

A filtering process can be anticipated. If housing is made available in low-risk locations, particularly if it is cheaper than prevailing new construction, it will attract those most ready to move. Any subsidies that facilitate moving will ease the process of working down the values of the riskier locations. Wherever the first people move from, we would expect others to move from higher risk locations to vacancies in lower risk locations. Activities that are less prone to damage and disruption by floods can be expected to move to the higher-risk sites. The rate of such adjustment should be amenable to improved information and public assistance.



The residential supply process is not well developed in the valley. Builders are few in number and public programs limited. HUD and FmHA have difficulty fitting their efforts to the costs and income realities of the valley residents and the constraints of the topography. There is a need for organizational capacity and judicious subsidies to meet housing objectives. If flood control objectives are to be met at the same time, the kind of expertise held by the Corps of Engineers also needs to be involved. But how can this be put together best?

There may be considerable potential for innovative construction designs -- both in house construction and in site preparation, but this may call for more flexibility in standards than has heretofore been achieved. This suggests complex negotiations at the Washington agency level, probably at the Congressional level, as well as at the state level. Given the complexity of the structure and the site-specific problems involved, this may call for a variety of approaches and considerable resources just to coordinate the many actors necessarily involved. The freedom of the Corps of Engineers to operate on a project level with direct authority and funding from the Congress may be crucial to providing a variety of viable approaches.

Community structure is small and of limited capacity. A long-term, sustained effort will be required to take advantage of the kinds of community structure that exist. Many aspects of life in the Valley suggest that small and limited capacity communities will continue to be desirable and likely to persist. Previous studies of community characteristics important to flood-risk management have emphasized the physically nearby neighborhood (Erikson, 1976). The situation appears to be more complex than that. If neighborhood were all that mattered in relocating people

from a high-risk area, then the task could be done a neighborhood at a time. Projects could move about as fast as neighbors could agree that the new site met their needs.

But other factors can be expected to be important. These include distance to work, attachments to school, church, family groups, as well as neighbors. If these are as strong or stronger than neighborhood, then a more complex and varied strategy will be more successful than that of merely moving whole areas at once. Some whole-neighborhood projects can be expected. The community of Rawl is involved in such a relocation project at present and illustrates this potential. However, some people may also be interested in moving closer to the job or church or family members. Some may even appreciate the chance to break away from the existing neighborhood. Then a variety of locations available at the same time to inhabitants of a particular high-risk neighborhood may bring about faster adjustment and a higher project success rate.

How Might the Agency Programs Fit Together? It is clear that no single agency can bring housing and flood policy together by itself. A task force of the Water Resources Council has been studying the implementation of the nonstructural aspects of the President's Water Policy Initiatives, a cornerstone of which has been the implementation of a program of nonstructural flood-control measures. New regulatory measures have been rejected to allow time for those now called for in the HUD flood insurance program to be established and tested. However, stepped-up implementation and enforcement of Executive Order 11988 on Flood Plain Management is called for. This requires each federal agency whose activities influence decisions about development on the flood plain to see that the order is carried out in a way essentially as restrictive as the stric-

tures in the flood insurance program. Presumably, any plan that spelled out a program of low-risk site development and/or relocation could become the basis for the implementation of E011988.

But E011988 has had a basic weakness. Implementation has been assigned to the Water Resources Council, which lacks a direct field staff. It must depend on the individual agencies to monitor themselves and each other with whatever help the limited number of River Basin Commissions can provide. This is a system with limited capacity to insure that a coherent, coordinated flood-plain management strategy is developed and in fact carried out. The Corps has the required expertise and a record of creating field administrative capacity. Such an agency is essential in developing and maintaining a flood plain management plan and providing day-to-day support services. This kind of expertise could make E011988 something more than a good intention.

The President's Task Force on Nonstructural Flood Protection is recommending enforcement of E011988 and also calling for an attempt at nonstructural measures in as many as fifty of the most flood-prone communities.

The Corps of Engineers has the opportunity in the Tug Fork Project of developing an innovative organizational arrangement to make flood plain management a reality. It can perform an umbrella function with respect to recruiting participants to strategy development. It can participate in the site development process directly and indirectly. Likewise, it can supplement the capacity of providers. It can provide a technical and supportive input to the several state housing agencies and to the closely related activities of the Appalachian Regional Commission. It can provide support services to local housing agencies directly and through the state and ARC

units. It can also develop working relationships with organizations like Rural America and the National Demonstration Water Project. These organizations provide support services to local organizations in housing and site service development. And, finally, it can help to build the capacity of local grass roots housing groups. These may lack expertise and financing but have close contact with the needs and preferences of local residents and have the community acceptance to be able to act as change agents. Given the complexity of the situation, it is probable that a strategy of doing some or all of these things will more likely lead to success than doing only a few things on a large scale.

Crucial to the development of a joint housing and flood policy program will be the linkages to the housing finance agencies. Obviously HUD programs, operating through the general community development block grant approach, already are required to have a supporting land use and facilities plan. Linking these plans into the flood planning activity should be quite straightforward and could be accomplished directly by Corps personnel or through the States and/or ARC.

Farmers Home Administration may offer greater potential and at the same time greater challenge. FmHA projects are smaller and very differentiated in type. Small housing projects, sewer and water and other community facilities, are handled as discrete units and do not require a comprehensive community plan. However, this flexibility and the existing delivery system of county offices makes the FmHA program a very attractive prospective participant. The problem is that FmHA lacks an effective outreach capacity. It does not have sufficient staff to maintain contact with community groups who are potential project sponsors. It also lacks staff

capacity (and probably authority) to participate in the flood plain management strategy.

Two other USDA subagencies may in time provide this capacity -- the Soil Conservation Service and the Cooperative Extension Service. Under the Resource Conservation Act of 1977, such linking of USDA activities may occur. SCS has long experience in watershed planning. Cooperative Extension has long been a force in community affairs. But neither is active in linking housing policy to flood policy today. The Corps would be well advised to provide this outreach capacity itself or to stimulate it among grass roots organizations.

## SUGGESTIONS FOR FURTHER RESEARCH

This data base can provide many further insights. Other variables are available for manipulation, to be used in combinations other than those presented here.

In the area of Tug Fork housing as it is today, it is likely that various characteristics of quality and, perhaps, location in the flood plain will be correlated. Likewise, income and housing expenditure information taken in the survey will give some insight into the affordability of housing not indicated in census data. (For example, respondents were asked what they thought they could afford for a down payment and what their present house had cost when they bought it.) Expenditures by renters and owners for housing as a proportion of reported income require fairly complex data manipulation. In general, continuous variables such as income and housing cost have proven difficult to extract and manipulate due to problems in coding and programming. These problems are in the process of being solved, however.

In addition, more descriptors of the sample household could be presented and related to housing characteristics and preferences. Some of these may be of use in developing the final design details, but do not add to the overall picture.

Factors associated with satisfaction could be examined in more detail. For example, both income and housing costs may turn out to be correlated with satisfaction. And however unlikely it seems, when they are taken into account the relationship between satisfaction and degree of flood risk may look different.

Various community factors would be of interest. Those that indicate community capacity were not built into the sample because sample size was too small to measure community differences. Stream reach is available for at least the Stanley sample and might give some indication of community differences. Some aspects of the sample could be more closely compared to census and other data for the valley, as well as standard results from other areas and for rural populations in general.

Statistical tests and significance levels are presented for some comparison and could be provided for others.

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**Part II**

**FLOODING AND**

**COAL MINING PRODUCTIVITY**

## INTRODUCTION

The purpose of this section is to analyze the relationship between flooding and coal mining productivity. The thesis is that the flooding adversely affects productivity both from direct disruption and damage in mining and transporting coal occurring from floods and indirectly from the adverse impacts on the capabilities of each community and each individual to meet productivity goals and to cope with capital losses in property and cumulative losses in human resource productivity.

### Discussion

Appalachia, that region set apart, produces a large share of the coal which fuels the nation's power plants and steel mills. The energy-rich area is beset with environmental problems, which coupled with the unique "boom to bust" cycle typical of extractive economies, have led to a uniquely low level of living for its residents. Although they contribute the fundamentally necessary and valuable resource to an energy-hungry nation, its people live as if members of another culture in a time-warp where economic well being is typical of the depression era. In a paradoxical milieu, miners who can earn upwards of \$25,000 per year must live in communities which provide a sub-marginal level of public services and in houses which often fail to meet normal standards of decent, sanitary, and safe quality.

The Tug Fork area of Kentucky and West Virginia shows the combined effects of a persistent cyclical economy based on coal extraction and an extreme environmental hazard from persistent and severe flooding. Thirty thousand people live in the valley. Ten thousand reside in the flooded areas and homes averaging \$11,000 in value. Five major floods

occurred in the 20 years 1957 through 1977. Flooding has caused attrition in housing quality and availability and resulted in attrition in public services. The communities simply cannot recover from floods and maintain a high quality and variety of public services, except where the state and federal governments step in to maintain selective services. Public schools are one example where state funds dominate and where new schools and buses are maintained. Normal public response to flooding is to help people go back to their homes and businesses. The 1977 flood in the Tug Valley caused \$200 million in damages and resulted in \$150 million in mitigation, primarily from federal funds. This investment in mitigation acted to put people exactly in the same flood hazard location if their houses were not destroyed and to help replace losses. Thus they are at the same hazard with federal help.

The replacement by mitigation, although gaining as the federal government has accelerated its responses to natural disasters, fails to totally replace the losses. Thus the attrition in housing stock, in public sector capability, and the grinding psychological impacts of persistent severe flooding on human lives continue to take a toll cumulatively. Tug Fork Valley is in six Appalachian coal counties -- counties which produced over 46 million tons of coal in 1975 (about 7 percent of total national output). The product of these coal mines travels to coal users for the most part by unit trains. Over 18 unit trains traverse the valley daily. Many of the mines in Tug Fork are captives of the multi-national steel firms. Most of the mines are unionized in affiliation with the United Mine Workers.

Poor housing, limited community services and severe environmental problems combine to result in an unusually low quality of life for the individual coal miner and his family. Governor Rockefeller argued in May 25, 1977, testimony before the Senate Subcommittee on Energy Production and Supply that the provision of a better quality of life should be a fundamental commitment of Federal policy in addressing the Nation's energy problems. He suggested that "...We must offer coal miners the chance to achieve living conditions which are now enjoyed in other major industries in our country ... including opportunities for good housing ... water and sewage systems, the health facilities, the recreation facilities which the miner and the coal industry need in today's world."\* One should add the remainder of the production and distribution complex associated with coal production. Employees of services all have the same needs in Tug Fork. Furthermore, the area has a substantial population of citizens who are in retirement years or disabled and unable to work. All of these people have needs for housing and community services.

#### Analysis

The impact of flooding on coal mining productivity was evaluated by means of a regression model. Output per employee was compared with

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\* Gov. J. D. Rockefeller, IV - "A Plea for the Forgotten Factor in Fuel Output: The Miners," Louisville Courier-Journal & TIMES, June 5, 1977.

flood damages per capita for record flood and the percent of coal produced by surface mining. The model was calibrated from data for 43 Appalachian counties which produced at least one million tons in 1975.

Flood of Record Effects on Coal Production in 43 Appalachian Counties

	Tons Produced, '75	Employment	Tons/EMP	(PCSURF) % Surface Mining
Average	5,451,791	2,350	2,333	52.5
Standard Dev.	588,941	307	1,432	4.9

	1970 Pop. Affected by Flooding	*Damages from Record Event	(FLCAP) *Per Capita Damage of Record Flood
Average	7,653	\$4,087,000	\$ 534
Standard Dev.		\$4,886,000	\$1,255

\* 1975 Dollars

Two measures of association were attempted, both show modest relationships in the proper direction.

Correlation Coefficients

Per Capita Flood Damage	- .18451		
Tons	- .25820	.23025	
% Surface	.50538	- .02738	- .48151
	Tons per Employee	Fl. Damage per Capita	Tons



One interesting thing about the data is that the largest coal producing counties show a negative correlation with productivity. Higher productivity is associated with the percent of surface mining and negatively correlated with flood damages per capita. Regression results are about as expected. The per capita flood damage variable shows a coefficient of the correct sign with a modest degree of significance (at coefficient which rejects the null hypothesis at a .90 probability).

The regression format is as follows:

Tons per employee = f (annual tons produced, per capita flood damage from record event, and percent of coal produced from surface mining).

The statistically significant variables are abbreviated in the summary below:

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	<u>Average Value</u>	<u>Standard Dev.</u>
TON/EMP = 1,926 - .002 (FLCAP) (1.4)	X <sub>1</sub> = \$534 FLCAP	1255
F = 3.97 + 2.1 (PCSURF) (3.0)	X <sub>1</sub> = 52% SURF	32

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The regression using damage per capita shows a stronger statistical relationship than does regression on total flood damages and emphasizes a need to reduce the flood hazard in the most severely affected areas. The elasticity of the flood damage per capita coefficient is -.03639, indicating that a one percent reduction in flood damage per capita would

increase in a 3/100 percent increase in productivity per employee, or an average increase of 9 tons per employee, worth about \$20 a ton or \$180 per year. In the average county this would amount to \$428,000 additional product per year.

If these results are applied to the Tug Fork counties, the potential impact of flood damage reduction in improving coal mining productivity is 17,103 tons per year for each percent decrease in flood damages. Since the flood damage variable is based on the record flood, reduction of the 1977 flood by 75 percent would result in extra production of 1,282,725 tons per year worth an excess of \$25 million annually. since this extra production can be achieved without additional inputs, the value of the product is a net increase in national output and income.

PART III

HUMAN RESOURCE IMPAIRMENT

AND ITS PUBLIC COST IMPLICATIONS

#### ACKNOWLEDGEMENT

I wish to thank my former colleague, David John Miller of the St. Paul District, who participated equally with me in early conceptual work on the idea of "behavioral damages" and its positive implications for cost/benefit calculation and analysis of effects for the planning "system of accounts." Its development as a human cost in this study is a field effort to meet his standards of craftsmanship and service as a precursor of the research team assembled for this study. Charles Edw. Simpkins

PART III

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## INTRODUCTION

The purpose of this section of the human costs report is to show that the process of human response to flood history experiences in Tug Fork has created not only the readily visible, immediate post-flood impacts but long-run human resources losses. These losses accrue in rising costs for social support services provided by public and private agencies, in cumulatively lowered resilience of victims to respond to other problems and opportunities after "recovering" from each flood, and in a collective inability to build and maintain a level of public services requisite for economic development. Section I of this human costs report uses data from a survey of flood plain residents in a primarily cross-section analysis to show the cost of psychological trauma resulting from the April '77 flood. The present section is directed to describing the Process of experienced harm and to showing evidence of long-run (perhaps cumulative) changes in human behavior which imply an attrition in human resource capital.

When flood relief costs are accounted for, damages (in addition to mitigated property losses and costs of temporary housing) are limited generally to the costs of administering the relief programs. By conservative official reports, about \$28.5 million in emergency help and recovery grants and loans followed the April 1977 flood.

But these immediate public costs to the Nation are not the final price tags. A devaluation of private property and household asset positions lowers ability to support public infrastructure which provides schools, roads, sanitation, recreation. With accompanying reduction in individual and

community willingness to invest in repair or maintenance, and to take risks in support of community and economic development, the resourcefulness of people themselves as human capital (in imagination, skills, ability, and will to action) is reduced. Individuals and families become more dependent as community facilities and property base are depleted and greater external support in social overhead services and individual assistance are required.

The following sections expand the concept of human resource impairment, empirically examine the human response process, and develop a rationale economic effects. The data indicate a process through which natural events, physical vulnerability, psychological effects, and adaptive response behaviors of victims function to create a potential impairment of human resources for productive ends. They suggest a loss of wealth and productive capacity, much in the same logic that destroyed capital in real and personal property is defined as damage to be reduced or prevented. Human capital is a component of economic productivity in the same sense as is physical capital. It, therefore, also functions as a potential element in benefit/cost accounting.

#### THE HUMAN RESPONSE PROCESS

##### Indicators

There are three types of indicators or variables tests for evidence of a disaster response process: flood event experiences, psycho-physiological states, and economic adjustment responses. The specific indicators measured within each type in the household survey are listed in Table 1. These

indicators were selected to test the hypothesis of human resources impairment in Tug Fork.

Table 1: Three Categories of Indicators Used in Household Survey.

<u>Flood Experience</u>	<u>Psychological and Physical States</u>	<u>Adjustment Responses</u>
Forced to Leave Home	Change in Health	Flood Insurance
Time out of Home	Specific Illnesses	Life Insurance
Damage to Home	Family's State of Mind	Medical Insurance
Depth of Water in Home	Health Score of Family	Savings
Sentimental Items Lost		Credit
		Purchasing
		Organizations Contacted

As indicated by the table, the response process assumes the flood experience to be a cause of a mediating psychological state. The psychological state, conjointly with objective impacts of the experience, induce (and perhaps impose) an adjustive change in behavior.

The general types of indicators and the way they are displayed in the descriptive analysis tables of the section on survey data results are based on

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a straightforward common-sense explanatory framework. If people's capacity to maintain themselves and contribute to the economy and society is impaired as a consequence of flood impacts, it will show in at least two kinds of behavior - uses of household income and resort to financial aid - by which they respond after disaster. Impairment will also be detectable in the self-reported psychological effects diverging from individuals' own conceptions about normal outlook, health, and functions of themselves and their families. Beyond these immediate consequences to persons we are concerned with the indirect implications of the same data for a sustained public cost arising from the summed impairments so indicated. Hence, the common sense questions are: (1) What happens to individuals? (2) How do they experience it in mind and body? (3) How do they adjust to impacts? and (4) What are the public consequences of these changes in people? The answer to the last question can only be inferred, but if empirical evidence for the preceding three is established, the last step will be strongly indicated.

#### Allocation of Household Income

The first kind of changes in behavior which people may make to cope with their perception of what has happened to them, their resulting emotion states, and their changed material circumstances (e.g., property losses), have to do with household money allocations of expenditure (most of the variables in the "Responses" column on Table 1). They may make shifts among such items as savings, various insurance policies, amount of credit, durable goods consumption, and medical services. These changes may act to increase expenses, atrophy capital assets in housing and furnishings, and force increased borrowing.

In the case of flooding, actual losses in excess of expected losses act to decrease the value of the home. These forced adjustments amount to a sharp reduction in solvency and the ability to deal with other financial problems. In Tug Fork, this predicament is often accompanied with a "boom-to-bust" cycle of high income because of erratic jobs in coal mining. Changes in individual and family assets, discretionary income, and ability to cope with uncertain financial contingencies feeds into the economy of the Valley where it results in more extensive impacts on revenues and, ultimately, the receipts of local business.

Resort to Financial Aid

A second kind of behavior by which people adjust to disaster experiences is that of requesting financial assistance from a variety of helping agencies. The organizations the respondents contacted after the April 1977 flood are listed in Table 2.

Table 2: Helping Organizations to Which Respondent Resorted for Aid

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no organization contacted	Individual Family Grant Union
hospital or clinic	Social Security
private physician	Pension
Medicare	Legal Aid
Red Cross	Logan County PRIDE
Mennonites	Mingo County OPEC
church	IRS
senior citizens	Commission on Aging
town government	Small Business Administration
Department of Welfare	Other
ECD	
HUD	

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The resulting public disbursements of aid in grants and loans are already counted as damages, in emergency and recovery costs, in current Corps accounting practice.

The point of showing the experiential process underlying the flatly stated cost is to open for inspection and judgment the questions of whether the national replacement costs for previous levels of well-being, self-support, and productive capacity in the Valley actually do restore that status quo ante. Or are there likely to be long-term added "real" costs generated by experiencing this condition of (apparently) transitory dependence?

Moreover, it should be noted that emergency and recovery costs are not, by current accounting, recorded to their full extent in all forms. Nor do the disaster assistance programs of most agencies have elaborate record-keeping systems which can document fully the numerous incidental, special and administrative costs which they incur beyond grants, loans, services, equipment and regular personnel deployment in the disaster area. Full costs to victims in disruption, loss of amenities, and real property are also not counted to the extent of full monetary evidence of human travail which regulation and guidance permits. On both these latter points impressive evidence has been provided in a recent draft document, prompted by the Frankfort, Kentucky, flood of 1978.\*

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\* Dr. Sheehab Eddin, Guidelines for Obtaining Estimates of Flood Disaster Costs in an Urban Area. (Louisville District, COE, August 1979:Draft).

These recovery, replacement, hidden, private and public human resources rehabilitation costs are - in the logic of Federal water resources planning evaluation - a large portion of what society pays for the "no action" plan in a depressed area of low capital in property, which is minimally able to help itself through mechanisms of resilience and convertible wealth.

#### SURVEY DATA RESULTS

The information from the survey is purposely presented in a plain cross-tabulation form. This provides readers with the actual distributions of responses and permits them to inspect data and form their own judgments. For purposes of this paper, the cross-tabulation format is preferred over more complex analytical techniques which might increase the power of the statistical inference but sacrifice visibility of the data. The approach has additional advantages because many indicators are nominal or ordinal in nature, rather than interval or ratio measures.

##### What Happens to People and How do they Experience it Psychologically?

The series of cross-tabulations in this section are between the flood experience indicators and the psycho-physiological state indicators of Table 1. These cross-tabulations are directed to showing what proportion of people experienced the flood event indicators, in what degree; and in which psychological ways and how strongly they were affected. This is a quantitative stating of the first two previously stated common sense questions of the field investigation: What happens to individuals and how do they experience it in mind and body?

### Psychological Effect of Damage to the Home.

The first cross-tabulation, shown in Table 3, presents data on those psychological impacts of damage to the home. Damage to the home is perhaps the most massive, physical, and immediate experience of natural violence that flooding can wreak upon the individual and family, short of maiming or death. The summed family health score is based on a scale ranging through five categories from "Excellent" to "Very Bad." The respondent gave information as to the general health of each member of the family, and this indicator was simply added in each household.\*

Contrary to common sense expectations, the data show that there is little or no systematic effect of damage to homes on any of the three psychological indicators about the emotional state of families. There is no readily apparent theoretical explanation for this lack of relationship. It can only be suggested on this evidence that degree of damages to property is primarily experienced in a rational, objective mode as a physical and economic fact to be dealt with by known compensatory procedures. It may also be that this focus on respondent's own home, alone, may exclude the psychological impact of the collective loss of the community - some 600 homes lost.

This interpretation was checked by also examining the effect of "Depth of Water in the Home," another physical indicator of adverse experience.

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\* No detailed methodological design will be given here, in the interest of readable development and length. All data and research design documentation are available on request from IWR.

Table 3: Effect of Damage to Home on Three Psychological - Physical Indicators

Damage to Home	Family Health Score					Specific Illnesses		Family's State of Mind			Same as Before
	0	1-10	11-20	21-30	31-45	No	Yes	Depressed Cry	Worried Nervous	Fear Pain	
None	1.1	65.9	11.4	10.2	11.4	81.2	18.8	12.3	33.3	36.7	16.7
Little	8.8	65.0	16.2	2.5	7.5	76.7	23.3	9.1	36.4	41.8	10.9
Moderate	1.9	88.5	5.8	1.9	1.9	80.9	20.0	9.3	18.6	41.9	27.9
Severe	(0)	(12)	(0)	(0)	(0)	(0)	(11)	(0)	(2)	(2)	(3)
Ruined	9.1	75.8	6.1	3.0	6.1	89.3	10.7	14.	4.8	33.3	42.9

Generally, the interpretation was confirmed with the exception of some influence on physical illnesses reported, as can be seen in Table 4.

Table 4: Specific Illness by Depth of Water in Home

<u>Specific Illness</u>	<u>Depth of Water in Home, feet</u>			
	<u>0 - 1.0</u>	<u>1.1 - 5.0</u>	<u>5.1 - 10.0</u>	<u>10.1+</u>
No	85.0	85.7	78.4	52.9
Yes	15.0	14.3	21.6	47.1

The increase in affirmative responses with depth of water is clear: ranging from about 15 percent in cases of 1 foot or less of water, to nearly 50 percent among those who experienced 10 feet or more of water above the first floor level in their houses. "Depth of Water," like home damages, showed no relation to either of the other two variables - family's general health or state of mind. The key rationale here is probably consistent with our interpretation of objective perceiving of the physical states in the three null relations of Table 3. Specific (perhaps diagnosed) illnesses are, like "Depth of Water," primarily "measured" physical (bodily) facts; hence the statistical relatedness here and the interaction of two physical factors (quite probably in literal contact) in the flood.

### Psychological Effect of Being Forced to Leave Home.

What of the psychological effects of physically induced "circumstances" or experiences - not in themselves immediately physical - such as being forced to leave the home, time out of the home, and loss of sentimentally important possessions? The panel of data arrays in Table 5 generally confirms moderate to strong psychological impacts of the physically induced experience of being forced to leave home by flood waters.

The focus of quantitative evidence for the sensitivity of "Family Health Score" to whether or not members were forced to leave their home is in the comparison between percentages in the two ranges of most adverse health (21-30 and 31-45) among those who did and didn't leave. None of those families able to remain scored in these adverse ranges, but 15.6 percent of those forced out did report poorer health. (That this may be subjective self-perception in no way vitiates potential effect on response behaviors - the subjective states are experiential facts much more likely to function as input to cognition and consequent social behavior than are objective truths not believed). A second confirmation is the gamma correlation, an ordinal measure of association, which at  $+.41$  is moderately strong for social data.

The effect, upon illness, of being forced to leave home is shown to be quite strong (Gamma of  $.61$ ) in the second array. This is, of course, in part due to the fact that the earlier effect of water depth is contributory to forced leaving. There is once again a difference of about 15 percent in adversity (20.5 vs. 5.9) between those who did and didn't have to leave home.

Effect on family state of mind (more than two years after the experience) is not so strong as upon the other two psycho-physical variables already



Table 5: Effect of Leaving Home on Three Psychological - Physical Indicators

	Family Health Score				Specific Illnesses		Family's State of Mind			Same as Before	
	0	1-10	11-20	21-30	31-45	No	Yes	Depressed Cry	Worried Nervous		Fear Pain
Forced to Leave Home											
No	8.1	78.4	13.5	0.0	0.0	94.0	5.9	16.7	29.2	20.8	29.2
Yes	3.0	71.6	9.9	6.5	9.1	79.5	20.5	10.4	27.0	41.1	20.2

examined in the panels of Table 5, but it is quite clear. The principal difference between stayers and leavers is visible in "Fear of Rain" and those families whose outlook is "Same as Before" the 1977 Flood. Among those forced out of their homes, fear is double (41.1 vs. 20.8) in frequency over those who live in the valley and cope with the threat, but have not directly faced its physical force. The difference in numbers who are not changed in state-of-mind is about 9 percent between those who were able to remain in their homes and those who had to leave. To place these results in meaningful perspective, it is significant that one of the baseline numbers of this table indicate that one-fifth of a regional population lives in fear of the rain.

Psychological Effect of Loss of Sentimental Objects.

Table 6 presents a final panel of data arrays on the relationships of a flood event experience with the three psychological-physical indicators we have consistently used to test for emotional impacts. The loss of an object of sentimental value is once again a physically caused experience or circumstance which in itself also involves a physical change (presence or absence of a cherished object; or as before, being within ones home or without).

The effect of sentimental losses on families' reported health is best grasped by adding across the three highest adverse health categories in the row showing those who had no loss, then across these same, more adverse, health categories for those who did lose something. Comparing the two rows, the sums for more adverse health are 11.7 percent among those who lost nothing and 27.0 percent among those who did lose something sentimental.

Table 6: Effect of Loss of Sentimental Objects on Three Psychological - Physical Indicators

Loss of Sentimental Objects	Family Health Score				Specific Illnesses		Family's State of Mind			Same as Before	
	0	1-10	11-20	21-30	31-45	No	Yes	Depressed Cry	Worried Nervous		Fear Pain
No	2.9	85.3	8.8	0.0	2.9	98.4	1.6	9.8	14.6	39.0	34.1
Yes	4.5	68.5	11.0	7.0	9.0	76.1	23.9	11.4	30.2	36.9	18.1

Correspondingly, the range of best health shows a logical reversal of distribution, with a spread of about 17 percent.

The second cross-tabulation of Table 6 conveys a sharp distinction in incidence of physical illnesses by the criterion experience of sentimental possessions lost. Less than 2 percent of those spared such loss were made ill. Nearly one-quarter of those reporting lost objects also reported illnesses in their families. Either of two interpretations are plausible for this finding. It may be that depth of water (implying bodily exposure), which as been seen (in Table 4) to predict illness, may also account for lost sentimental objects so that we are seeing its effect again here although it is "hidden" causally behind the losses. But it is also a plausible interpretation that depth of water, if it did not also bring despair for lost possessions, would have far less consequence in illnesses; hence the real force is the losses.

The last array of Table 6 presents no similar problem of ambivalence for its interpretation. We already know that contact with water depth and general damage to the home has little to do with a family's emotional condition. The significant quantitative signal in this third array is located in the second column, indicating worry and nervousness. The rate of this condition among those deprived of loved family possessions is, two years after the flood, a little over double that for families not deprived (30.2 percent vs. 14.6 percent). Depression, crying, and fear of rain are all about equal between the two groups. The difference in worry is mirrored, logically then, in the approximate reversal between the two groups' responses to whether they feel the "same as before" the flood. The results in this array lend some support

to the sentiment interpretation for illness, discussed in the preceding middle panel of the table.

Sense of General Recovery.

At this point in the inspection and interpretation of the survey results, the psycho-physical effects of several forms of human contact with flood waters have been examined through seven data arrays. These have provided some substantial empirical evidence that several measurable dimensions of morale, perception, and bodily well-being are adversely changed. This first phase of inquiry, "What happens to people?" and "How are they affected in mind and body?", can be given some summary, scope, and closure by assessing the respondents' sense of general recovery to emotions and activities, as this sense exists for people who have or have not been victims of the major flood experience indicators. This was done by asking people to tell us whether they considered things were "back to normal" for their families. The results are shown in Table 7.

For all flood experience indicators, the direction of percentage magnitudes down the "No" column indicates increasing failure to re-establish normality of family life as experience of adverse indicators (on the left) increases. The Gamma correlations at the base of each crosstab sum up the extent to which "what happened to" people has affected their present condition. In all cases they are clear and strong with impact differences as great as 40 percent. Time out of home is included here, although it was not carried through the entire analysis. Its inclusion here, in the summary, is relevant because of its delaying potential for family recovery activity.

Table 7: Effect of Four Experiences on "Things Back to Normal"

<u>Damage to Home</u>	<u>Back To Normal</u>	
	<u>No</u>	<u>Yes</u>
None	9.7	90.3
Little	0.0	100.0
Moderate	23.5	76.5
Severe	38.0	62.0
Ruined	52.4	47.6

Gamma =  $-.52$  at  $.000$

Forced to Leave Home

No	22.9	77.1
Yes	38.2	61.8

Gamma =  $-.35$  at  $.12$

Time Out of Home

1 Day or Less	11.1	88.9
2 Days to 1 Week	20.5	79.5
1 Week to 1 Month	36.1	63.9
1 Month to 6 Months	43.8	56.3
Over 6 Months	11.1	88.9
Permanently	55.3	44.7

Gamma =  $-.42$  at  $.0003$

Loss of Sentimental Objects

No	12.1	87.9
Yes	42.3	57.7

Gamma =  $-.68$  at  $.000$

### How do People Respond to their Experiences and Conditions?

This step in the assessment of the survey results is directed to answering the third of the common sense questions which describe the objectives of this study: How do people adjust to what has happened to them? To study this question, the cross-tabulations are between the flood experience indicators and economic adjustment indicators of Table 1.

The preceding section gave evidence to show what happened to individuals and the way the extents in which contact with the flood changed their self-perceptions of well-being. That in itself has considerable implications for people as a productive resource - in diminished morale, perception of opportunity, and disposition toward risk. This section examines what people do; how they respond as measured by indicators of the two kinds of behaviors which were discussed for their relevance to human resource values: household economic changes, and resort to financial aid.

#### Economic Responses to Damage to Home.

As in the assessment of psychological effects, the variable "damage to home" is the major flood experience criterion. But in this phase of inquiry we are concerned with effect in producing specific action, assuming on prior evidence that the psychological impacts are, in these tables, bound up also "in" the causal force of the flood experience indicators.

The first cross-tabulation of Table 8, concerning savings level, indicates a strong change in the direction of position loss as damage to homes increases (reading down the "decrease" column from 15.6 percent reporting decreases, through almost three-fourths (73 percent) to about 53 percent among those whose homes are ruined). It should be noted that, whenever it appears, ruin

Table 6: Effect of Damage to Home on Four financial Adjustment Response Behaviors

Damage to Home	Change in Savings Level			Change in Credit			Changes in Purchasing Behavior					Change in Flood Insurance			
	Decrease	Increase	Same	Decrease	Increase	Same	Specific increases	Replaced losses	Specific decreases	Generally Less	Inflation	Other	No	Yes	
None	15.6	81.3	3.1	11.5	84.6	3.8	8.3	10.0	41.7	5.0	20.0	10.0	5.0	70.1	30.0
Little	27.3	72.7	0.0	10.0	50.0	0.0	20.8	28.3	24.5	1.9	15.1	5.7	3.8	58.3	41.7
Moderate	62.7	33.3	3.9	18.0	76.0	6.0	18.9	13.5	43.2	5.4	8.1	10.8	0.0	26.9	73.1
Severe	73.0	27.0	0.0	37.5	55.6	6.9	(0)	(0)	(4)	(0)	(0)	(0)	(0)	16.2	83.8
Ruined	52.9	45.9	1.2	24.7	62.	13.0	(3)	(3)	(9)	(0)	(0)	(0)	(0)	53.9	46.1



or loss of home will always present some break in numerical pattern, as it does here. This is true because total ruin or loss is not just one more degree of damage in a continuum but is actually a difference in kind of predicament a family faces. Many expenses or liabilities or opportunities considered in these tables decline or abruptly end in this extremity, while others perhaps outside our explicit data may then arise. This circumstance is somewhat of a "black box" likely to produce some appearance of numerical pattern anomaly, as it does here.

The array on credit in Table 8 shows a general but uneven decrease as damage to home increases. If this is read in conjunction with the several "decrease" columns of the adjacent panel on Purchasing Behavior, it may be warranted to conclude that this credit obligation decline is in less essential consumer goods. The "increases" in credit (of 6.0%, 6.9%, and 13.0%) among those with greatest home damage quite probably indicates debt incurred to replace furnishings (note also "loss replacement (13.5%) for moderate damage in the next array on Purchasing.) Hence, spending on credit declines, but some respondents are forced to increase obligation for fundamentals.

The data array on Purchasing Behavior is not clear and is marred by lack of sufficient base numbers for calculation of stable percentages in the two bottom rows representing extreme home damage. However, we can make it quantitatively clearer by condensation, as follows:

---

	<u>All Increases</u>	<u>Same</u>	<u>All Decreases</u>
<u>Damage</u>			
None	18.	41.7	35.0
Little	49.1	24.5	22.7
Moderate	32.4	43.2	24.3

---

The condensation suggests that in the two rows of greater home damage, a general conservatism (including inflation pressure) has resulted, while at the same time larger proportions of respondents report specific outlay increases. If we remember that respondents were answering with reference to the flood, these data suggest a general involuntary loss of discretionary consuming and at the same time a considerable increase in forced spending. (A preliminary examination of data on percent of decrease in savings showed the bulk of cases in a drop of 25 to 50 percent. This is hardly likely to be a freely chosen magnitude).

The last panel of Table 8 shows proportions of respondents who took out flood insurance after the flood, as a future precaution. These percentages (reading down the "Yes" column) indicate a rather dramatic range of variation for social behavior data, as did the savings panel. Again, there is a clear break in pattern for those who no longer had a property and here the explanation for the "anomaly" is regrettably obvious. In general, this insurance panel further confirms a process of tying up assets in "forced" options, leaving less household resources available for further contingencies or "live" options for future opportunity.

### Economic Effect of Being Forced to Leave Home.

Table 9 supports the results indicated in Table 8. Being forced to leave the home is a sound indicator of both disruptive and emotional impact which may accompany the more objective fact of home damages. How do the four "dependent" behavioral factors vary with this disruptive experience criterion? In the "yes-no" dichotomy of "leaving" we have the advantage of simplicity and greater clarity. We may take the parallel advantage of a briefer commentary on numbers that require less interpretation. In short, a decrease in savings is imposed on 37 percent more among those forced to leave their homes than among those not forced to leave.

Comparison between leavers and stayers is not possible with respect to purchasing behavior, due to the small response to the question among stayers. However, the distribution between specific increased buying and general cutting back among leavers replicates the earlier pattern of response to home damage.

A comparison of proportions of those who have adopted flood insurance also confirms the previous results of Table 8, with a difference of about 20 percent. It should be kept in mind throughout these comparisons that not only the differences indicate the force of experience. For example, if one reads across in the flood change array the absolute magnitudes are also powerful evidence of changed behavior. Even though not forced to leave home, 44 percent did react by adopting insurance. When not only the general influence is weighed but also the specific calamity of being forced from home, then (reading across for leavers) we find well over half (64%) are induced to act.

The overall results of the eight arrays of Tables 8 and 9 offer fairly substantial evidence for the power of flood experiences not only to induce

Table 9: Effect of Being Forced to Leave Home on Four Financial Adjustment Response Behaviors

	Change in Savings Level			Change in Credit			Changes in Purchasing Behavior					Change in Flood Insurance			
	Decrease	Increase	Decrease	Increase	Increase	Decrease	Specific Increases	Replaced	Specific Decreases	Generally Less	Inflation	Other	No	Yes	
No	22.9	71.4	5.7	9.1	78.8	11.1	(3)	1	(10)	(3)	(1)	(0)	(0)	55.6	44.4
Yes	60.2	35.9	0.9	8.3	63.6	28.2	16.0	16.0	38.5	3.8	14.7	7.7	3.2	35.9	64.1

"human suffering" (which many critics dismiss as an exaggeration of the intangible, based on a few exceptional victims), but to impose rather systematic change on the behavior of a population. The implications of this evidence will be discussed in the final section on human resource consequences.

Effect of Adversity on Request for Aid.

Table 10 presents evidence on the second general kind of behavior with which we are concerned as an indication of impairing impacts - resort to help or financial aid.

There are two points of focus for visual inspection which yield clear pattern in the distribution of the upper panel on effects of damage to home. the first is down the column of respondents who appealed to no organization. The drop in proportions who asked no help is some 65 points as damage increases.

The second focus of visual inspection is on the upper right sector of the array (among those who had little or no damage) and the lower right sector (among those who had moderate to ruinous damage). The pattern of relationship between adversity and seeking help is clearly evident. It is reinforced by a third focus scanning from lower left sector up the diagonal to upper right sector. The low responses on this axis and the logic of the table rather strongly confirm our expectations of behavior. "Everybody," it should also be clear in these data, does not rush to "capitalize" on a flood - those who need help, as law and charity provide, do seek it.

The lower panel of Table 10, relating "number of organizations contacted" to whether respondents were forced to leave their homes, is a concise and

Table 10: Number of Organizations Contacted by Extent of Home Damage  
And Leaving Home

	<u>Number of Organizations Contacted</u>						
	<u>None</u>	<u>One</u>	<u>Two</u>	<u>Three</u>	<u>Four</u>	<u>Five</u>	<u>More</u>
<u>Damage to Home</u>							
None	72.7	12.1	12.1	3.0	0.0	0.0	0.0
Very Little	75.0	8.3	0.0	16.7	0.0	0.0	0.0
Moderate	21.2	3.8	30.8	11.5	7.7	15.4	9.6
Severe	3.7	8.8	17.5	21.1	18.8	15.0	14.9
Ruined	6.8	11.4	27.3	25.0	5.7	10.2	13.7
<u>Forced to Leave Home</u>							
No	59.5	10.8	16.2	5.4	2.7	2.7	0.0
Yes	12.4	9.1	23.0	19.9	9.9	12.5	5.2

simplified further confirmation of the evidence on damage effects. Once again, the criterion experience creates a wide difference between those who sought no help in the two groups. All comparisons in the table repeatedly confirm the expectation of adversity and greater dependency.

At this point our examination of direct empirical evidence about the specific effects of flooding on individuals is concluded. The final step is to consider what the "human costs" observed in this study mean, in the sense of their social and economic implications. What we are willing or not willing to infer from the evidence is a problem of judgment in a context of risk. We are concerned, basically, in the concluding section with our fourth, originally stated, common sense question - "What are the public consequences of these changes in people?"

#### CONCLUSIONS: PUBLIC CONSEQUENCES AND PLANNING IMPLICATIONS

The meaning of people's flood-induced resort to public assistance entitlements consists of several points. First, the data relating the individual's experiences with number of organizations contacted by the individual dispels the notion of some critics that economic aid is generally sought by people who don't need it. The logic of these data suggest that those who seek help need it. By the relative magnitude of impact suffered, and fragility of pre-flood self-sufficiency, they apparently tend to ask in degrees inverse to their actual ability to help themselves. The protection of people exhibiting this general pattern of behavior would constitute avoidance

of a present recovery cost which is founded on genuine harm to individuals.

The current cost is not likely to be reduced by denial.

A second point of meaning to public assistance costs is also more apparent when observing data on the human behavior process in interaction with destructive natural causes. If people are considered as human resources from either a social system or an economic perspective, then the public entitlement funds paid for emergency and recovery costs are maintenance costs. Damage to housing, furniture, appliances, etc., are an impairment in support facilities which are required to sustain individuals and households at some acceptable level of contribution to their own viability for work, and to the economy.

What these recurring emergency and recovery costs mean, in merely trying to keep people as human resources at some minimum constant level of viability, is a third point. The output of human resource maintenance and productive potential is very likely a value which cannot (within reasonable investigative limits) be reliably determined by either the "willingness to pay" or the "net income" method on behalf of any proposed plan. At best, only fragments might be captured by these methods. But there is applicable WRS guidance providing an empirical approach which applies to a public act of human resource maintenance:

"The cost of the most likely alternative means of obtaining the desired output can be used to approximate total value when the willingness to pay or change in net income methods cannot be used. The cost of the most likely alternative ... merely indicates what



society must pay by the next most likely alternative to accrue the output ... This assumes, of course, that society would in fact undertake the alternative means."

The "most likely alternative" to any plan involving Federal action to avoid human resource impairment costs in Tug Fork is the NO ACTION plan, i.e., the present conditions or the "without project" condition. It need not be assumed that society would be willing to undertake this alternative (to avoidance of harm) at some estimated cost. Society has undertaken it, in the absence of other remedy, in the 1977 flood at an emergency and recovery cost of 25.8 million dollars, and at other cost magnitudes in many previous floods. The point of tracing this parallel between the usual accounting of emergency cost "damages" on the one hand, and the human resources impairment - maintenance perspective of socioeconomic analysis on the other, is not to suggest double counting of the 25.8 million dollars. It has been done for two positive reasons:

The first is to demonstrate how the initially posed parallel between a human resources maintenance interpretation and the usual emergency-recovery interpretation can be carried through, on evidence, to the same end cost. The second reason is that the equally sound human resources interpretation, ending in the "same" cost for recovery, rather strongly suggests some further

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\* Water Resources Council, "Proposed Revisions to the Principles for Planning Water and Related Land Resources," Federal Register, Vol.44, No. 102, p. 30248 (Thur., May 24, 1979).

implications for the Nation which the "repeated cure" emergency recovery conceptualization of costs doesn't.

In the context of much data from many sources, and the resulting general observation about the effects of recurrent flooding in the Tug Fork Valley, the human resources perspective directly suggests a rising curve of cost for human maintenance. What most long-term observers - Federal, State, and local - have agreed is that both property and the quality of life are deteriorating under the cumulative effect of successive floods. Rehabilitative and compensatory funds are not effectively holding the economic system and social organization of the communities at some identified previous level. Nor are they preserving some minimum satisfactory qualitative state or level of active developmental capacity, set by conscious public policy.

All local effort and received funding are expended on the objective of "keeping even." This is failing, over time, despite the optimistic clean-up and recovery appearances in the short run after the point event of any single flood. In a context of declining material resources and community organizational capability for action, what of the resourcefulness of the individuals whose perceptions, attitudes and behavioral dispositions are - in creative and productive orientation - strongly influenced and set in their constraints by such contextual factors?

The clear implication is that the effective capacity of individuals for both self-sufficiency and contribution to growth and development decreases along with the material base and social infrastructure through which they must act to achieve those productive ends. In short, there is a downward "ratchet" effect, a cumulative decline in the human resource capacity (capital) of the

sum of individuals, which parallels that of declining and deteriorating property.

What this downward curve in wealth, organizational capacity, and psychological perception of rational opportunity means for the de facto policy of emergency recovery is that, over the time span of recurring flood events, it is a sound projection to expect an ever-increasing cost level to recover an ever-declining resource in human capacities. There is some point of intersection in judgment consensus, if not precise measurement, where the cost becomes a welfare burden on behalf of a depleted, dependent population, and ceases to be an investment in recovery of the productive capacity of a viably organized socioeconomic system of individual skills, learning, abilities, and motivation. General indicators would suggest that this intersection of declining resources and rising public "recovery" costs (creating an inadvertent welfare policy toward flooding) is not far ahead in the Tug Fork Valley.

The data on household economic response behaviors have demonstrated that flood experiences do cause adjustive responses among expenditure items. Generally, savings decline, consumer credit debt is reduced, forms of insurance increase, and the restrictive impact on consumption spending is about twice that of inflation. To this may be added, of course, obligation to Government recovery loan repayments. These changes are, by circumstance, a disruptive effect in that they arise deterministically from a negative event, and are not freely chosen acts of persons who engage in them.

Here, the data stop on this "human behavior response to flooding" process. This sequence of description and reasoning is not primarily to validate a

conceptual interpretation (as with public assistance), but to empirically establish a previously unmeasured effect. Hence, here also stops direct evidence to confirm further consequences of a purely economic, rather than an aggregate behavioral kind, such as observed to this point.

However, the limitation is only in the available time, scope, and data of this investigation into behavioral evidence for impairment of people as human resources. A concern with the economic effects, beyond the household allocation of income, shown as behavioral responses here, points straightforwardly to some specific steps into primary economic inquiry. The question of indirect costs in external diseconomies is at issue, and it is a legitimate item of accounting in the Corps' cost/benefit calculation procedure.

Part IV

HOUSING ANALYSIS

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## THE HOUSING ANALYSIS TASK

### I. HOUSING AND FLOOD POLICY CAN COME TOGETHER

#### Background to Housing Policy

In 1949, federal housing legislation established the goal of a decent home and suitable living environment for every American family. Since that time, the definition of "decent" and "suitable" housing has come to include a variety of characteristics. These include physical condition of the dwelling, presence or absence of plumbing, the amount of living space per family member, and even the social milieu of the neighborhood. The inclusion of a wide variety of characteristics is necessitated by the fact that regional and individual differences must be recognized. Standards for "decent" housing in a warm climate might vary considerably from those for housing in the northern regions of the United States. And "suitable" housing for a single person would probably not be "suitable" for a larger family. It is also recognized that the house is not an isolated entity and that part of its function is defined by the environment surrounding it.

The definition of housing that is decent and a suitable living environment, therefore, varies according to its location and function. Certainly, the quality of housing in the Tug Fork Valley can be evaluated on the basis of the established guidelines for structure, space and amenities. In the case of Tug Fork housing, however, an additional dimension must be introduced. No house can be considered a decent, suitable living environment that is regularly and frequently ravaged by flood waters so that its structure is weakened, its contents damaged or destroyed and the safety of its inhabitants threatened.

The recent history of housing in the Tug Fork River Valley is a story of frequent damage to and destruction of a diminishing supply of housing that stands in contrast to housing policy in the United States at large.

Federal vs. Private Involvement in Subsidized Housing. The history of federal government involvement in housing has not been a long one. In fact, there was little concern at any level of government for housing until the late 1800s. At that time health conditions in crowded New York City tenements led to the passage of the Tenement House Act of 1867. Subsequent federal involvement in housing was limited to short-term activities, such as the provision of housing for war workers during World War I. It was not until the Depression of the 1930s that the federal government entered the housing scene on a broad, national scale. Even then, there was more interest in providing employment (through the Public Works Administration) and in bolstering the real-estate and banking industries (through the Home Owner's Loan Corporation and the Federal Housing Administration) than there was in providing housing to low-income families.

The role of the federal government in the provision of housing has been controversial from the start--in part at least because such participation is seen as interfering with the private housing market. This controversy has been very evident in the programs for slum clearance and construction of public housing. Federal programs that promote the private sector, such as mortgage insurance and low-interest construction loans, have been much more favorably received.

When the Housing Act of 1949 authorized 135,000 units of public housing for each of the subsequent six years, that section of the legislation survived Congress by only a narrow margin. Opponents claimed that public housing did not house the poor and was socialistic or communistic,

and that it might lead to racial desegregation. (Keith, 1973) In addition, public housing was believed to be in competition with privately owned slum dwellings.

During the 1950s, opposition to public housing became less vehement. There were several reasons for this. First, organizations concerned with the revitalization and redevelopment of urban areas began to emerge and to challenge the real-estate perspective. Second, the urban renewal program authorized by the Housing Act of 1954 attracted different types of developers, who were indirectly drawn into the design and production of public housing. And, finally, more progressive attitudes on the broad housing issues seemed to be appearing among mortgage bankers and building materials and equipment manufacturers. (Keith, 1965) To be sure, such attitudes were not entirely altruistic. As Charles Abrams has commented:

That the federal program survives today is due less to its general popularity than to the support it has received from the official housing agencies, from the backers of urban renewal, and from the Wall Street investment houses which have been floating its tax-exempt bonds. (Frieden, 1969)

Since the passage of the Housing Act of 1954, there has been less organized opposition to the federal role in housing. Recent housing legislation has provided the means for joint participation of the federal government and the private sector. There has been an increasing tendency to involve private industry in housing production and to create financing methods that supplement, rather than replace, private banking function.

Provision of Rehabilitated as Well as New Housing. Federal government housing policy prior to the 1970s has emphasized the production of new housing rather than the preservation and upgrading of existing housing. According to Solomon (1974):

The variety of strategies employed by federal housing policy over the years -- mortgage insurance, land write-downs, favorable tax concessions, accelerated depreciation provisions, private turnkey contracts -- is a testimonial to legislative and bureaucratic ingenuity. However, despite this aptitude for social invention, our major housing programs reflect a disturbing single-mindedness in their basic approach: an excessive reliance on the subsidization of new construction, as opposed to the improved utilization of the existing housing stock through conservation, rehabilitation or direct consumer subsidies.

Part of the resistance to construction of new housing for low-income families results from the attitude that the poor should not have housing as good as that purchased by families with higher incomes. It was believed that they could rely on older, less modern housing filtered down from upper income groups. Many students of the housing subsidy technique, however, look to housing rehabilitation as part of a workable solution to the low-income housing problem. According to Hartman (1975):

The logic of a strategy to rehabilitate wherever possible rather than to build new structures is compelling: it is cheaper and faster to salvage the good parts and replace or repair the bad than to tear down a structure and construct an entire new building. Displacement and relocation problems that characterize clearance and redevelopment can be avoided, community and neighboring ties sustained; and for low-income families in particular, living in rehabilitated housing can be psychologically and socially more desirable than living in new housing projects that serve to identify and isolate their residents.

While housing rehabilitation has certainly not been the solution to the nation's housing problem, it does provide one more approach that can be included as part of the overall housing package. Certainly there are areas where deterioration is so advanced that the bulldozer is the only solution; other areas can be revitalized with rehabilitation or with a combination of rehabilitation and new construction.

The Community Approach to Housing. When public housing legislation was first enacted as part of the Housing Act of 1937, local agencies were established as the organizations to receive government funds, construct low-cost units and administer the program. The entrance of the federal government into the realm of public housing was of enormous significance, especially in upgrading the quality of housing for low-income families. Many successful public housing projects have been constructed in the ensuing years. However, the conservative orientation of many local housing agencies, as well as constraints of public housing legislation, have led to a lack of innovation, poor site location, and identification of the projects as low-income (and often, racially segregated) ghettos. Many communities ignored the issue entirely, and never established a public housing agency, in spite of the fact that an acute need for low-cost housing might have existed.

The community approach is an attempt to overcome local resistance to low-income housing, and to avoid the stigma associated with isolated low-income projects located in marginal areas of the community. Instead of the traditional categorical grant system, in which federal money is allocated for specific projects, that may or may not include funding for low-income housing, housing comes through a Community Development Block Grant. A basic requirement for funding is a comprehensive, community-wide plan for housing in the form of a Housing Assistance Plan (HAP).

An assumption basic to the requirements of a HAP is that plans for low-income housing will meet present and future community needs and will provide for the integration of low-income housing into the community as a whole. Communities without a HAP have been challenged on their right to receive federal community development funds for other projects. But so far

this mechanism has not been sufficiently coercive to impel those communities who oppose low-income housing into participating in the program.

The Economic Mix in Housing. The Housing and Urban Development Act of 1965 made a significant contribution to housing legislation with the introduction of the concept of the rent supplement. Under this plan, the federal government would pay the difference between a fixed percentage of a low-income family's income (usually 25 percent) and the market rent of the rental unit. Like the idea of public housing, the concept was controversial, but the line-up of opposing forces was reversed. The rent supplement program had the support of such private organizations as the National Association of Home Builders, the Mortgage Bankers Association of America and the American Bankers' Association. This was because the projects would be sponsored, financed, owned and operated largely by private builders and lending institutions. However, it was opposed by some public housing authorities...

...who saw it as competitive to their predominant position in developing and managing housing for low-income families and as a program which would draw away scarce financial resources which might better go into additional low-rent public housing. Also, a number believed that private developers lacked the experience and motivation to do a satisfactory job in the management of housing for low-income families. (Keith, 1973)

The establishment of the rent supplement, and the introduction of 25 percent of family income as a housing expenditure level, provided the basis for subsequent legislation.

The rent-supplement approach attempts to deal with the so-called "economic mix" problem in subsidized housing. Early housing programs made use of subsidies that were permanently tied to specific units of public housing. In addition, public housing legislation in effect until 1961

required residents to move out when their incomes surpassed a defined level. This assured that public housing maintained a "project" image of physical and social isolation of the poor. In the rent supplement concept, the subsidy is not attached to a specific housing unit. In addition, residents do not have to move when their incomes increase; adjustments in the size of the supplement are made to reflect the proportion of income available to pay for housing.

#### Background to Flood Policy

Individuals and communities that occupy the flood plain, acting as separate decision makers, have many incentives to take actions that actually increase the overall risk of flood damage. In spite of millions of dollars spent on flood prevention, damage figures seem to increase over the years.

Construction in the flood plain not only poses a risk for the individual but often increases the risk for others. It can increase the amount and speed of run-off by reducing infiltration. Filling and building too close to the river can cause a previously harmless flood flow to back up and damage much more property. Doing with "yours" or "mine" what we choose can make what is "ours" much more of a problem. The solution is to undertake a variety of public and private actions so that losses are reduced to more tolerable levels.

Broad Strategies -- Relief, Flow, Location. In response to disasters, the nation has evolved a series of relief measures impressive in scope and generosity. The outpouring of assistance to put things back the way they were is one way of spreading the risk. Indeed, the cost of recovery has been an important incentive to find ways to avoid flood damage.



The 1936 Federal Flood Control Act began a response that put primary emphasis on changing the flow of water. Dams, channel improvements and levees have been constructed to give partial protection to most of the cities in the nation. Some argue that the result is to encourage more and unreasonable occupancy of the protected flood plains. However, there is little hard evidence on the relationship between occupants' risk perception and control devices. But every structural measure has its limits; millions in damages from floods that are within those limits have been avoided. Millions in damages from floods that exceed those limits continue to be felt. Nonetheless, in the case of these continuing losses, there is little else to be done short of redevelopment and relocation.

The major long-run solution must be to locate and relocate activities so that they are sensitive to the risk of floods. Some activities are more prone to damage from high water than others. Parks and open space are needed by every urban area -- floodways can provide such amenities. Buildings can be built to minimize water damage, often within the range of existing good construction and design practice. But these adjustments to flood risk apparently will not happen without quite different local knowledge of risks, financial incentives and scope for regulations than we have had. For example, local land use controls are frequently formulated without this information.

What is clear is that no single approach to the problem will "work." Technically, no single approach does it all. Economically, the nation cannot afford to put enough resources into any one solution. And politically it cannot expect to develop enough support for any one program. Perhaps the biggest problem to be faced is the political problem of risk awareness. Right after a major flood many are aware, but the push is to

only reduces the capacity to hold back water, but actually increases the amount and speed of the runoff. But how to keep such development from taking place? Exhortation to local governments to use their land use control powers to protect downstream communities does not have much promise. Buying development easements or simply the whole title is a surer approach. Some \$8 million is now authorized to purchase about half of the wetland acreage with the remainder to be acquired by the State of Massachusetts.

Prairie du Chien was the second project authorized. In this case it was clear that no structural measures could be justified to protect the some 1,000 Prairie du Chien residents who live on a low-lying island and adjacent mainland areas flooded regularly by the Mississippi River.

Interestingly, most of the people involved have been either enthusiastic supporters of the concept or at least accept it. The Congressional representatives, the local officials and many others responded in this way as a result of a carefully developed participation program. Deliberate step-by-step exploration of the problems of implementation and liberal doses of imagination and hoped-for funding seem to have produced a nonstructural project. The city will develop a relocation area on higher ground with assistance from the project. Further, the project will spend up to \$1.1 million to move some houses onto new foundations and to buy others for razing. Owners of the houses that will be taken down will be reimbursed to obtain equivalent new houses.

This type of approach with its solid program development characteristics and adequate attention to implementing details and compensation is what is needed. But for this to be a real alternative we have to be as equally willing to spend money to achieve it as we are to build dams and channel works. Once we have established that willingness, existing rules

requiring a nonstructural plan and recommendations that structures are superior to feasible nonstructural approaches, will take on some meaning.

A New Prospect for Small Watersheds. Section 73 of the Water Resources Development Act of 1974 should not be limited to the large project and large problem setting. Small watershed projects usually carried out under PL 566 by the Soil Conservation Service also have the potential of using this authority. Perhaps the Congressional strictures to emphasize farm flood problems in this program can now be eased and some of the untapped potential of the small watershed approach can be realized.

But the small watershed offers another possible flood-mitigating opportunity. The problem is in having adequate warning that a flood is coming. On many major rivers the Federal Weather Service is able to provide many hours of warning. But where the physical situation is such that six hours or less is the best expectation, the federal system offers only limited help. A local self-help program using local observations and interpretation is not difficult to design. The few successful efforts -- Olean, N.Y., for example -- indicate the value of such a system. The problem is getting such a system organized and sustained over the years. Watershed organizations are called for, but they need technical assistance and other support. This could come from state or federal agencies or perhaps basin organizations like the Susquehanna River Basin Commission that is in fact developing such an effort.

Flood Insurance -- The Community Sensitizer. There have been recent changes in the federal flood insurance program administered by the Federal Emergency Management Agency (FEMA) and complementary state legislation. These changes should make many more aware of the risks they face as well as encouraging more effective flood plain regulations. Existing development

can be covered through subsidized insurance. Once the detailed data is available to set the rates, all new building must be covered by insurance at full actuarial rates. Before the detailed data is made available by FEMA, the community must adopt a permit procedure for the designated high-risk areas. Also federal aid, including flood relief payments, in these hazard areas will be limited unless the community qualifies for the program. Qualification requires the adoption of regulations that specify how construction will be made sensitive to the flood risk shown by the detailed data.

The existence of flood plain information and controls should stimulate interest in other approaches to flood risk management. Dams and channel work should be easier to translate into perceived benefits. Relocation and floodproofing should make more sense to more people.

The Need For a Complementary State Program. Higher levels of government influence local actions by grants-in-aid, direct services and mandates. Mandating actions for local governments is constitutionally a state prerogative which obviously may be influenced in turn by various federal inducements. In the case of the flood insurance program it might appear that a formidable set of inducements had been organized to produce effective local flood plain management. However, there is a basis for expecting less than overwhelming results. An understanding of why and how a disparity between results and expectations may come about could suggest how supplementation should be designed.

In some communities the flood insurance program, with its subsidized insurance for existing property and its sanctions through community grants and individual loans, supports a significant existing local interest in land use controls. Proponents of such techniques are reinforced by the

requirements and can take advantage of the expertise offered, undercutting opposition by pointing out that the community now has no choice, at least for the flood plain. For the communities where no sympathetic local group is significant in local affairs, there is reason enough to expect effective filibustering and bargaining if not outright noncompliance.

The denial of federal grant aid to the nonconforming community presents a most sensitive problem. These will be grants that both the local people and the granting agencies want accepted. At the very least, long hours of negotiation can be forecast. The likely intervention of the Congressional delegation will at least involve some awkward confrontations and may pose the threat of legislative modification of the program. And FEMA needs to show success in its handling of the assigned task to manage the program. Substantial pressures exist to find ways to placate the recalcitrant communities at some cost to the rigor of the execution of the program. What constitutes an acceptable control ordinance? Must a residence always have its first floor above the 100-year flood elevation? What is acceptable floodproofing for the other uses that may be placed below this level? The scope for bargaining is there.

Wisconsin has had a mandated flood-plain regulation program since 1966. A few other states had followed suit prior to the late 1973 amendments to federal flood insurance programs that raised the coverage and added the sanctions. New York limits state intervention to only those communities designated by FEMA as having flood hazards, and limiting the state to only constraints on flood-plain use sufficient to qualify for the federal insurance.

Technical assistance from the state, however, should facilitate inter-municipal coordination and cooperation. It should provide expertise which

can be used to bargain with FEMA. Professional values in implementation, uniformity between jurisdictions, linkages to other flood risk and water management alternatives and plans should be enhanced. If adequate resources are forthcoming, it should be possible to monitor the cumulative effects of exceptions and variances. Local land use regulators should at least have access to the knowledge of such effects, if not reinforcement in its application. The likelihood of two agencies (FEMA and the state) finding enough resources between them to do the needed follow-up should be greater than if only one were involved.

However, it should be noted that the greatest advantage in state involvement may be in the constitutional question of who has the authority to mandate a local government action. It would be clear under the New York statute that local compliance is indeed mandated. This is in addition to the incentive of the federal sanctions.

Flood Risk Management as an Example of Step-by-Step Policy Development. Public policy changes come in a series of incremental steps, rarely in large sweeping reforms. It is easier to get agreement for proposals for limited changes where the remedy is well defined and clearly linked to a particular problem. A national land use policy act or a comprehensive state land use control program is much more difficult. Uncertainty about who will be affected, and how, is enough to cut the chances for support. Linking housing objectives to flood plain management offers approaches that attract support. Several problems are posed by this process that should be recognized.

First, this is a remedial process of diagnosis and prescription. Changes in programs are made and their effect should be assessed, not only on the direct objective but on side effects as well. The response to the

changes will come first from those who have a direct, immediate and tangible stake. Those who are affected less directly, in smaller ways and less tangibly, will react more slowly if at all. And in today's fast moving world the turn around time for revising program changes is much shorter. This increases the burden on those who would represent the broader, more diffused interests.

Second, it is increasingly difficult to see how these many programs fit together, where they complement each other and where they counteract each other. It may be harder to do this at higher levels of government than at lower -- the system is so complex and responsibilities so specialized. Yet the local community seems to have so many constraints placed upon it from outside. Again, a special challenge is put to our community leadership to know their local situation and take responsibility for getting it reflected and understood at higher levels of decision making.

#### Housing and Flood Policy Come Together

Limited experience in other programs around the country has shown that housing and flood policy not only can come together, but should come together as part of a comprehensive approach to flood-plain management. It appears that at least part of the problem of how to decrease flood damages is a housing problem. Many residents of flood plains are simply unable to obtain housing beyond the flood-risk zone that meets their requirements: terms of cost, location and type. So they remain in flood-prone housing, enduring the constant threat of property damage and psychological trauma, and incurring the costs that result from disaster relief, flood insurance and low-interest loan programs designed to aid recovery.

recover, to get back to normal. As the memories fade, the public will to act fades. The course of action left is to seek to build sensitivity to flood risk into as many of our public actions as possible. For this to happen, private and public advocates of flood risk management are needed at every level of decision making.

The New Politics of Water Resources. Water development projects have traditionally been fueled with the energy of local support. (Ingram, 1972) Even though the Corps of Engineers is a major purveyor of such projects, an examination of their structure of decision making shows that they depend heavily upon local inputs. Local leaders provide much of the information required to define the project, and the Corps certainly depends upon them to obtain the several essential Congressional approvals required. In the past one Congressional representative would be reluctant to get involved in the project of another; most participants worked hard to move each project along as all had a positive stake in the process. With many more projects in the pipeline than could be built -- the backlog of authorized projects is well over a decade's investment -- strength of support and lack of local conflict were essential to a priority status.

This has changed with profound effects for flood risk management. Environmental groups in particular are often legitimate participants in the decision-making process. An environmental issue calls forth a constituency that cuts across project areas and Congressional districts. The threat of escalation to a national issue hangs over the simplest traditional project. And environmentalists are unlike more traditional interest groups who have participated in the past -- the water agencies have had little to offer that they want.



The prescription for this state of affairs has three parts (Allee and Ingram, 1972), all of which seem to be coming about. First, a broader bargaining arena would allow more interests to be accommodated. Flood control must be a part of a process that looks at many other concerns -- more than those that can be satisfied by multiple-purpose dams. Second, potential conflicts must be identified earlier; for them to be accommodated successfully, environmental problems must be surfaced even before the impact statement is written. Third, if the agency program mix is expanded it may be easier to find combinations of actions which will attract the necessary support.

A Realistic Federal Approach to Flood Plain Management Projects. In section 73 of the Water Resources Development Act of 1974, the Congress has signalled that it is willing to seriously consider putting federal funds into nontraditional approaches to flood risk management. It strengthened this signal by authorizing two projects that had not been recommended by the Office of Management and Budget. Essentially, any means to reduce flood risk that can pass the benefit to cost test is now eligible for at least 80 percent funding.

The two unconventional projects authorized are worth thinking about. They represent just the sort of long-run solutions that local governments have been unable to implement without outside incentives. Such approaches have been advocated for years but only rarely accomplished and then only with unusual leadership. It is perhaps time to make them the more usual approach.

The Charles River Project is simple enough in principle -- prevent the loss of the natural flood storage in the 15,000 acres of wetlands upstream from the flood areas. Filling, draining and building on these wetlands not

Flood policy incorporating a provision of housing options into flood plain management procedures can facilitate the adjustment of land use practices to flood risk. New housing policy directions that have been previously identified can provide the basis for this approach. There are abundant opportunities, for example, in a comprehensive, nonstructural program, to integrate the services of the private sector and government agencies. This can be done in flood mitigation measures, development of infrastructure, construction and rehabilitation of housing and other services. The combination of new housing construction with rehabilitation makes it possible to adjust present real estate to the realities of flood risk. At the same time, new opportunities are provided in low-risk areas. The use of monetary resources to facilitate relocation by supplementing rents and mortgage payments (a well-established housing program feature but a new goal) rather than to pay for flood damages makes sense.

Most important, both housing policy and flood policy have been moving in a similar direction in recent years. Emphasis on comprehensive planning, involving all aspects of the community or communities and the relationships among them, has been strong and getting stronger in both areas. Housing policy has emphasized the importance of the integration of new housing solutions into the community as a whole. Water resources policy has emphasized the integration of water projects with other approaches to resource management. It should be in the planning process, therefore, that the synergy of housing solutions and flood control remedies can be maximized.

Many recent changes in flood policy point to a readiness to move away from traditional emphasis on changes in channels and building of dams.

Most important are some project-level experimentation (e.g., Prairie du Chien), new congressional activity and interest (section 73), and the farreaching flood insurance program that builds upon years of flood plain information efforts. Linking flood and housing policy through a continuous planning process at the regional level looks promising.

## II. TUG FORK HOUSING TODAY

The critical shortage of decent housing in Central Appalachia has been documented not only by the US Census of 1970, but also by more recent studies. These include the report of West Virginia Governor's Task Force on Mountainous Housing Report, (HUD, 1978) annual reports of the West Virginia Housing Development Fund and Kentucky Housing Corporation, and reports of such organizations as Coalfield Housing and the Tug Valley Recovery Center. According to a West Virginia housing study, (West Virginia, 1977), "The lack of decent housing is one of the most serious problems facing the state." Rural areas, such as the Tug Fork Valley, have been identified as having the most acute housing need. McDowell County, for example, had 6,053 substandard units in 1970, or nearly 42 percent of its total occupied stock. (West Virginia, 1978)

The State of Kentucky has also identified housing problems that are especially acute in the Tug Fork area. The Kentucky Appalachia Development Plan reports:

The severe, long-standing housing shortage in Eastern Kentucky has been compounded by expanded coal production, by an influx of population and by disastrous floods in April, 1977. The Urban Studies Institute at Louisville conducted a housing needs analysis for the Kentucky Housing Corporation in 1977 which indicated a gross housing need for Kentucky Appalachia to be 130,770 housing units in 1975. The study also projected that 166,634 housing units would be needed by 1980.

The overwhelming obstacles to increasing the supply of housing in the Tug Fork River Valley have also been well documented by previous studies. In brief, they can be characterized as follows:

1. Lack of availability of suitable land on which to build. This can be attributed to two factors -- ownership of large tracts of land

for mineral rights, and the topography of the valley. According to the Report of the Working Group on Mountainous Housing, (HUD, 1978) two-thirds of all privately-owned land in the State of West Virginia is owned or controlled by large corporations, most of whom are absentee landlords. In addition, 85 percent of all land areas in West Virginia consist of slopes of 12 percent grade or steeper.

2. High development costs of housing sites are due to the topography of the land, lack of development of infrastructure, and ownership patterns. The State of Kentucky has found that, "In areas with large reserves of coal and limited developable land, it is not unusual for land to sell for \$40,000 to \$60,000 an acre including site-development costs and mineral rights ownership." (Kentucky Development Cabinet)
3. Absence of housing construction industry. Labor that has been trained in construction is usually employed in the mines. There are few trained carpenters, plumbers, masons, etc., available for housing construction.
4. Lack of financing mechanisms. Mortgages are extremely difficult to obtain, and financing terms are restrictive. Most are written for ten years at relatively high interest rates. Commercial banks are unwilling to make these loans, and there are no savings and loan associations in the Valley.
5. Lack of good transportation routes for material and prefabricated housing units. Roads leading into the valley are narrow and steep, limiting the size and weight of trucks that can transport either building materials or prefabricated units. Although the main line

of the Norfolk and Western Railroad runs through the valley, its primary function is the movement of coal. To this, the transportation of housing materials takes a poor second place.

6. Inappropriate construction regulations for subsidized housing.

FmHA and HUD regulations are written with the general U.S. housing situation in mind. They do not take into consideration the constraints of topography, land use and financing that exist in much of central Appalachia today.

The difficulties in increasing the supply of housing in the Tug Fork River Valley are compounded by severe flooding, which reduces the supply of existing housing. A recent study of the Spring 1977 flood, for example, estimates that 4,731 residential primary units in the study area were affected, including over 600 units that were totally destroyed. (Stanley, 1979) Thus, the supply of Tug Fork housing units is dealt a double blow. It increases little because of institutional, economic and environmental constraints, and it decreases from the effects of flooding. It is impossible to document accurately whether this balances out as a total increase or decrease of actual units. But it is probable that, if not fewer units, a decrease in overall quality of housing results, as exemplified by the continued occupancy in "temporary" HUD trailer parks.

The purpose of the housing section of the Tug Fork Valley Study is threefold: (1) To define the housing situation as it exists today in the Tug Fork Valley, (2) to identify some of the housing and location preferences of the residents, and (3) to suggest approaches to facilitate achievement of national housing goals for the people of the Valley.

Concern for the housing situation of Tug Fork Valley residents can be justified in several ways. From a pragmatic perspective, the Valley

contributes substantially to U. S. coal supplies. This production level is expected to increase as supplies of alternative sources of energy decline. If they are to continue or increase their level of production, miners and their families must live in housing that provides comfort and protection from the elements, at the very least. From a humanitarian perspective, it seems reasonable to attempt to provide housing that does not pose a constant threat of physical injury to its residents. For this constant threat, as previous experience has shown, can have longlasting effects in both emotional and physical well-being. (Erikson, 1976) But most important, it is consistent with federal legislation, in existence for over 30 years, to maintain an objective of decent, safe and sanitary housing for all the residents of the Tug Fork River Valley.

#### Characteristics of Tug Fork Housing

The first stage of the analysis of housing in the Tug Fork Valley is to characterize it on the basis of survey sample data. A few key variables are commonly used to describe the character of housing in a particular study area. Tenure (owner vs. renter) patterns give an indication of the stability of the housing market area, since renters are more likely to be mobile than owners. Presence of a bathroom is used as an indicator of housing quality. Persons per room and lot size provide information on crowding and density, which in turn are useful quality-of-life indicators. Financial data, such as mortgage debt burden and rent-income ratio are useful descriptions of housing costs being born by residents in the housing sample.

Frequency data for these key variables show how Tug Fork housing in general compares with housing in other non-metropolitan areas of the United States. (Figure 1) Tenure patterns are remarkably similar between Tug Fork and other non-metropolitan areas.

Frequency data, however, only give a very general picture of housing conditions. The central concern of this study is the relationship between housing and flooding. Therefore, the analysis should be more useful if housing characteristics can be broken down by flood risk category in order to locate the significant relationships. It might be hypothesized, for example, that housing at higher levels of flood frequency would be of lower quality because of frequent damage and the inability of residents to make costly repairs. It might also be hypothesized that residents in these high risk areas would more likely be old, poor and/or renters. Their housing choice is limited by socio-economic constraints, and they are traditionally most likely to be found occupying poorer quality housing.

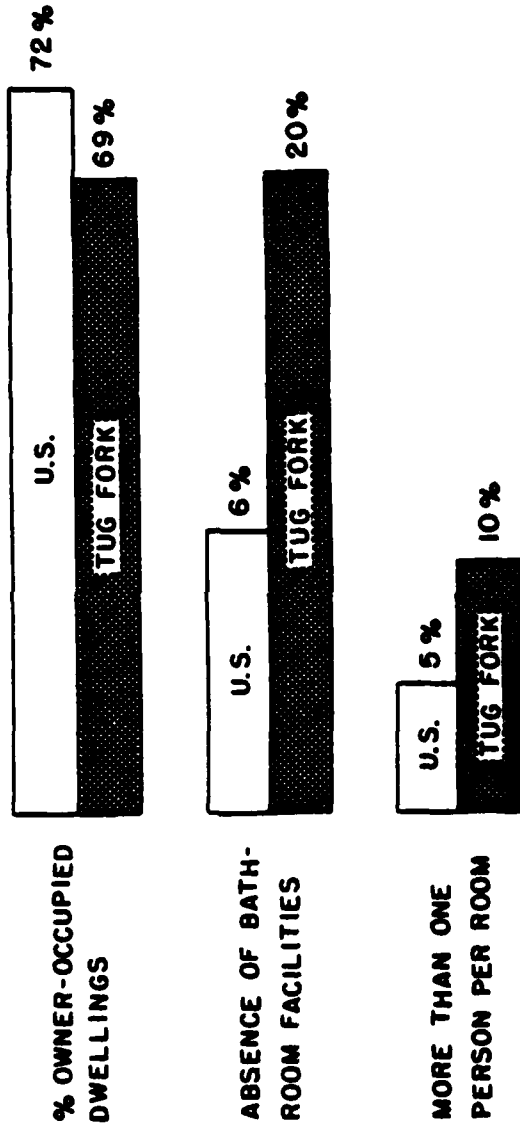
For the purpose of this analysis, households in the survey group have been organized into three categories: (1) Maximum risk, which includes HUD trailer households<sup>1/</sup> as well as those in the 5-year and 20-year flood frequency zones, (2) Moderate risk, including households in the 50- and 100-year flood frequency zones, and (3) Minimum risk, including households in the 500-year and SPF frequency zones and beyond. One hundred thirty-five households, or 48 percent of the sample, are in the maximum risk category; 55 households (20 percent) are in the moderate risk category; and 78 (28 percent) are in the minimum risk category. When housing variables

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1/ HUD trailer cases were omitted from the housing characteristics analysis, because their responses pertain to the HUD trailers and not to the houses that were destroyed in the 1977 flood.



**FIGURE 1. COMPARISON OF HOUSING CHARACTERISTICS IN TUG FORK WITH  
TOTAL U.S. NONMETROPOLITAN AREAS**



**SOURCE: ANNUAL HOUSING SURVEY (1976)  
TUG FORK SURVEY (1979)**

are broken down into these three categories, it should be evident whether such characteristics as home ownership, housing quality and crowding differ on the basis of flood risk.

Table 1: The Relationship Between Housing Tenure and Flood Risk Zone, Tug Fork River Valley, 1979 (N=191)

Tenure	Minimum	Risk Zone Moderate	Maximum
		Percentage	
Owners	81.8	89.1	76.3
Renters	13.0	9.1	23.7
Other	<u>5.2</u>	<u>1.8</u>	<u>0.0</u>
Total	100.0	100.0	100.0

$\chi^2 = 8.63, 4df$

Significance = 0.071

There is some tendency for a higher proportion of households in the maximum risk zone to be renters than in other zones, although the difference is not highly significant. (Table 1) Nearly 24 percent of the households in the maximum risk zone are renters, while only 9 percent in the moderate zone and 13 percent in the minimum zone are renters. The higher occurrence of rental housing in the maximum risk zone is indicative of the less stable housing condition there, and may also reflect the undesirability of homeownership in such a high-risk location.

Table 2: The Relationship Between Housing Quality and Flood Risk Zone as Measured By Presence of Bathroom, Tug Fork River Valley, 1979 (N=190)

Bathroom	Minimum	Risk Zone Moderate	Maximum
		Percentage	
Yes	31.8	77.8	81.4
No	<u>18.2</u>	<u>22.2</u>	<u>18.6</u>
Total	100.0	100.0	100.0

$\chi^2 = 0.368, 2 \text{ df}$

Significance = 0.832

There is no significant difference in housing quality as measured by the presence or absence of bathroom facilities among the three flood risk zones. (Table 2) Housing units without indoor plumbing range from 18.2 percent in the minimum risk zone to 22.2 percent in the moderate risk zone. It should be noted here, however, that the Tug Fork Household Survey used only a simple measure of whether or not there was a bathroom in the housing unit. No attempt was made to determine what facilities were included in the bathroom, and whether or not they were functioning. It is possible that more detailed data might have shown more significant differences among the zones.

Table 3: The Relationship Between Persons Per Room and Flood Risk Zone, Tug Fork River Valley, 1979 (N=191)

Persons Per Room	Minimum	Risk Zone	Maximum
		Moderate	
Percentage			
1 or less	97.4	100.0	93.2
more than 1 to 2	2.6	0.0	5.1
more than 2 to 3	<u>0.0</u>	<u>0.0</u>	<u>1.7</u>
Total	100.0	100.0	100.0

$$\chi^2 = 5.188, 4df$$

$$\text{Significance} = 0.269$$

In looking at the relationship between persons per room (a measure of crowding) and flood risk zone, no highly significant differences were found. (Table 3) The moderate risk zone was the least crowded, with all of the housing units having one person per room or less. The maximum risk zone had the highest level of crowding, with 1.7 percent of the units having more than 2 to 3 persons per room, and 5.1 percent having more than 1 to 2 persons per room. In other words, nearly 7 percent of the dwellings in the maximum flood risk zone were crowded, while only 2.6 percent in the minimum risk zone and none in the moderate risk zone were crowded. While the difference is not statistically significant, it is again indicative of poorer quality housing in the maximum risk zone.

Table 4: The Relationship Between Number of Rooms in the Housing Unit and Flood Risk Zone, Tug Fork River Valley, 1979 (N=191)

Number of Rooms	Maximum	Risk Zone	Maximum
		Moderate	
		Percentage	
3	2.6	1.8	1.7
4	14.3	5.5	18.6
5	29.9	29.1	28.8
6	33.8	30.9	28.8
7	13.0	20.0	15.3
8	5.2	3.6	6.8
9	0.0	3.6	0.0
10	<u>1.3</u>	<u>5.5</u>	<u>0.0</u>
Total	100.0	100.0	100.0

$\chi^2 = 15.296, 14df$

Significance = 0.3582

There is some slight indication that housing units in the maximum risk zone are smaller than those in the other two zones. (Table 4) But again the results are not statistically significant. For example, 49.1 percent of the units in the maximum risk zone have 5 rooms or fewer, as opposed to 46.8 percent of the units in minimum risk zone and 36.4 percent in the moderate risk zone. None of the sample households in the maximum risk zone were over 8 rooms, while 1.3 percent in the minimum risk zone and 9.1 percent in the moderate risk zone were.

Table 5: The Relationship Between Size of Lot and Flood Risk Zone, Tug Fork River Valley, 1979 (N=165)

Size of lot	Minimum	Risk Zone	Maximum
		Moderate	
		Percentage	
Same as house	4.3	4.3	0.0
Less than 1/8 acre	39.1	37.0	54.0
1/8 to 1/4 acre	27.5	17.4	18.0
1/4 to 1/2 acre	7.2	19.6	18.0
1/2 to 1 acre	8.7	15.2	10.0
Over 1 acre	8.7	6.5	0.0
Other	<u>4.3</u>	<u>0.0</u>	<u>0.0</u>
Total	100.0	100.0	100.0

$\chi^2 = 19.302, 12df$

Significance = 0.082

When housing density is measured by lot size, it appears that density levels are somewhat greater in the maximum risk zone than in the other risk zones. (Table 5). Ninety percent of the sample dwelling units in the maximum risk zone were one-half acre or smaller, while approximately 78 percent of the dwelling units in the minimum and moderate zones were in this size category. None of the dwelling units in the maximum risk zone were on lots over one acre in size, while 6.5 percent of those in the moderate risk zone and 13 percent of those in the minimum risk zone were in this category.

This brief analysis of housing characteristics in the Tug Fork River Valley has shown some interesting variations by flood risk zone. However, most of them are not statistically significant. It appears likely, on the basis of the data, that there will be a higher proportion of rental households in the maximum risk zone, and a greater density of housing units.

Less clear is the relationship between flood risk zone and such variables as bathroom facilities, crowding and size of unit, although there is some indication that units in the maximum risk zone are more crowded and smaller.

Perhaps the most telling figures are those that give some feeling for the "quality of life" component of the housing supply. In addition to limited size of both house and lot, 57 percent of the housing units were in the maximum risk zone, and 19 percent had no indoor plumbing. It may not be possible to identify significant differences among flood frequency levels. But it is possible to characterize much of the housing in the valley as failing to meet the standards for decent, safe and sanitary housing.

#### Characteristics of Tug Fork Households

Another perspective on the housing in a particular study area is obtained when the characteristics of the household units occupying that housing are examined. Are the residents of the housing rich or poor? Old or young? Married or single? Different population groups have different housing needs: families with young children need play space; elderly households may require special features for the handicapped; and singles often look for recreational facilities as well as housing. A demographic profile of the population in the valley, then, gives us some idea of what future housing needs might be. It also shows us how good the "fit" is between households and the housing they currently occupy. A further refinement of the analysis breaks down these demographic characteristics by flood risk zone. This reveals if there is any variation in the distribution of population groups on the basis of flooding.

Table 6: The Relationship Between Type of Household and Flood Risk Zone, Tug Fork River Valley, 1979 (N=267)

Type of Household	Risk Zone		
	Minimum	Moderate	Maximum
	Percentage		
Husband-wife, no children	22	26	17
Husband-wife, children	40	35	41
Single parent	4	13	9
Primary individual	18	17	21
Unrelated group	0	0	2
Extended family	17	11	10
Other	<u>0</u>	<u>0</u>	<u>1</u>
Total	100	100	100

$\chi^2 = 10.67, 12df$

Significance = .557

The largest group when the sample is broken down by type of household is the husband-wife with children group. This is followed in order by frequency by husband-wife households without children and primary individuals. There is a slightly higher percentage of primary individuals in the maximum-risk zone and of husband-wife families in the minimum- and moderate-risk zones. However, there are no significant differences statistically between risk zones in terms of household type.



Table 7: The Relationship Between Age of Household Head and Flood Risk Zone, Tug Fork River Valley, 1979 (N=255)

Age of Head	Risk Zone			Total
	Minimum	Moderate	Maximum	
	Percentage			
19-24 years	30.8	23.1	46.2	100.0
25-35 years	7.7	17.9	74.4	100.0
36-45 years	38.7	22.6	38.7	100.0
46-64 years	34.9	19.3	45.9	100.0
65 years and over	27.0	22.2	50.8	100.0

$\chi^2 = 14.657, 8df$

Significance = 0.0662

The breakdown of age of household head by flood risk zone indicates that there are differences in distribution by age among the flood risk zones. The maximum risk zone has a significantly higher percentage of households in which the head is between 25 and 35 years of age. Other age groups are distributed more evenly throughout the flood risk zone. Contrary to some other research that indicates a higher percentage of elderly in maximum risk flood areas, the Tug Fork sample does not find this to be true. Although slightly more than 50 percent of households in which the head is over 65 years of age are located in the maximum risk zone, this is no more than might be expected based on the fact that 50 percent of all the sample households are in the maximum risk zone.

Table 8: The Relationship Between Total Household Income and Flood Risk Zone, Tug Fork River Valley, 1979 (N= 198)

Income (\$)	Risk Zone			Total
	Minimum	Moderate	Maximum	
	Percentage			
0 - 1,999	0.0	16.7	83.3	100.0
2,000 - 4,999	15.6	12.5	71.9	100.0
5,000 - 9,999	19.3	21.1	59.6	100.0
10,000 - 19,999	38.3	18.3	43.3	100.0
20,000 - 29,999	32.1	35.7	32.1	100.0
30,000 - or more	46.7	33.3	20.0	100.0

$\chi^2 = 24.839, 10 \text{ df}$

Significance = 0.0057

The data for income also show significant differences by flood risk zone. Low-income families with household incomes below \$5000 per year are heavily concentrated in the maximum risk zone. More than 83 percent of households in the below \$1,999 range and nearly 72 percent of households in the \$2,000 to \$4,999 range are in this location. While the difference is not nearly as dramatic, upper income households -- those making more than \$30,000 per year -- are more likely to be found in the minimum risk zone.

Table 9: The Relationship Between Size of Household and Flood Risk Zone, Tug Fork River Valley, 1979 (N=266)

Size of household	Risk Zone			Total
	Minimum	Moderate	Maximum	
	Percentage			
1	28.0	18.0	54.0	100.0
2	28.8	26.0	45.2	100.0
3	44.6	23.2	32.1	100.0
4	31.4	20.0	48.6	100.0
5	9.5	19.0	71.4	100.0
6	7.7	23.1	69.2	100.0
7	33.3	0	66.7	100.0
8	12.5	0	87.5	100.0
9	0	0	100.0	100.0
10	0	0	100.0	100.0

$\chi^2 = 28.180, 18df$

Significance = 0.0594

The distribution by size of households shows that there is a significantly higher proportion of single-person households and large households (more than 5 persons) in the maximum risk zone. The preponderance of single-person households in this location is related to age, since single-person households in the Tug Fork River Valley are more likely to be elderly than any other age group.

In terms of household characteristics, then, it appears that the households in the maximum flood risk zone are significantly different from those in the moderate and minimum risk zones in several ways. They are likely to be low-income households in which the household head is either elderly or young adult. Households are likely to be very small -- probably single elderly -- or quite large. The characteristics of these maximum-

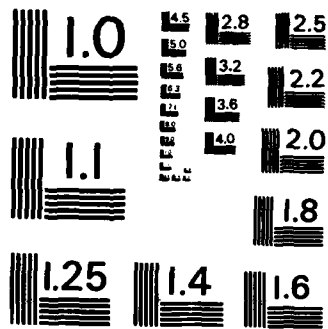
risk households give some indications for the kind of housing needs that would have to be met if alternative housing were to be provided. At least two types of housing need are evident: (1) Housing designed to meet the needs of single elderly, and (2) Housing designed to meet the needs of large young families with children. The analysis of housing preferences will further define what form this housing must take in order to not only meet the needs of these households, but also provide them with an incentive to move out of their high-risk location.

#### Housing Finance Patterns

A rule of thumb frequently used in evaluating housing cost burdens is that a household should not spend more than 25 percent of income for housing. This would be especially true, of course, for low-income households. According to the survey, 51 percent of the renters in the sample were paying more than 25 percent of income for rent. Since many of these households are undoubtedly in the low-income category, it is conceivable that they might qualify for the federal rental assistance program (Section 8). This would be true in either the housing they currently occupy or in new or rehabilitated housing to which they might move.

Among the owners, only 17 percent were paying more than 25 percent of their incomes for housing. This is partially a reflection of the small proportion of owners who have mortgages on their homes: 33 percent. Sixty-one percent of the homeowners in the sample had no mortgage on their homes, while 6 percent gave no response to the question. It is apparent from these statistics that many homeowners in the sample are not accustomed to paying a large proportion of current income for housing. This unusual situation is important in terms of future housing options, for it may be





MICROCOPY RESOLUTION TEST CHART  
 NATIONAL BUREAU OF STANDARDS-1963-A

that strong financial incentives may have to be offered to Tug Fork River Valley residents to attract them to new housing. Willingness to move may be tempered by the fact that the housing financial burden is considerably lower in current housing, no matter how great the risk of flooding.

It is well known that one of the reasons for the limited supply of housing in the Tug Fork River Valley is lack of mortgage money. Savings and loan associations, a primary source of housing funds in other parts of the country, are non-existent in Tug Fork. Residents who are fortunate enough to obtain mortgages are dependent on commercial banks and government sources. Forty-nine percent of the households in the sample had mortgages with commercial banks, 46 percent made use of financing from government sources such as FmHA and SBA. Other sources made up the remaining 4 percent.

Even when a household can obtain financing from a commercial bank, however, the terms are prohibitive. Local mortgage loans usually run for only 10 to 12 years, and interest rates are high. An additional complication is the fact that borrowers may have difficulty keeping up the value of their houses so that it equals the size of the outstanding loan. This problem, of course, is exacerbated by the constant flooding.

One source of home financing for West Virginia residents of the Tug Fork River Valley is Single-Family Mortgage Program Bonds (1979 Series A). This is a mortgage loan purchase program under which the State Housing Development Fund purchases mortgages from participating lending institutions. These are used for the purchase or rehabilitation of single-unit owner-occupied housing. The Housing Development Fund had about \$1 million set aside for the Tug Fork River Valley that was to be obligated by January

9, 1980. Applications to date have come primarily from the Newtown subdivision. It is possible that more money will be available after January 9 because of funds resulting from recapture.

A similar program is available for households on the Kentucky side of the Tug Fork River. The Kentucky Housing Corporation (a state agency) provides

"below market interest rate financing for single and multi-family housing, land acquisition and development, construction, and rehabilitation of housing for sale or rent to persons or families of lower income. The funds for these loans come from tax exempt bonds, which sell at several points below the regular market rate because of their favorable tax treatment." (Koebel, 1979)

Fortunate residents of the Tug Fork Valley who can qualify may be eligible for one of the units of subsidized housing in varying stages of planning or construction. Subsidized housing is made available through various combinations of state and federal programs. Federal housing programs currently in use in the Valley originate from both HUD and FmHA, and include:

HUD Section 8 - a rental assistance program for low-income families that are paying more than 25 percent of income for rent. The program applies to new, existing and rehabilitated housing.

FmHA 502 - a home ownership loan program for low- and moderate-income rural families who cannot otherwise obtain credit on reasonable terms. Loans may be used to buy, construct, relocate, rehabilitate, improve or weatherrize a dwelling and related facilities.

FmHA 515 - provides loans for rental housing for low- and moderate-income rural families and for rural elderly.

Both West Virginia and Kentucky make use of these housing programs, usually in combination with state funding. West Virginia, for example,



finances site development costs from the Housing Development Fund (and, if appropriate, from supplementary disaster funds). Actual construction is usually financed through the federal programs. The Housing Development Fund also helps those families whose incomes are too low to qualify for the FmHA 502 Program.

A problem experienced by both Kentucky and West Virginia is that site development costs are so high that they price new housing beyond the range of low-income families in spite of the government subsidy. The only solution is to find a means of "writing off" site development costs. This is one way in which federal disaster funds have been used.

West Virginia has currently underway in the three counties of the Tug Fork Valley: 293 single-family units, 395 units for the elderly and 58 multi-family rental units. Kentucky has plans for, or is already constructing, 569 multi-family units and 233 units for family and elderly. (See Table 10)

Mingo	Newtown Sub-division	51	Single Family	FHA 502, HUD Disaster CDRC Funds	Houses being marketed.
Mingo	Big Nuncy Subdivision	74	Single Family	FHA 502, HUD Disaster CDRC Funds	Under construction.
Mingo	Laurel Creek Subdivision	130	Single Family		Construction awaiting outcome of litigation between State of West Virginia and Cotiga Corporation.
Wayne	Charter House	70	Elderly	HUD Section 8	Construction anticipated in 1980.

Source: W. Virginia Housing Development Fund; July 1979.

County	Project Name	No. of Units	Type of Units	Funding Source(s)	Status of Project
			Kentucky		
Martin	Dampsey Project	160	Multi-Family	ARC/Section 8	Has final commitment at HUD
Martin	Mulison Project	100	Multi-Family	ARC	Planning
Pike	Tug Fork District	114	Multi-Family	ARC/Section 8	Approval pending submission of technically acceptable proposal.
Pike	Douglas Project	233	Family and Elderly	ARC/Section 8	Site Development
Pike	Happy Hollow	75	Multi-Family	ARC/HUD Housing	Pending HUD approval.

Source: Kentucky Housing Development Fund; August 1980.

Table 10: Subsidized Housing in the Tug Fork Valley, Tug Fork River Valley Survey, 1979

No. of County	Project	Funding Units	Type	Source(s)	Status of Project
West Virginia					
McDowell	Gary Subdivision	26	Single Family	FHA 502	Two houses complete, remaining lots available under FHA 502, and conventional financing.
McDowell	Welch Elderly	100	Elderly	HUD Section 8	Construction anticipated in early 1980, mid 1980.
McDowell	Coalwood Elderly	50	Elderly	HUD Section 8	Construction anticipated in 1980, currently being processed by HUD.
McDowell	Roxkridge Sub-division	?	Single Family		Very early stages. Land being negotiated. Number of sites still undetermined.
Mingo	Rawl Subdivision	12	Single Family	Division of Housing (now part of W. Va. Housing Development Fund)	Under construction.
Mingo	Creekwood Apartments	58	Family Rental	FHA 515, HUD Section 8, HUD Disaster CDRC Funds	FHA loan closing anticipated.
Mingo	Smith Towers	100	Elderly	HUD Section 8, HUD Disaster CDRC Funds	Under construction.
Mingo	Williamson Towers	75	Elderly	HUD Section 8, HUD Disaster CDRC Funds	Under construction.

### III. WILL TUG FORK FAMILIES MOVE?

The concept of residential mobility has consistently occupied the attention of demographers, geographers and other social scientists. Residential mobility is usually defined as moving that involves short-distance moves, generally not across state boundaries, and not resulting from a change in employment status. As such, residential mobility is differentiated from migration. Migration involves long-distance moves that usually result from a change in employment status (either transfer, change of jobs or retirement). Residential mobility, by definition, is not primarily determined by employment changes. Therefore, it tends to reflect voluntary location changes more closely related to household preferences resulting from a variety of household characteristics.

#### National Mobility Trends

Almost 20 percent of the total American population changes residence annually, a statistic that has stayed relatively constant since the 1940s. About 6 percent can be considered migrants; 14 percent are engaged in what is termed residential mobility. This contrasts with the Tug Fork study group, in which 44 percent of the households have been in their homes for more than ten years, and 13 percent for six to ten years. Tug Fork residents, therefore, are much less mobile than households in other parts of the country.

Research in the area of residential mobility has identified a variety of household characteristics that influence moving behavior. One characteristic is age -- or, more specifically, the age of the household head. This, along with such characteristics as marital status and number of children, serves to identify the position of the family in the family life

cycle. Research indicates that households in which the head is younger than 35 years of age are more likely to be mobile. These households are likely to be single or two-person households, without children. Their mobility rate is considerably higher than that of families with children and of older households whose children have been launched.

Mobility rate is defined as the ratio of movers to the total population multiplied by 100. Recent research (Spears, Goldstein and Frey, 1975) has identified mobility rates at different stages of the family life cycle as:

Never married	7.0
Just married	87.5
Married (by age of household head)	
18-29	25.4
30-44	9.0
45-64	5.3
65+	4.2
Divorced and separated	17.2

The variation in mobility among these households is related not only to age of the household head, but also to tenure -- whether the family currently owns or rents its housing. Young singles and young, childless couples are more likely to be renters, while those with children are more likely to be homeowners. Older couples whose children have left home are likely to remain in the home that they have owned throughout the child-rearing years. But there is a tendency for a change of residence and tenure at retirement or upon the death of a spouse.

Tenure, therefore, is also a characteristic that relates to mobility -- both as an independent factor and as it correlates with a household's

position in the family life cycle. Taken independently, it has been consistently found that renters are more mobile than owners in all age and income groups. (According to Speare, Goldstein and Frey, 1975, renters had a mobility rate of 17.5, while owners had a mobility rate of 4.5). This relationship is not difficult to understand, since renters generally have far less invested in their housing -- both emotionally and financially -- than owners. In addition, households whose location plans are uncertain or whose incomes tend to be unstable are more likely to select rental housing.

Another household characteristic that has been found to be related to mobility is crowding. The crowding measure most commonly used in mobility studies is the one found in the United States Census: a ratio of more than 1.0 person per room is considered crowded. A ratio of more than 1.5 persons per room is considered severely crowded. The Speare, Goldstein and Frey research identified the following simple relationships between crowding and mobility:

<u>Persons per Room</u>	<u>Mobility Rate</u>
0 - .31	7.6
.32 - .58	8.5
.59 - .97	9.8
1.00 +	16.6

Various attempts have been made to refine this crowding measure to incorporate social values associated with the concept of crowding into the person-per-room ratio. The "bedroom deficit" concept developed by Morris and Winter (1978) is one of these. According to Morris and Winter, the simple designation of more than one person per room as "crowding" does not reflect the American social values. These pertain to bedroom utilization

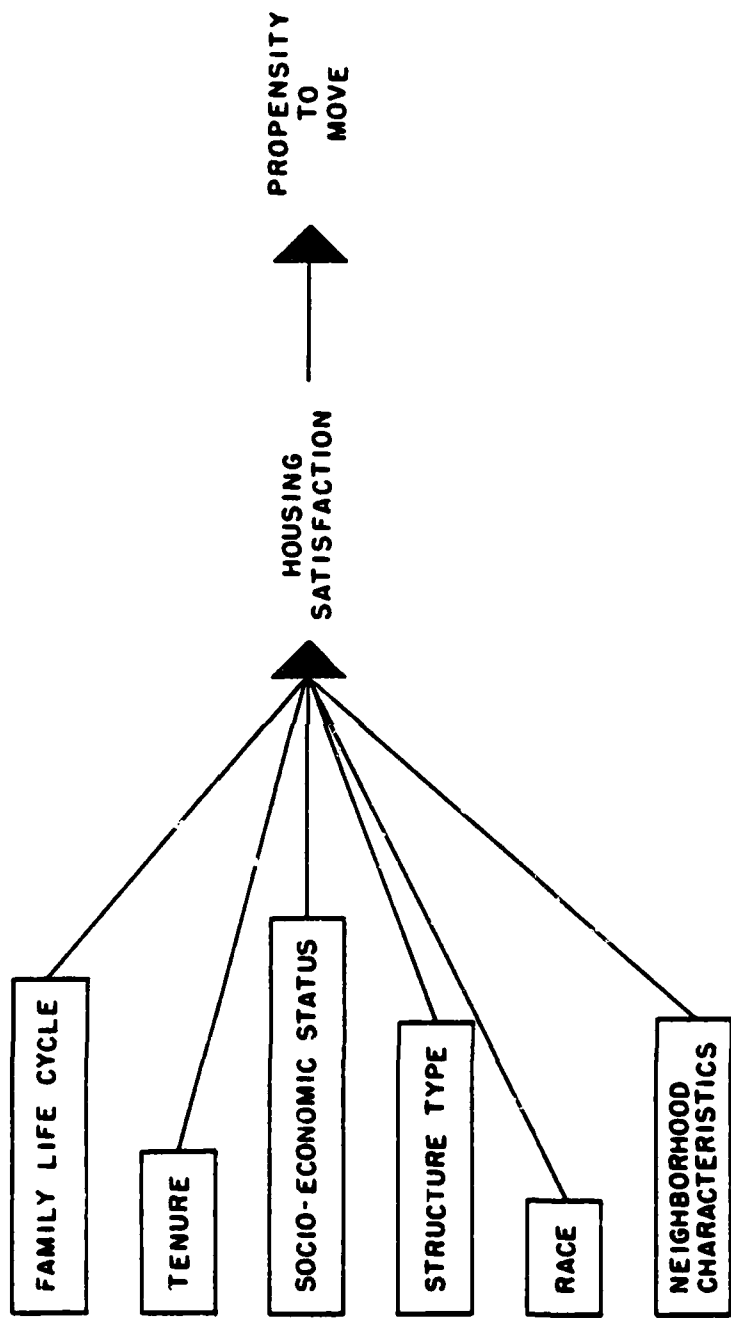
and the social sanctions against the sharing of bedrooms by family members of different sex and age. The "bedroom deficit" concept, therefore, considers a household crowded, even if there is no more than one person per room if a "bedroom deficit" exists.

Income also tends to be a factor in mobility, although the relationship is not as clear as it is in the cases of family life cycle and crowding. Most research indicates that low-income households are more likely to move than higher-income households, although the mobility rate may rise again at the highest income levels.

Extensive research on residential mobility, therefore, has shown that a variety of household and housing characteristics affect mobility. They determine how satisfied people are with their housing and how they perceive it to "fit" their definition of adequate housing. These relationships can be expressed in a path model that is commonly used as an explanation of the process of residential mobility. (See Figure 2)

Based on previous research, it can be expected that the households in the Tug Fork Valley most likely to express a desire to move will be renters, the elderly and households experiencing crowding. An additional factor that might also stimulate mobility, specific to Tug Fork, would be flood experience. Conventional wisdom holds to the idea that residents of flood plains do not desire to move. However, little research has been done to confirm or deny this thesis -- especially in the absence of income and other constraints to moving choice. According to Kates (Cunlap and Catten, 1979), mobility -- relocation away from the flood plain -- can be expected as a mode of adjustment to avoid natural disaster. This behavior is not evident in the Tug Fork River Valley, as mobility statistics indicate. However, it is possible that more mobility would occur if opportunities to

FIGURE 2. THE PROCESS OF RESIDENTIAL MOBILITY





move were made available. The next section investigates whether there is a willingness, or propensity, to move in Tug Fork that might lead to moving behavior if housing options were provided.

#### Willingness to Move in the Tug Fork Valley

The 278 survey households in the Tug Fork Valley were asked the question: "If decent, affordable housing were available to you outside the floodplain, would you be willing to move?" According to frequency data from the survey, more than 66 percent of the respondents would be willing to move. The responses to the survey are an expression of attitudes toward moving, not actual moving behavior, which may be constrained by income and availability of housing. However, comparisons of responses to propensity to move questions have found a sufficiently high correlation between positive attitudes toward moving and moving behavior. Thus, an affirmative response to the question can be considered significant indication of potential future mobility.

Taken as a whole, then, the sample population in the Tug Fork Valley, contrary to conventional wisdom, has expressed an overwhelming desire to relocate from the flood plain. Why, then, is the idea so pervasive that residents of the flood plain are unwilling to move? The answer may lie in the difference between attitudes toward moving and actual behavior. While a high proportion of the residents have expressed a desire to move, actual mobility of Tug Fork households has been limited. According to the data, 19.4 percent of the households have lived in their homes for one year, 23.7 percent for 2-5 years, 12.9 percent 6-10 years, and 43.9 percent for more than 10 years. According to previous research, the desire to move may not be manifested in moving behavior because of such constraints as lack of income and financing, and unavailability of housing.

### Characteristics of Potential Movers

Previous research has hypothesized that households expressing a willingness to move are likely to be either young (household head under 35) single-person households, households experiencing crowding, and/or renters. The cross tabulations in Tables 11, 12, 13 and 14 show relationships among these variables.

There is a significant difference by age in the propensity to move. (Table 11) Young households -- those with a household head under 35 -- are much more likely to be willing to move than older households. The oldest households -- those with a household head over 65 years of age -- were least likely to move. These results confirm the general life-cycle theory. Households with heads over 65 are unlikely to want to move unless they experience a disruption such as retirement or death of a spouse.

Table 11: Propensity to Move by Age of Household Head, Tug Fork River Valley, 1979 (N= 263)

Age of Household Head	Yes	No	Total
	Percentage		
19-24	78.6	21.4	100.0
25-35	85.4	14.6	100.0
36-45	71.9	28.1	100.0
46-64	67.9	32.1	100.0
65 +	50.0	50.0	100.0

$\chi^2 = 15.91274, 4df$

Significance = 0.0031

Table 12: Propensity to Move by Family Type, Tug Fork River Valley Survey, 1979 (N = 278)

Family Type	Yes	No	Total
Percentage			
Husband-wife, no children	57.9	42.1	100.0
Husband-wife, w/children	78.9	21.1	100.0
Single Parent w/children	68.2	31.8	100.0
Primary Individual	48.1	51.9	100.0
Unrelated Group	50.0	50.0	100.0
Extended Family Group	71.9	28.1	100.0
Other	100.0	0.0	100.0

$\chi^2 = 18.62393, 6df$

Significance = 0.0048

In this case, results are unexpected in terms of the family life-cycle model, which postulates that movers are most likely to be single-person households and primary individuals. In the Tug Fork sample, at least, the family groups most likely to want to move are husband-wife families with children and extended family groups. One probable explanation for the low positive response among primary individuals is that most of this group in the sample are elderly. They have a much lower probability of willingness to move than young singles who are also primary individuals. There are few young singles in the Tug Fork sample.

Table 13: Propensity to Move by Persons per Room, Tug Fork River Valley Survey, 1979 (N = 274)

Persons per Room	Yes	No	Total
	Percentage		
0 to 1.0	64.9	35.1	100.0
more than 1-2	89.5	10.5	100.0
more than 2-3	85.7	14.3	100.0

$$\chi^2 = 5.946, 2df$$

$$\text{Significance} = 0.0512$$

Data on the relationship between crowding and willingness to move conform to the general hypothesis that crowding is a predictor of higher mobility rates. Households with more than one person per room are much more likely to answer affirmatively to the moving question than those with less than one person per room. However, there is no significant difference between households that are crowded (one to two person per room) and those that are severely crowded (more than two to three persons per room).

Table 14: Propensity to Move by Tenure, Tug Fork River Valley Survey, 1979 (N = 274)

Tenure Status	Yes	No	Total
	Percentage		
Own	60.8	39.2	100.0
Rent	80.8	19.2	100.0
Other	75.0	25.0	100.0

$$\chi^2 = 9.85437, 2df$$

$$\text{Significance} = 0.0072$$

The results of this analysis confirm the general hypothesis that renters are more mobile than owners, although a large proportion of owners have also indicated a willingness to move.

Table 15: Relationships Between Propensity to Move and Position of Household in the Floodplain, Tug Fork River Valley Survey, 1979  
(N = 278)

Flood Frequency	Yes	No	No Response	Total
	Percentage			
HUD trailers	77.6	21.1	1.3	100.0
5-year	72.7	27.3		100.0
20-year	64.9	35.1		100.0
50-year	42.3	53.8	3.8	100.0
100-year	65.5	31.0	3.4	100.0
500-year	70.6	29.4		100.0
SPF	55.6	44.4		100.0
Minimum Damage	59.6	40.4		100.0
Flood Zone not Indicated	70.0	30.0		100.0

$\chi^2 = 17.82802, 16df$

Significance = 0.3341

Although differences are not significant, the data show some interesting variations in willingness to move related to position in the flood plain. As might be expected, residents of HUD trailer parks are most likely to express a desire to move. This high positive response is undoubtedly due to a combination of factors. A flood experience in which their homes were totally destroyed has been compounded by the experience of living in "temporary" disaster housing for more than two years after being displaced. Residents of the five year flood plain also had a high rate of positive response, indicating a relationship to flood experience. Residents of the SPF and minimum damage ranges, as might be expected, showed a lower rate of response.

The low reponse of residents in the 50 year flood plain and high re-  
sponse in the five year flood plain do not conform to the general pattern.  
This indicates that flood experience alone cannot be used to predict moving  
behavior -- at least in the Tug Fork sample.

Data on propensity to move, therefore, seem to indicate that a large  
number of residents in the Tug Fork Valley would be willing to move out of  
the flood plain, regardless of household and housing characteristics, if  
such housing were made available to them. However, younger households --  
in which the head is 35 or younger -- including husband, wife and children  
appear to be the households most receptive to new housing. Other candi-  
dates to which new housing might be appealing would be extended family  
groups, single-parent households and renters of all ages.

The elderly appear least willing to move. However, even in this age  
group, 50 percent of the sample population evidenced a willingness to move.  
Even a percentage of this magnitude, while it is lower than other age  
groups, would provide a large enough target group for some specialized  
housing opportunities.

#### IV. WHAT KINDS OF HOUSING ARE PREFERRED?

Very little is known about the housing preferences of Americans in general, or of specific population groups. But if new housing opportunities are to be provided to residents of the Tug Fork River Valley, it is important to have some idea of the form those opportunities should take and the groups of residents to whom they should be directed. As part of the current survey, respondents were asked questions pertaining to their satisfaction with the housing they currently occupy, their willingness to move to a new location and the kind of housing they would most like to have in the future. Respondents were also categorized by stage in the family life cycle, socioeconomic status, and current exposure to flood risk, so groups most willing to take advantage of new housing opportunities could be identified.

An analysis of housing preferences is significant for several reasons. It not only identifies the kind of housing most preferred by respondents but also identifies some preferred alternatives if the first choice is not feasible. This is especially significant at a time when fewer families can expect to own single-family homes -- a situation that is even more acute in the Tug Fork River Valley.

Knowledge of housing preferences enables planners at all levels of government to provide housing programs that are responsive to the populations to whom they are directed. In the case of the Army Corps of Engineers, the survey of housing preferences provides an opportunity for local public participation in the comprehensive plan for the Tug Fork River Valley.

Housing is an important component of the quality of life. If it is to be even partially improved for Tug Fork residents through improvement of housing conditions, location in a flood-free zone is only one consideration. Additionally, new housing opportunities must incorporate features viewed by the residents as components of satisfactory housing.

#### Satisfaction with Present Home

The first step in the housing preferences analysis was to find out something about how Tug Fork residents view their present living situation. This included the house itself and the immediate surroundings -- yard and neighborhood. Respondents were asked what they liked most and least about their current home (Table 16 and 17).



Table 16: What Tug Fork Residents Like Most About Their Current Home,  
Tug Fork River Valley, 1979

Characteristic	Number	Percent
Location (close to work, school, etc.)	56	20.1
Sentimental value	34	12.2
Like everything	31	11.2
Don't like anything	25	9.0
Interior space	23	8.3
Other	17	6.1
Provides basic shelter	16	5.8
Design or construction	15	5.4
Comfort, homyness	12	4.3
Amount of privacy	11	4.0
Exterior space	9	3.2
Condition of structure	8	2.9
Tenure status	7	2.5
Location in flood plain	3	1.1
No response	<u>11</u>	<u>4.0</u>
Total	278	100.0

Table 17: What Tug Fork Residents Like Least About their Current Home, Tug Fork River Valley Survey, 1979

Characteristics	Number	Percent
Like everything	105	37.8
Location in flood plain	47	16.9
Interior space	29	10.4
Condition of structure	22	7.9
Design or construction	10	3.6
Don't like anything	8	2.9
Location (close to work, shopping, etc.)	8	2.9
Exterior space	6	2.2
Amount of privacy	4	1.4
Tenure status	2	.7
Comfort, homeyness	2	.7
Other	19	6.8
No response	<u>16</u>	<u>5.8</u>
Total	278	100.0

The location of the house, curiously, is an important factor in both housing satisfaction and housing dissatisfaction. Residents like the fact that their housing is conveniently located and is close to work, school, church and other activities. At the same time they dislike the fact that it is located in the flood plain. At this point in time in the Tug Fork Valley, it is almost impossible to have a convenient location without also being at some flood risk.

The importance of location to the respondents is of interest in terms of planning. Certainly no housing options, no matter how appealing the

unit may be, will be visible unless consideration is also given to accessibility to employment and community activities. In fact, it may even be necessary to offer options to some of these community institutions to follow the residents to new housing locations in order to maintain accessibility and contact.

The relatively high rating given to the sentimental value of the house is an indication that Tug Fork residents perceive their homes as something more than basic shelter. Many housing researchers have probed the question of the symbolic value of housing, but probably no study has more relevance here than Fried's "Grieving for a Lost Home". (Fried, 1963) Fried discovered, in a study of Boston families relocated for an urban renewal project, that housing that may be considered substandard by outsiders is actually valued higher by its residents. This is because of close bonds among neighbors and extended families living near each other.

Tug Fork residents also have these close neighbor and family bonds, so they can exhibit a relatively high level of housing satisfaction at the same time that many structures appear to be of poor quality. The message here is that the housing problem will not be solved merely by improving the physical quality of housing. We must recognize the symbolic value of the house and its linkages to other households, as well.

This point was particularly well illustrated during the pretesting of the questionnaire when there was some uncertainty about using the term "house" or "home" in wording the survey. When interviewed about her "home", one flood victim burst into tears. "I don't have a home anymore," she said. "I just have a house."

In addition to asking respondents what they liked most and least about their homes, the question was also posed: "What is your ideal home?"

Again, there is a fairly strong evidence of housing satisfaction. Twenty-six percent of the respondents described their current home as their ideal home, while 8 percent wanted a home free from flooding, 32 percent wanted a more elaborate or expensive house and 14 percent simply thought of their ideal home as decent, safe and sanitary housing.

Satisfaction With the Yard

House lots in the Tug Fork sample varied from less than 1/8 of an acre to more than one acre. Most yards are less than a half acre in size. Residents were asked what they use the yard for:

Table 18: Uses of the Yard, Tug Fork River Valley Survey, 1979

Use	Number	Percent
To sit in, for recreation	83	29.9
For children's play area	81	29.1
For gardening	38	13.7
No special use	38	13.7
For a work area	9	3.2
For storage	3	1.1
As a buffer, protection	1	0.4
Other, no response	<u>25</u>	<u>9.0</u>
Total	278	100.0

Yards are most frequently used in the Tug Fork Valley for family activities: adult relaxation and recreation and children's play. Another frequent use for those with large enough yards is the cultivation of a garden. Interestingly, only one respondent described the yard as a buffer

zone that protects the house. Observations of yards in the valley showed many of them to be completely enclosed by a fence, usually constructed of chain link. The fence defined the boundaries of the yard, but usually was not high enough to keep out anyone who might want to step over it nor to shut off the view. It appears that the definition of personal territory is important to Tug Fork residents. And privacy is defined in these terms rather than in terms of separation from sight and sound or in terms of protection from intruders. Respondents were asked in what ways they would change their yards (Table 19).

Table 19: Changes that Tug Fork Residents Would Make in Their Yards, Tug Fork River Valley Survey, 1979

Change	Number	Percent
Level land or raise it	49	17.6
Increase the size	39	14.0
Erect other structures (e.g., storage shed)	22	7.9
Plant grass, trees, shrubs	12	4.3
Add a pool or other equipment	7	2.5
Decrease the size	1	0.4
Other, no response	<u>148</u>	<u>53.2</u>
Total	278	100.0

The relatively large number who would like to level their land or raise it reflects two of the major land problems in the valley -- it is often either too hilly or in the flood plain. Small yards are a function of the necessity for densely-located housing rather than preference; many residents would like to have larger yards, if they could.

### Neighborhood Satisfaction

It is often stated that neighborhood ties in the Tug Fork Valley and in other areas of Central Appalachia are particularly strong and that housing opportunities must provide options for neighborhoods to remain intact if they desire. Erikson (1976) has cited the disruptive effect that relocation in HUD trailer parks without regard for previous neighborhood patterns had on the survivors of the Buffalo Creek disaster. He quotes one of the residents:

Perhaps the communities people were placed in after the disaster had a lot to do with the problem. If there had been time enough to place people (near) the same families and neighbors they were accustomed to, it might have been different. Instead, they were haphazardly placed among people that were strangers with different personalities. I have conflicts with people I don't even know. It seems like everyone's on edge, just waiting for trouble to happen.

Several questions about the neighborhood were asked in an attempt to establish the validity of this view (Table 20).

Table 20: Responses to Questions About Neighborhood in the Tug Fork River Valley Survey, 1979

<u>Question 1 -- What does the neighborhood mean to you?</u>		
Response	Number	Percent
People I fee close to	133	47.8
Immediate neighbors	72	25.9
A physical designation	50	18.0
Nothing	2	0.7
Other, no response	<u>21</u>	<u>7.6</u>
Total	278	100.0

<u>Question 2 -- How satisfied are you with your neighborhood?</u>		
Response	Number	Percent
A lot	204	73.4
A little bit	35	12.6
Not at all	35	12.6
Indifferent	1	0.4
No response	<u>3</u>	<u>1.1</u>
Total	278	100.0

Question 3 -- How often do you talk to your neighbors?

<u>Response</u>	<u>Number</u>	<u>Percent</u>
Every day	181	65.1
Often	33	11.9
Once a week	20	7.2
Once a month	4	1.4
Not often	19	6.8
Whenever necessary	1	0.4
Never	12	4.3
No response	<u>8</u>	<u>2.9</u>
Total	278	100.0

Question 4 -- Would you miss the neighborhood if you moved away?

<u>Response</u>	<u>Number</u>	<u>Percent</u>
A lot	186	66.9
A little bit	43	15.5
Not at all	44	15.8
No response	<u>5</u>	<u>1.8</u>
Total	278	100.0



Question 5 -- Would it matter if the neighbors moved, too?

Response	Number	Percent
Not applicable (non-movers)	91	32.7
Yes	37	13.3
No	136	48.9
No response	<u>14</u>	<u>5.0</u>
Total	278	100.0

Responses to these questions indicate that neighborhood ties are, indeed, as strong in the Tug Fork River Valley as they are in other parts of Central Appalachia. Among the people willing to move, however, there is a sizeable proportion who would not care whether the neighbors moved, along with them. This response should be interpreted with caution. Since neighborhood ties are so strong, even those movers who are willing to separate from the old neighborhood will undoubtedly look for opportunities to resume strong neighboring patterns in the new neighborhood. This presents a challenge in that planning for new housing options should consider not only the provision of physical structures, but also provision of an environment conducive to the formation of new neighboring patterns, as well as the maintenance of old ones.

Preferences for Future Housing

The second step in the housing preferences analysis was to determine what Tug Fork residents might look for if they opted for a new housing

location. Pictures of five different kinds of housing were shown to the respondents, who were asked to give their first and second choices. (See Figure 3) Housing types were selected because they either represented the kind of housing presently existing in the valley or housing that has been proposed for future development. Selection (1) is a garden apartment; (2), a typical rustic mountainside house; (3), a mobile home; (4), a small, single-family home; (5), a contemporary multifamily dwelling.

Table 21: First Housing Choices of Tug Fork Residents, Tug Fork River Valley Survey, 1979

Choice	Number	Percent
Single-family home	138	49.6
Mountain house	63	22.7
Mobile home	9	3.2
Garden apartment	5	1.8
High-rise apartment	3	1.1
None of them	43	15.5
No response	<u>17</u>	<u>6.1</u>
Total	278	100.0

As might be expected, the overwhelming choice of Tug Fork residents conforms to the norm for housing in the U.S. — the single-family home (Table 21). In the case of the choices offered here, the housing option that was selected by nearly half the respondents was a small, one-story home, typical of those found in the Tug Fork area. However, a large number

Figure 3: Photographs of Housing Choices Offered in the Tug Fork Survey, 1979



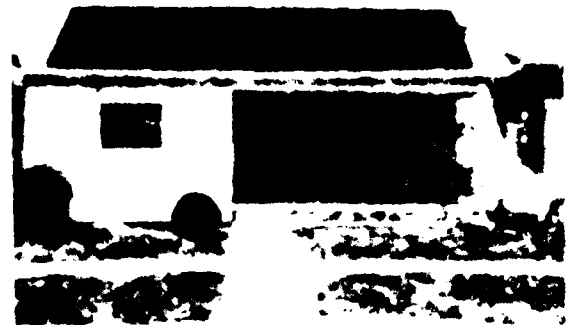
Garden apartment



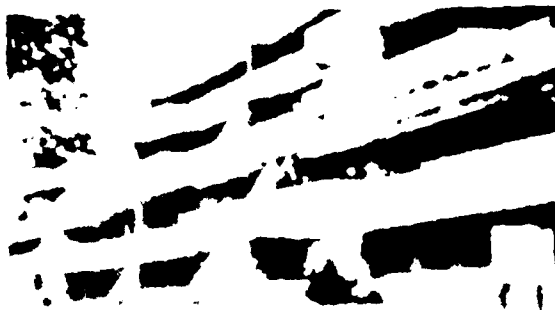
Mountain-top house



Mobile home



Single-family home



Mountain-side apartment

of respondents (nearly a quarter) selected another type of single-family home that is not as familiar: a rustic, A-frame type house that might be one of the styles offered in future housing options.

It is interesting that the mobile home, so much in evidence in the Tug Fork area, ranked a poor third in terms of preference. This confirms the conventional wisdom that mobile homes are found in abundance more as a result of necessity than of desire. According to the Kentucky Development Cabinet:

When conventional financing for home purchase is unavailable or unaffordable, most low- and moderate-income households remain in substandard housing or purchase a mobile home as a last resort for obtaining safe, decent and sanitary solutions to their housing needs. Since most bank policies on mobile homes are stiff .... most buyers will finance a mobile home through the mobile home sales company. Although the .... interest rate is exorbitant, the lower down payment .... and the .... mortgage terms of most mobile home dealers are more affordable for low- and middle-income families.

Mobile homes have attendant problems that offer less than desirable solutions for housing needs. The value of the mobile home depreciates in a short period of time, often sanitary sewage is not available and is dumped illegally into streams, and water supply and quality cannot be assured. At best, mobile homes are a temporary solution to housing needs. (Kentucky Development Cabinet, n.d.)

High-rise and garden apartments were almost totally unacceptable as a first choice of housing for the Tug Fork residents surveyed. The second choice of respondents is also interesting because it indicates the kind of housing they might find acceptable if their first choice is not feasible. (Table 22) The desire for single-family housing still predominates, but the proportions have changed so that there is almost equal preference for the conventional single-family, the mountain and mobile home. However, nearly half the respondents in the sample would not give a second choice of housing. Their first choice -- presumably, in most cases, the conventional single-family home -- was the only choice they would make. A few more

respondents turned to multiple dwellings for their second choice, but that mode of housing is obviously unpopular among Tug Fork residents.

Table 22: Second Housing Choice of Tug Fork Residents, Tug Fork River Valley Survey, 1979

Housing Choice	Number	Percent
Single-family home	35	12.6
Mountain home	35	12.6
Mobile home	25	9.0
High-rise apartments	8	2.9
Garden apartments	7	2.5
None of them	41	14.7
No second choice	<u>127</u>	<u>45.7</u>
Total	278	100.00

A final concern in regard to preferences deals with the special issue of housing for the elderly (Table 23). Twenty-three percent of the households in the sample have a household head over 65. It seems logical to assume that at least some of these households would be interested in locating in special housing for the elderly.

Table 23: Interest in Housing for the Elderly by Age of Household Head  
Tug Fork River Valley Survey, 1979 (N = 278)

Age of Household Head	Yes	No	Maybe	N.R.	Total
19-24	57.1	42.9			100.0
25-35	46.3	48.8		4.8	100.0
36-45	36.4	60.6		3.0	100.0
46-64	41.6	54.0		4.5	100.0
65+	25.0	71.9		3.2	100.0
No age given	38.5	53.8		7.7	100.0

X = 18.752, 20df

Significance = 0.5380

Although the differences among age groups are not statistically significant, the data indicate that interest in housing for the elderly tends to decrease with age. Among those over 65 who would be expected to be most interested, only 25 percent responded in the affirmative. However, the youngest households responded positively to the idea of housing for the elderly at a rate of more than 57 percent. Interest of younger families can probably be explained by the fact that they are concerned about parents or grandparents. Many houses are small; the idea of having a widowed parent or grandparent in residence may be cause for concern on the part of the younger generation. Among the elderly, it is possible that those who

are most interested in special housing are already there, leaving only those who do not want to move to that kind of housing in the study sample.

One point should be remembered in this context, however. Tug Fork residents, for the most part, have probably not had much experience with specialized housing for the elderly. The only special housing in the valley is in the form of apartments designated for elderly residents, but lacking many of the additional features that such housing can provide. For example, there is no congregate housing which provides the opportunity for independent living coupled with the services such as congregate dining facilities, recreational programs and medical supervision. As the population in the valley ages, the need for such facilities may become more acute. But it seems possible that even now -- if they could avail themselves of such an opportunity -- there might be some demand on the part of Tug Fork residents.

We have already determined that, on the basis of the population sampled here, a significant proportion of Tug Fork residents are willing to move to obtain flood-free housing. Another commonly held belief is that few would be willing to move very far, and new housing opportunities must be as close to old neighborhoods as possible, if they are to be acceptable. Therefore, the respondents were asked how far they would move if they would, indeed, relocate. (Table 24)

Table 24: Location to Which Tug Fork Residents Would be Willing to Move  
(By Order of Preference), Tug Fork River Valley Survey, 1979

Location	Number	Percent
Out of the neighborhood	42	23.9
Within the neighborhood	31	17.6
Out of the valley	30	17.0
Out of the county	25	14.2
To an adjacent state	22	12.5
Out of the region	18	10.2
Don't care	<u>8</u>	<u>4.2</u>
Total	176	100.0

It does appear true that many of those who are willing to move would like to move only a short distance away: 41.5 percent of the "movers" would like to move no further than out of their immediate neighborhood. However, 17 percent of those willing to move would be willing to relocate in an area outside the Tug Fork Valley, and the remaining 41.4 percent would be willing to relocate out of the county or beyond.

Apparently, it will be possible to locate housing options at greater distances from the original neighborhood than might have been thought possible. We must keep in mind, however, the desire on the part of respondents to live in what they consider a convenient location.



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PART V  
COMMUNITY DYNAMICS IN THE 100-YEAR FLOOD PLAIN  
OF THE TUG FORK RIVER

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## CHAPTER I

### THE TUG FORK VALLEY COMMUNITY STUDY

#### INTRODUCTION

Coal-rich, flood-prone Tug Fork Valley demands the attention of concerned public officials on two scores. On the one hand, there is a need to protect the area from the suffering and costs of past disasters; on the other hand, to prepare the Valley to make a maximal contribution in coping with the energy crisis this country faces.

For these reasons, the Tug Fork Valley has been the subject of intensive study, particularly in terms of hydrologic conditions (e.g., in Corps of Engineers studies) and the relationship of population projections and potential coal productivity (e.g., Abt Associates Analyses, 1979). This report, as part of the I.W.R. Tug Fork Study, focuses on the social characteristics of the people with special reference to community ties and changes. Knowledge of life as it has been and as it is should help policy makers understand (a) how personal and community needs intersect and (b) public responsiveness to directions the Valley may move in the future.

#### OBJECTIVES

This report has two primary objectives. The first is to present a social profile of the Tug Fork Valley. This means identifying communities along the Tug Fork. It means finding



out about those communities as social systems with histories that are subject to constant change vis-a-vis nature, the nation's priorities, and the dynamics of demography and leadership. It means assessing community cohesion by noting where children go to school, families go to church, workers work. Housing density, population mix and mobility, local politics, and how people meet their survival needs have to be scrutinized. In addition, it means that family and neighborhood networks, physical and mental well-being, and attitudes toward life cannot be overlooked.

To learn about each community in all of these ways would be an impossibility. Therefore, the social profile provides a basis for classifying communities. This leads to the second objective: In-depth analysis of four Tug Fork communities. Close scrutiny of these communities reveals the dynamic interplay of social institutions, cultural proclivities and flood damage mitigation.

The understanding derived from the study of the social profile and the in-depth community analysis provides a basis for policies and programs that meet the needs of the area.

#### SCOPE OF THE STUDY

An attempt has been made to limit this study to those portions of the six counties within West Virginia and Kentucky that lie within the 100-year flood plain of the Tug Fork River.<sup>1</sup>

Therefore, only portions of officially recognized civil jurisdictions are included. In this way, the study area differs from that of other studies.<sup>2</sup> However, because of a dearth of data on the 100-year flood plain, data for larger areas, e.g., enumeration districts, have been used where necessary.

Limitation to the 100-year flood plain means that only communities lying within it are considered in this report. Some 100 named communities have been identified. These are shown on the accompanying map (Figure 1).

#### Assumptions Underlying the Study

A basic assumption is that, like American communities elsewhere, Tug Fork communities have undergone rapid changes as a concomitant of these rapid changes characterizing the national and international scene. Another assumption is that responsiveness to change agents varies from community to community depending upon each community's history, leadership, and population characteristics. Thirdly, it is assumed that the patterning of relationships, i.e., the organization of a community, is closely related to its economic underpinnings. Therefore, much can be learned about the social groupings and lifestyles of community members and about community cohesion and conflict by looking at where and how people earn a living.

#### Limitations of the Study

Data about predominantly rural, unincorporated communities in the Tug Fork Valley is hard to come by. For example, the



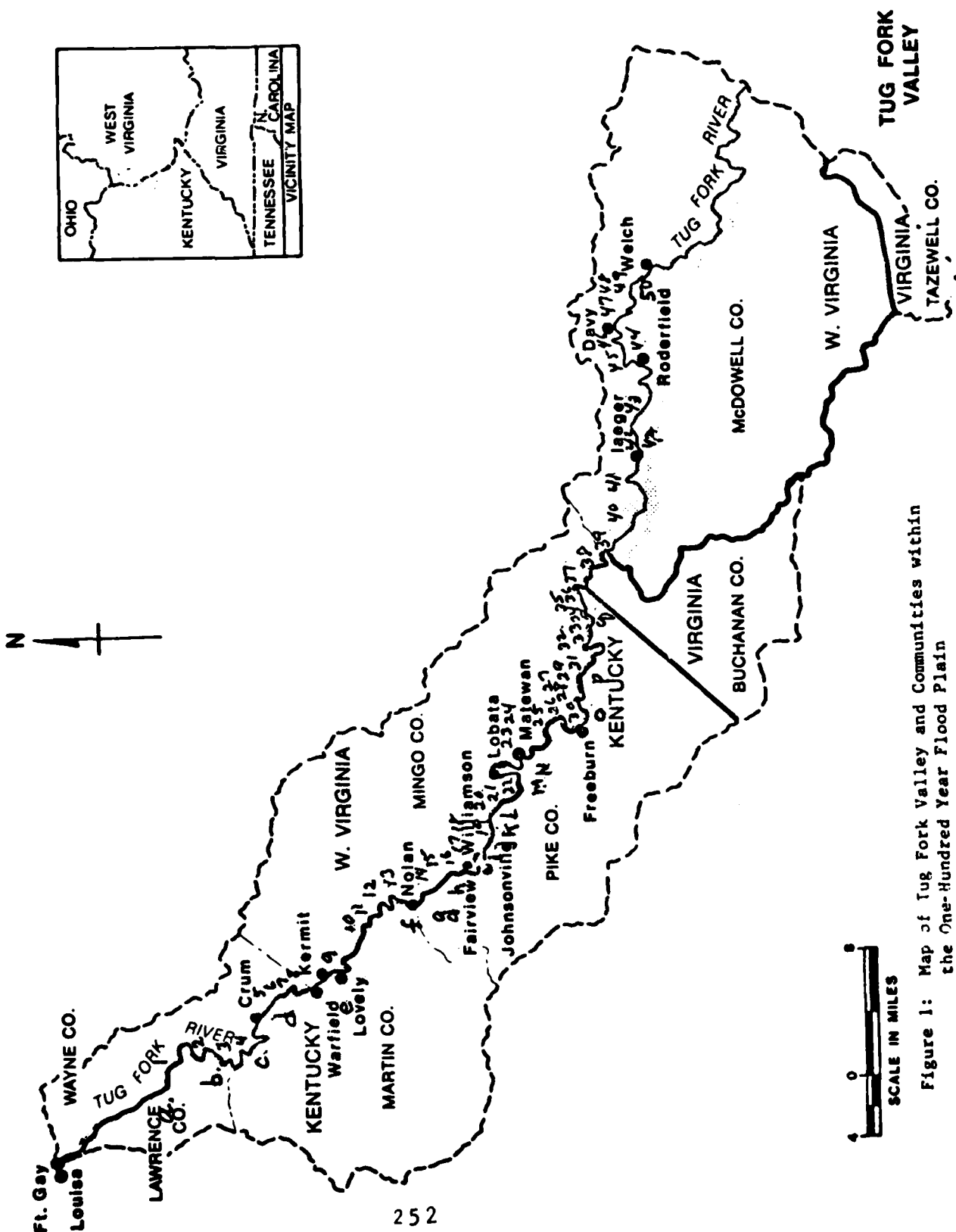


Figure 1: Map of Tug Fork Valley and Communities within the One-Hundred Year Flood Plain

FIGURE 1 : NAMED COMMUNITIES IN THE 100-YEAR FLOOD  
PLAIN IN WEST VIRGINIA AND KENTUCKY\*

WEST VIRGINIA

1. Glenhayes
2. Webb
3. Bull
4. Tripp
5. Stonecoal
6. Stepptown
7. Marrowbone
8. Greyeagle
9. East Kermit
10. Naugatuck
11. Blockton
12. Maher
13. Oldfield
14. Hatfield
15. Borderland
16. Chattaroy
17. Goodman
18. West Williamson
19. East Williamson
20. Rawl
21. Merrimac
22. Sprigg
23. Surosa
24. North Matewan
25. Blackberry City
26. Rose Siding
27. Sydnor Addition
28. Thacker
29. Grapevine
30. Delorme (Edgarton)
31. Vulcan
32. Cedar
33. Devon (Meador)
34. Glen Alum Junction
35. Wharncliffe
36. War Eagle
37. Alnwich
38. Wyoming City
39. Panther
40. Krollitz
41. Litwar (Hull)
42. Sandy Huff
43. Wilmore
44. Hensley
45. Mary Town
46. Twin Branch
47. Marine
48. Mohegan
49. Capels
50. Welch

KENTUCKY

- a. Clifford
- b. Turkey Creek
- c. Job
- d. Hode
- e. Beauty
- f. Hatfield
- g. Turkey Creek
- h. South Williamson
- i. Goody-Leckieville
- j. Aflex
- k. Stringtown
- l. Burnwell
- m. Buskirk
- n. McCarr
- o. Majestic
- p. Woodman

\* Names printed on map not included in  
this list.

U.S. Census data (aside from being outdated) is based on 15-20% sampling and at best constitutes "guesstimates." Also, very few references are made to any of the flood plain communities in historical accounts and most of these are only a few sentences. No social science analyses of any of the specific Tug Fork communities were found. As a result, the researchers had to collect, sort, sift and evaluate whatever could be located and interpolate gaps in information on the basis of their experiences and training.

#### RESEARCH PROCEDURES

Figure 2 provides a flow chart showing the research design and identifying sources of data. Because of limited data about the specific area studied, particularly about social relationships, the researchers relied heavily on newspaper accounts, catch-as-catch can interviews, and observations based on several windshield tours of the Valley. This information was carefully related to documentation from available archival resources.

An early major task was identification of named communities within the 100-year flood plain. This was difficult, in part, because of the meandering nature of flood plain boundaries, especially as revealed in aerial photographs. But it was also difficult because no one map identifies all of the communities. Only by combining map information from the Corps of Engineers, Rand-McNally atlases, and highway

Figure 2: Research Design Flow Chart

Time	Spring	Summer	Fall	Winter
Phase	I	II	III	IV
Objective	<p>Exploratory Phase</p> <p>(a) Identify study area (b) Gain familiarity with Tug Fork Valley</p>	<p>Intensive Data Collection</p> <p>Gather as much information as possible at the local and state levels; zero in on Washington data that applies to Tug Fork Valley only</p>	<p>Analytic and Correlation Phases</p> <p>Analyse and interpret data; form tables</p>	<p>Evaluation Phase</p> <p>Select and evaluate amassed data in terms of Report objectives</p>
Data Sources:	<p>Archival Sources: Newspapers; U.S. Census; Histories; Government and Research Agency Reports; Local Telephone Directories; Maps; Dun &amp; Bradstreet Reference books</p>	<p>Windshield tours (personal observations); Interviews, Local data: publicity agency reports; Ky. W. Va. Govt. Data; and Historical Society &amp; Other Agency Visits</p>	<p>Combine data from all sources</p>	<p>Rely on obtained data; supplement with any new sources or additional information from previously obtained sources</p>
				V
				Report Finalization Submit Final Report

departments was it possible to identify communities with names.<sup>3</sup> (Approximately 100 were discerned.)

#### Plan of this Report

In the next few pages, the geographic and historic setting of the study area is briefly presented. This will be followed by a social profile of the Tug Fork communities as a whole. Attention will be directed to factors associated with community maintenance and survival on the one hand and with community changes and adaptations on the other. These factors include (a) demographic characteristics of the area with particular reference to comparing data on the Valley with comparable U.S. Census, enumeration and state-wide data; (b) political, economic, religious, familial, educational and recreational organizations and associations; (c) the areas infrastructure; (d) leadership; and the web of interrelations between the foregoing. This profile will be followed by a discussion of types of communities in the Tug Fork River Valley. Four communities reflecting a few of the variations in the social organization and social relations in the area are depicted in detail, again, in terms of community maintenance and survival and changes and adaptations.

The concluding section of the report will present general findings and two scenarios as to the future of these small communities. The final statement will indicate their pertinency to agencies and organizations concerned about establishing flood control and further areal development.

## AN OVERVIEW OF THE TUG FORK VALLEY

The Tug Fork Valley of the Big Sandy River in Appalachia serves as the boundary between Kentucky and West Virginia.<sup>4</sup> The winding waterway is but a shallow creek in many places; in other places it is deep and/or wide--as much as 50' wide, for example. (Of course, its depth and width vary throughout the year.)

The Valley on the Kentucky side provides little flat land for Pike, Martin, and Lawrence Counties adjacent to the Tug. There are few communities located in the flood plain. The rough terrain precludes urban-type development. (See Appendix A Table 1-1 : Number of Communities and Population Density, Tug Fork Counties, 1970). In contrast, the broader valley in the West Virginia counties of Wayne, Mingo, and McDowell lends itself to highway, railroad, and community development, as it winds its way through the coal-rich ranges in both states.

It is this coal that makes it essential to bed tracks and asphalt in prime valley land and to intensify the competition for lebensraum (living space) in a flood-prone valley.

The steep mountain slopes are either barren or dotted with on-going strip-mining operations, scars of earlier diggings, equipment and entries for deep mines, and evidence of lumbering.

In addition, nature's face is being altered as gigantic pieces of Twentieth Century technology literally move the mountains to produce highways to expedite the movement of coal. An occasional cluster of trees (second or later growths) serves as a reminder of the mountain's former face and the little logging that is done today.

Even with human modification of the mountains, the ranges still limit contacts between Valley occupants and other sections of the two states. And because of the steep slopes, only an occasional house sits alone in barely perceptible clearings. Most of the residential and other structures are crowded together on virtually every available site. The result is that the Valley is "almost" one long string town from Ft. Gay and Louisa downstream to Welch upstream--"almost" because the population is separated (generally by a range) into communities that average two to two-and-a-half miles from one another. (See Table 1-9). County average distances are shown in Appendix A, Table A1 - 9.

Despite these natural barriers, the estimated 30,000 people, clustered into at least 100 named communities along the Tug Fork River and the many creeks flowing into it, are linked by Route 52 and several other roads just as in an earlier period the Tug, as a transportation route, did.

#### Natural Hazards in Tug Fork Valley

Three factors contribute to the hazards of life in the Valley: floods, landslides, and mine subsidence. Each

Table 1-9: Tug Fork Communities within Flood Area  
by Population and River Mileage  
from Fort Gay, W.Va., and Louisa, Ky.

<u>West Virginia</u>	<u>Name of Community</u>	<u>Population</u>	<u>Distance from Ft. Gay</u>	<u>Incorporated</u>
<u>Wayne County</u>	Fort Gay	792	0	Yes
	Glenhayes	50	10.0	
	Webb	R	16.5	
	Tripp	R	23.0	
	Bull	R	25.0	
	Crum	300	28.0	
	Stonecoal	R	30.1	
	Steptown	R	32.7	
	Marrowbone	NP	33.4	
	<u>Mingo County</u>	Grayeagle	70	34.1
Kermit		716	34.6	Yes
East Kermit		150	37.0	
Naugatuck		200	41.0	
Blockton		R	41.5	
Maher		60	44.3	
Oldfield		NP	46.6	
Nolan		350	49.0	
Borderland		300	51.0	
Chattaroy		1200	52.9	
Goodman		200	53.5	
Fairview		NP*	55.0	
West Williamson		NP *	56.0	
Williamson	5831	57.0	Yes	
East Williamson	NP *	59.0		

\*Included in Williamson's population



Tug Fork Communities within Flood Area  
by Population and River Mileage  
from Fort Gay, W.Va., and Louisa, Ky.

<u>West Virginia</u>	<u>Name of Community</u>	<u>Population</u>	<u>Distance from Ft. Gay</u>	<u>Incorporated</u>
<u>Mingo County</u>	Rawl	75	61.5	
	Merrimac	100	62.5	
	Sprigg	175	64.5	
	Lobata	150	66.7	
	Surosa	40	67.8	
	Matewan	964	79.0	Yes
	North Matewan	700	70.0	
	Blackberry City	200	71.5	
	Lynn	NP	73.0	
	Rose Siding	NP	73.8	
	Sydnor Addition	NP	74.8	
	Thacker	100	75.0	
	Delorme (Edgarton)	400	77.5	
	Grapevine	NP	76.2	
	Vulcan	100	79.5	
	Cedar	NP	81.4	
	Devon (Meador)	75	85.0	
	Lindsey	NP	89.3	
	Glen Alum Jct.	R	91.6	
	Wharncliffe Station	75	93.0	
	War Eagle	50	99.0	
	Alwich	NP	100	
<u>McDowell County</u>	Wyoming City	NP	101.0	
	Panther	300	103.0	
	Krollitz	R	105.0	
	Litwar (Hull)	100	108.0	

Tug Fork Communities within Flood Area  
by Population and River Mileage  
from Fort Gay, W.Va., and Louisa, Ky.

<u>West Virginia</u>	<u>Name of Community</u>	<u>Population</u>	<u>Distance from Ft. Gay</u>	<u>Incorporated</u>
<u>McDowell County</u>	Jaeger	822	110.0	Yes
	Apple Grove	NP	112.0	
	Union City	NP	114.0	
	Avondale	NP	116.0	
	Sandy Huff	70	112.0	
	Wilmore	R	114.0	
	Roderfield	1100	116.6	
	Big Sandy	300	120.0	
	Hensley	250	122.0	
	Marytown	130	123.0	
	Twin Branch	200	125.0	
	Davy	993	127.0	Yes
	Marine	NP	129.0	
	Mohegan	150	130.0	
	Capels	300	131.5	
	Hemphill	NP	133.0	
	Welch	3800	135.0	Yes
	Havaco	NP	136.0	
<u>Kentucky</u>			<u>Distance from Louisa, Ky.</u>	
<u>Lawrence County</u>	Louisa	1781	0.0	
	Suffern	NP		
	Clifford	160	11.0	
	Turkey Creek	NP	23.0	

Tug Fork Communities within Flood Area  
by Population and River Mileage  
from Fort Gay, W.Va., and Louisa, Ky.

<u>Kentucky</u>	<u>Name of Community</u>	<u>Population</u>	<u>Distance from Louisa, Ky.</u>
<u>Martin County</u>	Hode	100	30.0
	Oil Springs	NP	33.9
	Warfield	350	34.4
	Beauty	450	35.0
	Lovely	700	36.1
<u>Pike County</u>	Hatfield	140	50.0
	Turkey Creek	600	55.5
	South Williamson	700	56.5
	Leckieville	300	58.5
	Goody		58.6
	Aflex	100	59.5
	Stringtown	200	62.7
	Burnwell		63.2
	Roundbottom	NP	64.2
	Buskirk	100	70.3
	McCarr	500	71.4
	Freeburn	400	78.0
	Majestic	NP	81.5
Woodman	90	86.5	

Key: NP=No Population  
R=Rural (Population unknown)

SOURCES: U.S. Census, 1970  
Dun and Bradstreet Reference Books, 1979  
Rand-McNally Atlas, 1979

reenforces the dangers of the other. The rainstorms that are associated with flooding are also responsible for tornados and hurricanes. These occur a few times a year but tend to be weak and cause little damage. Flooding, on the other hand, is a recurrent phenomenon in the Valley. Probably the two worst floods occurred in 1875 and 1977. However, there have been 5 major floods in the past quarter century. Since the most recent major catastrophe, the 1977 flood, sizeable ones occurred in 1978 and the summer of 1979.

The damages of the 1977 flood to the Tug Fork Valley basin are estimated to have totalled \$200,000,000. Some 2,200 families in West Virginia alone needed to be rehoused.<sup>5</sup>

Landslides and subsidence are probably a more constant hazard in the area. These factors contribute to the scarcity of available land for housing and, like minor floods that constantly plague many households, are the kind of irritant that householders have to accept as part of daily living. Although these hazards cause relatively little monetary damage individual households frequently are badly affected (and have little recourse for assistance). These may be associated with mining operations as well as rainfall. Land that has been stripped frequently washes down the slopes; land that has been mined underground caves in.

### Limits on Land for Community Development

The foregoing discussion has made it apparent that land is at a premium because of (a) steep mountains, (b) the narrowness of the Valley, and (c) natural hazards. In addition, the uses to which the land is put--coal mining and transportation routes--also cuts into its availability. One other factor needs to be identified as curtailing community development: The pattern of ownership. Most of the land is in the hands of several major multinational corporations which have mineral or surface rights of ownership. They are reluctant to make the land available to communities when it is not being mined.

The net effect of the shortage of land is (a) crowding together of structures, (b) inflated costs, (c) location of structures within flood areas (thereby ignoring federal efforts to control flood plain occupancy), and (d) a serious housing shortage. In addition, people have to travel great distances, frequently on poor roads, because they cannot relocate near their places of work.

#### SUMMARY

The objective of this report is to provide knowledge of the dynamics of community life in the Tug Fork River Valley. The foregoing pages indicated the qualitative nature of the research and the direction of its presentation in this report. This was followed by an overview of the setting in which the study communities are located. Despite the isolation imposed

on the area by the steep mountains, the railroads and the river linked the area in the past; the roads do it today. These opportunities for contact with other people and places make the Tug Valley more accessible than other communities within the six counties along the river.

## CHAPTER I - FOOTNOTES

<sup>1</sup>This area was identified through careful scrutiny of the U.S. Army Corps of Engineers maps of the Tug Fork Valley drainage basin (U.S.A.C.E., Huntington District, 1970 ). Drs. George Antle, Austin Vander Slice, and Annabelle Motz made the determination.

<sup>2</sup>The reader should be alerted to the fact that references to the Tug Fork Valley in this report refer to a narrower area than references in the comprehensive study by Abt Associates. They identify the Tug Fork Valley as all of the U.S. Census Enumeration Districts in eight counties abutting the Tug Fork River.

<sup>3</sup>There probably are other small communities in the flood plain. Their identity might be ascertained through interviews with long-time residents.

<sup>4</sup>The Tug Fork is approximately 130 miles from Welch to Fort Gay. Two-thirds of this distance serves as the boundary between Kentucky and West Virginia.

<sup>5</sup>For fuller accounts of the flood's damages see: "The Tug Fork Valley Flood," Dept. of the Army, Huntington District, Corps of Engineers, no date; "Potential Temporary Housing Sites: McDowell Cty., WV," prepared both by the Governor's Disaster Recovery Office & the Region II Planning & Development Council, Nov. 1978; and the Williamson Daily News, April 1977.

## CHAPTER 11

### A SOCIAL PROFILE OF TUG FORK VALLEY COMMUNITIES

#### HISTORIC BACKGROUND

It is generally recognized by social scientists that how people behave today is a mirror of their cultural heritages. And since, as is true almost everywhere, today's population reflects a melding of various waves of settlers, the heritage of today's Tug Valley Citizenry reflects the fusion of at least three identifiable groups of settlers.<sup>1</sup> The earliest were the European farmers and settlers who preempted the land from the Indians. Next come the veterans and other post-Revolutionary recipients of land grants who, with great inexactitude, claimed acreage. They were followed by men like Patrick Henry who, as agents for wealthy Easterners who foresaw the increased value of property ownership, went into the area to challenge the property rights of earlier settlers. With their legal approaches and city manners, they wrested land from those without documentation of their claims. In so doing, they set the pattern of absentee ownership that prevails in the area today.

Whereas the Post-Civil War period generally was marked by the rise of cities in conjunction with the growth of urban industrial centers, the Tug Fork Valley did not follow this



more common pattern (Abt Associates, "Land Use Analysis," 1979). Instead, the farm population of the Valley grew and land became more scarce as acreage was divided among heirs in smaller and smaller parcels. The struggling farmers found employment in logging, and, as the forests and soil became exhausted, the building of the railroads provided employment.

#### Coal and the Railroads

The railroads needed coal to run their engines and the burgeoning factory towns in the East needed coal--particularly around the time of World War I. Therefore, coal camps were built near mines, providing housing and the coal company store. (Some offered schools and churches for the miners and their families.)

The social effects of the introduction of railroads and mines have been of utmost significance to the people of the Valley. Summarily stated, the effects were:

- (1) Many people sold their land (or their mineral rights), not knowing how valuable the property was or whom the buyers were.<sup>2</sup>
- (2) Movement into coal camps was, for many, as traumatic as a change in lifestyle as movement of displaced farmers to a city. It meant:
  - (a) dependency on a landlord for housing and food;

- (b) dependency on the same landlord for wages and employment;
  - (c) living within earshot of total strangers whose life patterns varied;
  - (d) control of work behavior and leisure by the company;
  - (e) constant exposure to the hazards associated with mining.
- (3) An awareness of the need to organize into labor groups developed among the miners.
- (4) Segregated housing patterns were institutionalized by the coal companies. The coal camps were divided into three sections: one was for native-born Americans; another, for immigrants from Southern and Eastern Europe; and the third, for Blacks. Frictions and antagonisms abounded.
- (5) The miner and his family were completely subject to the economic forces far beyond his control. If he were laid off because of a lack of demand for coal or ill health, he had no place to go, no one to provide for him and his family. His only alternative was for his family to be dependent on community or family largesse unless he was fortunate enough to find employment with the railroads.

- (6) The railroad companies and the coal companies were dependent upon one another. This meant that in periods of prosperity they brought in cheap labor to compete with the local residents. The competition was for jobs, land, and wages. In times of depression, both industries were curtailed. There were no other industries to absorb the unemployed.
- (7) Until 1910, there were no child labor laws. Therefore, children were able to help out their families. The passage of child labor legislation added to the number of dependents the miner had to support.

Since the twenties, coal mining and railroading continued to be the major sources of income in the Valley. These two industries have continued to underlie life in the area, tying people's fates to the fluctuations of world markets and the interests of absentee-owned national and multinational corporations on the one hand. On the other hand, these industries are consorts of death and disease.<sup>3</sup> A result is that many families have had their lives traumatized by the fear or reality of either.

#### Other Significant Historical Factors

No cursory backdrop to the present would be complete without mention of four other significant phenomena that have had a marked effect on the communities of the Valley as they exist today. The first is the organization of Appalachian miners,

miners widely reputed to be arch-individualists, into labor unions. Aside from being an astonishing feat in light of descriptions of mountain people,<sup>4</sup> unionism has been very strong since the 1930's. It has demonstrated that Appalachian people can and do organize in typical American fashion to promote their own interests.

The second factor is equally American today. The miners are, like any other employees of major corporations (e.g., auto workers) dependent on both industry and union for their lives' sustenance. Added to this is a dependency upon the Federal Government. In other words, just as the coal camp was the counterpart of the company town in urban industrial cities, so, too, the triumvirate of Corporation, labor union, and Federal Government has developed to provide a measure of security to the Appalachian miner and the urban worker in large, complex organizations. The significance of this is that what has been found to be true of corporate employees in metropoli is probably mirrored in the Tug Fork Valley. (It also implies that since complex organizations are predominantly adapted to urban environments, problems faced by Tug Fork Valley communities may be attributed to the lack of "fit" of urban rules to geographic and cultural attributes of the Valley. Federal rulings regarding the use of flood plains is one example; the taboo on stud tires is another.) In brief, the Tug Fork resident, like his urban brother, has gained a greater degree of economic security

and opportunities to choose (e.g., where and how to live) in exchange for dependency on unions, corporations, and governments.

Closely related to the foregoing is a third significant set of circumstances that changed life in the area: the Kennedy-Johnson social welfare programs that were intended to improve the quality of life of millions of Americans. The introduction of these programs--including the presence of President Kennedy in Williamson--brought Federal funds, new organizations, and new channels for sharing a piece of the American Dream to a small but active segment of the local population. The programs have broadened the horizons of Tug Fork residents.

The fourth highly significant factor is the history of flooding in Tug Fork Valley--roughly one major flood every 5 years; four terrible ones in the last 20 years. For some, the past floods have been the most traumatic experiences in their lives and their memories make them apprehensive of the future. Any rainstorm rouses fear and anxiety. Others have lost memorabilia which were their link with roots in the area. Still others have had to adapt to a different location--sometimes better than what they had previously, sometimes worse. But regardless of their experiences with past floods, knowledge of the extent of damages that the floods have caused is a latent influence on their present-day living.

### Summary

In this very brief overview, a selective list of factors that are considered to color life in the Tug Fork Valley today and tomorrow have been cited. They point to the cruciality of coal and railroading on the economic basis of life, the trauma of relocation to coal camps, the history of shifting dependencies of the population and comparability to urban lives, new opportunities to reduce one's sense of powerlessness, and finally, the memories of flooding.

Against this backdrop, a picture of the Tug Fork Valley will be drawn in the following pages. First, the demographic context in which Tug Fork Valley community life takes place is presented. Then the Tug Fork Valley communities that are within the flood plain are identified, described and classified. Given the backdrop thus provided, a picture of the communities as social systems is drawn. The section concludes with an analysis leading to a series of conclusions about the Tug Fork Valley.

#### THE CHANGING POPULATION

A comparison of population figures in the area abutting the Tug Fork River provides basic indications of the social life there. First, analysis of the six counties' Census figures from 1920-1970 shows that all of the West Virginia counties experienced a steady growth up to the fifties, from which period

there was an abrupt decline in the period 1910 to 1976. The four coal producing counties (Martin and Pike in Kentucky), and Mingo and McDowell in West Virginia all peaked in 1950, dropped sharply in 1960 and continued the decline through 1976. Martin County rose slightly in the 1976 estimated population. Lawrence County, Kentucky reached its greatest population in 1910 with 20,067 and declined moderately through 1970. Its population was estimated to be 12,500 in 1976. Wayne County had its highest population of 39,700 in the 1976 estimate growing rather steadily from 23,619 in 1900. This is shown in Appendix Tables A2-8a and A2-8b.

In the first group of counties the gains and losses in population seem to be directly related to the coal industries fortunes. The drop in total population from 1950 to 1960 amounting to from 15% to 25% can be accounted for only by a considerable out migration of unemployed workers and young people coming in to the labor market.

#### Change of Residence

Table A2 - 8c of the Appendix reproduces the 1970 Census Table indicating the residential changes from 1965 to 1970. Eighty-nine percent of McDowell County residents remained in the county of residence from 1965 to 1970. At the other end of the list was Martin County where only 77 of the residents of 1965 had houses in that county in 1970. Lawrence, Pike and Wayne residents remained in the same county in about 85% of the cases and Wayne County with

82.67% was much the same. This took place in a period of declining population and represents the residence behavior of those after the exodus.

Current newspaper data reenforces census data. There is evidence that many people marry outside their home communities, and others change residency. Obituaries indicate that a sizeable percentage of heirs live elsewhere in the Tug Valley and outside of the state.

#### Distance travelled from home to work

It is not unusual for West Virginia and Kentucky workers to drive from 50 to 100 miles from their home to their place of work. The 1970 Census sheds some light on this (See Table A2-9 in Appendix A). In McDowell County only 9.33% worked outside their county of residence; in Pike County the percentage was 12.90%; in Martin County it was 15.60%; in Mingo it was 21.93%; in Lawrence it was 25.4% and in Wayne County it was 58.50%. The relatively large number of persons commuting from one county to another is an indication of the integral value of the Valley economy. State lines and distances do not deter people from seeking employment in other communities. Of course the scarceness of housing is another factor causing this behavior.

#### Place of Birth of Native Population, 1970

Table 2-10 shows the number and percentage of the native population of the six counties in Tug Valley who were born in the state of residence (West Virginia and



TABLE 2-10: PLACE OF BIRTH OF NATIVE POPULATION, 1970

County	Total Native Population	Born in States of Residence	Percent	Born Outside State	Percent
Kentucky					
Lawrence	10,720	9,061	84.5	1,271	11.4
Martin	9,371	7,879	84.1	831	8.9
Pike	60,988	50,401	82.6	8,528	14.0
McDowell	50,115	38,557	76.9	10,048	20.1
Mingo	32,691	24,765	75.8	6,910	21.1
Wayne	37,455	30,198	80.6	6,225	16.6

Kentucky respectively) and the number and percent of those born in a different state in the United States. This gives another view of the mobility of the population over time. Kentucky Counties in Tug Valley all have a larger percentage of their people born within the state. The counties range from 84.5 born within the state in Lawrence County to 82.6 percent of the people in Pike County. In West Virginia the range is from 80.6 percent born in the state in Wayne County to 75.8 percent in Mingo County. In Martin County, Kentucky, only 8.9 percent were born in other states and in Wayne County, Kentucky, 16.6 percent were born outside the state while 20% or more were born outside the state in Mingo and McDowell Counties in West Virginia. In Kentucky, the highest percentage of people born outside the state was in Pike County with 14.0 percent.

It must be remembered that these are 1970 figures and do not take into account large increases in population from 1950 to 1970. The people leaving were more likely to be newcomers to the state than native sons. Those born outside the state were proportionately greater in 1950 than in 1970.

#### Summary

The rapid movements in population growth and decline indicate immigration of workers when the coal industry is booming and out migration of the unemployed workers and the young people entering the labor market at other times.

This has an effect on business stability, leadership roles, social organization and community attachment.

#### THE TUG VALLEY ECONOMIC OVERVIEW

##### Economic Social Profile

The economy of Tug Valley is largely dependent upon the coal industry. The ups and downs of this absentee ownership industry dictate the prosperity or the depressed state of all businesses in the Valley. The peak of prosperity seems to have been reached about 1950 and only now is beginning to show prospects of growth again. The size of these outside coal companies may well be at least one of the reasons for the highly developed trade union movement in the Valley, particularly on the West Virginia side.

Looking at the counties touching the Tug one is struck by the "rural non-farm" nature of the population, contained within the confines of this narrow valley and living in communities which form a "string-town" pattern up and down the Tug Branch.

The counties in Kentucky and West Virginia that border the Tug Fork Branch of the Big Sandy river have a combined population of some 200,000 people. The 1970 Census reveals the reliance of the Valley on coal. Every county has a larger percentage of its labor force engaged in the industry than the United States average. Mingo County, West Virginia with 24% so engaged, McDowell County with

43%, Pike County, Kentucky with 34% and Martin County in that State with 18% have a lead over Wayne and Lawrence. The only other aspect of the labor force that consistently differentiates the valley from the U.S. average is the percentage employed in the educational system. Martin County, Kentucky and Mingo County, West Virginia have percentages three and two times the national average, respectively. All other counties exceed the national average by considerable amounts.

By using the Census enumeration districts that touch the Tug we can reduce the population covered to less than 60,000. Here we get a clearer idea of the relative poverty of the area.

In West Virginia's forty enumeration districts we find the median district had a per capita family income of about \$5,300 in 1970.. The range of median family incomes from the lowest to the highest by district was \$2,830 to \$9,964. In Kentucky the median family income in the fourteen districts in the Valley was \$5,700 with a range of \$2,045 to \$7,093. The nearby Kentucky income was probably accounted for by its higher labor force participation rate of 39.4% to West Virginia's 32.0%. The U.S. rate in 1970 was 61.0%.

When we turn to the communities within the 100-year flood plain we use Dun and Bradstreet data updated to 1979 and with more detail as to business strengths, stability

and varieties. The first thing that strikes one is the diversity of community economic bases. (See Appendix A2-14)

There are 22 towns listed along the 130 mile stretch of Tug Branch in West Virginia and 9 listed in Kentucky on the 85 miles that the Tug runs as a boundary for that state. The total recommended credit for these 31 towns amounts to \$699,090,000. The towns contain 23,217 people, 18,677 of which are on the West Virginia side. The per capita credit available to the communities in West Virginia is \$36,238, while in Kentucky it is only \$4,906.

On the West Virginia side six towns, each having a total of \$1,000,000 of recommended credit or more make up 99.4% of all the recommended credit available. These same towns account for 68% of the population. In Kentucky two towns each with a recommended credit total of \$1,000,000 or more make up 92% of the total credit recommended for Kentucky's side of the Tug although only account for only 25% of the population.

In West Virginia, 79% of the total recommended credit belongs to branches while in Kentucky 90% of the credit is attributed to branches.

Out of information such as this we can see that the West Virginia side of the Valley with Norfolk and Western Railroad and U.S. Highway 52 paralleling much of the river is economically the most developed part of the Valley. No

town on the Kentucky side has more than 700 people while in West Virginia we have two cities of over 3,800 and eight other towns of 700 or more. On both sides of the river there is almost continuous settlements in the narrow valley. One community almost runs into the next so that few except the largest are independent and have balanced economies. Furthermore just as the coal rights are largely in the hands of giant outside interests so the recommended available credit in all businesses lies with the branches. This characteristic of outside financial control permeates all aspects of Tug Valley business.

Using the Dun and Bradstreet materials again we find that about 20 percent of the listed businesses in Tug Valley are coal mines, 12 percent are engaged in construction or manufacturing, 15 percent are wholesale businesses, 40 percent are retail firms and 10 percent offer services. Kentucky has a much higher proportion in mines, but far less in wholesaling and services and less in retail businesses. This is a reflection of the lower volume of business activities in Kentucky and the lack of large population centers.

Low participation in the labor force (less than two-thirds of the national average); low per capita incomes, substandard educational attainment levels; dependency on an absentee owned fluctuating coal industry with consequent rapid turnovers in business establishments (especially

several locally financed ones); a "stringtown" settlement patterns up and down the narrow valley due to the scarcity of land characterize the rural non-farm population living within the 100-year flood plain.

Workers often drive 50 miles or more from home to work place because of the housing shortage. This tends to blur the sense of belonging to a particular community.

The valley is not the isolated back water of "hillbilly legend." By rail and road it is accessible to the outside world (especially in the West Virginia side). New people are being drawn in and there is a continuing out migration. Franchised businesses, Cable T.V., teachers from out of state are among other agents of change. Education ranks along with mining and retail and wholesale businesses as significant part of the labor force (far above the national average).

#### EDUCATION

"Education" performs at least three major functions in the American community. First, it is an essential agency of childhood socialization. Second, it prepares people for adult work-related roles. And, third, it is a major employer. By looking at the median years of schooling completed by people in a community, the amount of exposure that they have had to what is commonly accepted as basic knowledge for living in our society is evidenced. The median also provides a clue as to the potential work opportunities

individuals might have in light of their school-acquired knowledge and skills. This is also indicated by figures on high school graduation. Both of these measures, then, are indicators of individual qualities and what kind of performance a community might expect from its members.

"Education" as an institute that employs a cadre of workers--teachers, superintendents, typists, custodians, bus drivers, and the like reveals how members of a community earn their livelihood and what employment opportunities exist.

#### Median Years of Schooling Complete

Since there is no data on education in the 100-year flood plain, the data obtained from census enumeration districts which border on the Tug Fork are used. Table 2-17 shows the median years of schooling of persons 25 years old and over in Tug Valley sections of each county in West Virginia and Kentucky. (The data on the individual enumeration districts is provided in Appendix A, Table A2-17

This table reveals that the median districts in both Kentucky and West Virginia as well as the Valley as a whole are practically the same but the range of educational attainment among districts varies much more in West Virginia than in Kentucky. There are pockets of relatively well educated people in both Williamson and Welch that account for this. Welch has two enumeration districts in which the median school level attained is 12.5 years and



TABLE 2-17: MEDIAN YEARS OF SCHOOLING BY ENUMERATION DISTRICTS IN TUG VALLEY FLOOD PLAIN, 1970

County	Number of Districts	Median No. of Years per Districts	Range Among Districts
Kentucky	14	8.49	5.67 - 9.00
Lawrence	2	8.55	8.09 - 9.00
Martin	4	7.55	5.67 - 8.71
Pike	8	8.34	7.29 - 8.90
West Virginia	40	8.42	5.62 - 12.57
McDowell	13	8.50	6.96 - 12.57
Mingo	22	8.62	5.62 - 12.00
Wayne	5	8.15	7.04 - 8.46
Tug Valley	54	8.53	5.62 - 12.57

above. Williamson has three districts where the years of schooling range from 11.47 to 12.00 years. This provides still more evidence of the diversity of people living in Tug Valley.

#### Percent of High School Graduates

Again using census enumeration districts for defining the 100-year flood plain of Tug Valley, Table A2-17 indicates the percent of high school graduates in each district. The range among enumeration districts in West Virginia is much greater than it is in Kentucky.\* Again in the large towns of Welch and Williamson are districts with the highest percentage of high school graduates. The Valley does not have a homogeneous population yet as a whole, the percent of high school graduates in 1970 is extremely low. It is comparable to the national averages in 1940 and 1950. It is only in the urban centers that the percentages approach those of the U.S. average in 1970 (approximately 55%). This is reflected in the low per capita incomes and perhaps the political malaise of the area.

#### Persons Employed in Education

Table A2-19, Appendix A, presents a picture of the employment by industry of the civilian labor force of Tug Valley counties. This table shows the unusually large

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\*If we had comparable statistics for district 29 South Williamson with its population of 700, the Kentucky totals might be raised slightly.

**TABLE 2-19: PERCENT OF HIGH SCHOOL GRADUATES BY ENUMERATION DISTRICT IN TUG VALLEY FLOOD PLAIN, 1970**

County	Number of Districts No.	Median Percent H.S. Grads in Districts †	Range of Percentages in Districts ‡
Kentucky	14	18	7 - 35
Lawrence	2	22	8 - 35
Martin	4	11	7 - 33
Pike	8	21	12 - 35
West Virginia	40	21	7 - 74
McDowell	13	19	11 - 74
Mingo	22	25	8 - 50
Wayne	5	14	7 - 23
Tug Valley	54	21	7 - 74

proportion of that force employed in educational activities. In some counties it amounts to 2 and 3 times the national average and all counties are far above that average. From these 1970 statistics it would appear that Tug Valley was trying to upgrade its educational system. It also explains the listing of education below mining, and trade as the largest contingent within the labor force. This suggests the political importance of educational activities to the politicians who have broad responsibilities in choosing these workers.

#### Summary

The educational scene in Tug Fork is varied. At least half of the adult population had, in 1970, a little over an eighth grade schooling, i.e., the equivalent of what is expected for a 13 or 14 year old child. Yet a sizable percentage, particularly in the bigger communities, have completed high school. The number of people employed by departments of education suggests that 1980 census figures may show an increase in level of schooling attained. However, because the figures are for persons over 25 years, outmigration and population age distributions may counter-balance the evidence. This means that some communities are composed of people with similar educational experiences while others attract a diversified population.

## CHAPTER II - FOOTNOTES

<sup>1</sup>The historical account highlights specific factors of particular significance to this research. For a fuller description of the area's history, see J. Schwalbe, L. Raines, and M. Golden, "Description and Analysis of Historical Development" (Abt Associates, Draft Report, March 12, 1979).

<sup>2</sup>In the summer, 1979, The Washington Post had an article indicating that Appalachian people are still being induced to sell at low prices to local people. They are unaware that the local person is buying for a big corporation.

<sup>3</sup>See Table 3 in Appendix A for an example of the extent fatal and non-fatal accidents in Mc Dowell, Mingo, and Wayne Counties, W. Va., in 1977.

<sup>4</sup>See H. M. Caudill, Night Comes to the Cumberlands. Boston: Little, Brown and Co., 1976; and J. Weller, Yesterday's Children.



CHAPTER III: COMMUNITY LIFE IN THE ONE HUNDRED  
YEAR FLOOD PLAIN OF TUG FORK VALLEY, WEST  
VIRGINIA AND KENTUCKY

INTRODUCTION

The social profile of Tug Fork Valley provides a picture of the quality of life available to the citizenry. It identifies the parts that make up the fabric of daily living, but it does not indicate how the parts are related into a social system, how values and attitudes, personal and community histories, people and place, interface. Over the years a number of books and other writings have provided a dramatic picture of the people of Appalachia, a picture of poverty, isolationism, violence, and social and psychological deprivation. In recent years with the publication of Kai Erikson's book, Everything in Its Path, ravaging flooding has been added to the picture. And because Tug Valley is part of Appalachia, it has been presumed that it, too, is part of that picture. But does this picture which is sustained to some extent by the data in the social profile portray community life today as we enter the 1980s? Does it typify all of the people in the area or just some of them? Is the stereotypical picture

of Appalachia as a homogeneous, cohesive community appropriate as a base for developing flood plain policies?

In the Discussion for Task I in the proposal submitted for this study, the subject of "community cohesion" was presented as follows:

"Community cohesion" is generally considered a vital factor which gives individuals and the larger society stability and security. Presumably it consists of the bonds or attractions that hold members of a group together. Presumably, too, it rests on the group members' sharing of common goals, values, and patterns of behavior. Thus, it engenders cooperation in the daily tasks of living and generates an emotional network that intertwines individual lives with one another. It is a quality attributed to the people of Appalachia, people who include the oldest intact ethnic group in the U.S. (with the exception of native American Indians) in isolation from the mainstream of modern living.

It also is a quality that Kai Erikson has dramatically emphasized in Everything in Its Path: The Buffalo Creek Flood of 1972. Erikson analyzed the tragic concomitants of community destruction on flood victims. The trauma of community disruption, he says, is no less a problem than the flood disaster itself. Haphazard relocation of flood victims by policy agencies further destroyed those community ties that persisted after the flood had taken its toll.

That people in other Appalachian communities are likely to be traumatized by damage mitigation measures--whether in response to actual flooding or the threat of future floods--is a plausible hypothesis stemming not only from the case of Buffalo Creek, but also from historical evidence about the Appalachians. Yet, in the years since the Buffalo Creek disaster, socio-economic conditions in the nation and, more specifically, coal as an energy source has increased in value; and high rates of unemployment coexist with high rates of employment as inflation surges upward. Locally, many Valley communities are losing their populations; machines are replacing human power,

and the floods of 1977 and 1978 have dislocated people. Therefore, it may be equally plausible to suggest as a hypothesis that some communities--or portions of them--would be receptive to moving out of hazardous areas if the people themselves were free to select that option. Thus, it becomes important to learn whether "community cohesion" is linked to specific territories (to identify those communities where the land itself is vital for community survival and collective well-being) or is a tie that binds people regardless of their locations--or even whether it is a factor conducive to the resistance of change. For these reasons, it is important that policies and programs intended to mitigate flood damages be ones designed to meet the needs of different population groups and be formulated in ways that can be effectively communicated to them.

The implications of this hypothesis are that (a) people may be more mobile psychologically (i.e., more receptive to alternative ideas) and geographically than is generally assumed and (b) the bonds of community cohesion have been altered in recent years.

It is not the purpose of this research to test the hypothesis that people are willing to move from the Tug Fork Valley by asking them whether they are. That is a good question; one which the survey task of the larger study raises. The intent here is to analyze the objective web of community life to determine whether the people are so closely linked to their geographic environs--as Erikson found--that they would resist or have resisted elements of change in the past and would resist them in the future. Is community cohesion so integrally linked to a specific plot of ground that they could not adapt to change? In brief, then, the general framework of this section of the report is to study communities in order to find clues as to how they might respond to future changes.



### Assumptions

Based on earlier studies and writings, it has commonly been assumed that the people of Appalachia constitute a homogeneous population. Ergo, communities are reflections of one another. It is also assumed that the people of Appalachia differ from people elsewhere: they are hillbillies or "hollow folk" and poverty stricken. (Within recent years another general assumption has been made that they all are miners who have made a great deal of money because coal is an important national resource.) Further, it is assumed that flooding has a life-long deleterious influence on them. Yet, it is assumed, they refuse to move from the flood plain. The reasoning goes on that these Appalachians are not happy in their lot but cannot unite in order to bring about changes that might improve their situations.

But how applicable are these assumptions to the people in communities that experienced the 1977 flood in the Tug Valley?

### Objective of this chapter

An in-depth analysis of four communities in the 100-year flood plain in the Tug Valley is presented in order to provide a picture of life in these communities. (For a discussion of the criteria for selection of these sample communities, see Appendix B, p. B-1) The primary

objective is to analyze the nature of life in each of these communities in order to

- a. develop knowledge as to what constitutes a "community"
- b. identify the nature of community cohesion
- c. describe similarities and differences between the communities
- d. indicate variables suggestive of a typology of communities so that understanding of communities that have not been studied in such great detail may be enhanced
- e. provide insights into community responsiveness to flood-related policies.

#### A Note on Data Collection

Little information is available about any of these communities. Since they are sparsely populated, and unincorporated (except for Iaeger), data about them is generally part of county data. Local scholars have not engaged in community or historical studies of these small towns. Abt Associates, in their study of the Tug Fork Valley basin, included the entirety of U.S. Census Enumeration Districts including upstream and mountainous areas that have not been flooded. The Census estimates population information on the basis of a 15 to 20 per cent sampling which may not be representative in these rural places. It was possible to obtain crude data from Census on Iaeger and Chatteroy. Unfortunately, all

census data is from 1970. This calls for caution in reading because much has happened in the area since then: the "boom" in coal mining in the early '70s and the later decline with concomitant unemployment, the return of Viet Nam veterans, the search for employment outside of the communities, and the rise and fall of businesses locally, the end of the baby boom, and of prime importance, the floods of 1977 and 1978 which wreaked heavy damage and relocated many people. Therefore, the following discussions are based on the best available census and archival data, newspaper accounts, interviews, and observations available, all interpreted in light of the cumulated knowledge of small communities that sociologists have.

#### Plan of the Chapter

A brief introductory statement about the four communities is presented. It is followed by a discussion of each of ten communities: Goody, Kentucky, and Chattaroy, Crum, and Iaeger, West Virginia. Each community is analyzed in terms of its population composition, response to the flood of 1977, housing and educational conditions, the economy, and the community dynamics. The chapter then provides a summary of the similarities and differences between the communities. This leads to consideration of the nature of community cohesion as evidenced in these communities. Finally there are

several scenarios as to what might occur in the communities as the national coal policy of the 1980s is formulated.

#### AN OVERVIEW OF THE FOUR SAMPLE COMMUNITIES

Crum, Chatteroy and Iaeger are spaced along the Tug Valley in the three W. V. counties of Wayne, Mingo and McDowell. Goody lies across from Williamson in Pike County, Ky. Crum, downstream, is not far from Ft. Gay but accessible only by perilous mountain roads. In the past it served as a trade center for people cultivating the Valley land and that in the hollows. At some point in time, a coal camp house provided a clustering of houses. Today, nestled along U.S. Highway 52, the railroad tracks and the Tug River, there still are traces of its trading activities and its relationship to mining. In contrast, Chatteroy's history is tied to the prosperity of the railroads at the turn of the century and the need for coal for their engines. Like Crum, the fertile valley lands were used for a coal camp and from thence, the community developed. Today its agricultural origins have been virtually obliterated as the farm land has been converted into housing plots. Its proximity to Williamson makes it a suburb of that city.

Goody, too, is closely linked to Williamson. Benjamin F. Williamson owned land on both sides of the

Tug Fork River. It was divided among his four sons. One laid out lots for a city and sold them. That was the origin of the city of Williamson. The Kentucky land was in time sold, too. It is probably from the original Williamson tract that the town of Goody came into being as a coal camp for the Leckie mines. When the mines closed in the early '50s, the cottages were sold. Residential Goody today is composed of the present occupants of the coal camp houses. However, there is more to Goody than its residential section. The bewildering question of whether Goody begins and ends is discussed fully later in the chapter.

Iaeger, despite the fact that it is smaller than Chatteroy today, is the most urban of the four communities. It is the only incorporated one. But it is Janus-faced. For on the one hand--according to records and newspaper accounts it is a microcosm of a city. On the other hand, a tour of the community exposes a "downtown" of run down buildings reminiscent of riot-torn urban centers (but crowned by a beautiful new modern bank). Iaeger's history reveals that it was a thriving railroad and mining center with strong leadership many years ago. There are lingering traces of its glory--as if it is in its twilight years.

It is apparent from the beginning, then, that these four communities--despite being rural and small,

are diversified. They do not present a picture of homogeneity in Appalachia, a picture that so many writers have painted.

The four communities share a number of basic characteristics. One of the most important is their exposure to flooding of the Tug Fork River. In each of these communities, buildings border flood-prone waters. (Crum, Jaeger, and Goody are directly alongside the Tug Fork; Chattaroy, on Buffalo Creek, experiences the backing up of the Tug.) A second notable feature is that all are along the Norfolk and Western railroad tracks and U.S. Highway 52. Many buildings are between or alongside two of them. The coal-laden or empty trains roll by frequently in the course of a day. The highway is the main link between the Valley and the rest of the nation. It is heavily travelled by local and out-of-state trucks and cars. Although driving along it is not as dangerous in the area of these communities as elsewhere, it is nevertheless precarious. The tracks and the road cross each other at many points. Few crossings, however, are protected by signals for pedestrians or autos. And the trains that pass within a dozen feet of houses have no barriers to provide a modicum of safety. (It is no surprise, therefore, to read about tragic accidents throughout the area.)

Besides these basic commonalities between the communities, there are a number of other similarities:

1. Sewage is disposed of in the waterways.
2. Three of the communities do not have public water purification. Only Chatteroy has a community based water system (however, many people have their own springs and the system has not been very effective.)
3. The communities rely on county policy for protection. (Jaeger has a local police force for minor protective services.)
4. There are a few specialized services, e.g., shoe repairing, photography, etc., and professional services e.g., lawyers, orthodontists, etc., in these communities.

#### GOODY, KENTUCKY: AN AMORPHOUS COMMUNITY

##### INTRODUCTION

Across the river from Williamson on Route 119 is an area frequently referred to as South Williamson, Ky.. One section along the highway and partially bounded by the Tug River is a shopping center--the Appalachian Mall. Inquiries there as to the location of Goody produced a variety of responses. Some people never heard of Goody; others were uncertain as to whether the mall is Goody or whether a nearby residential community is Goody; yet others mentioned "Leckieville."

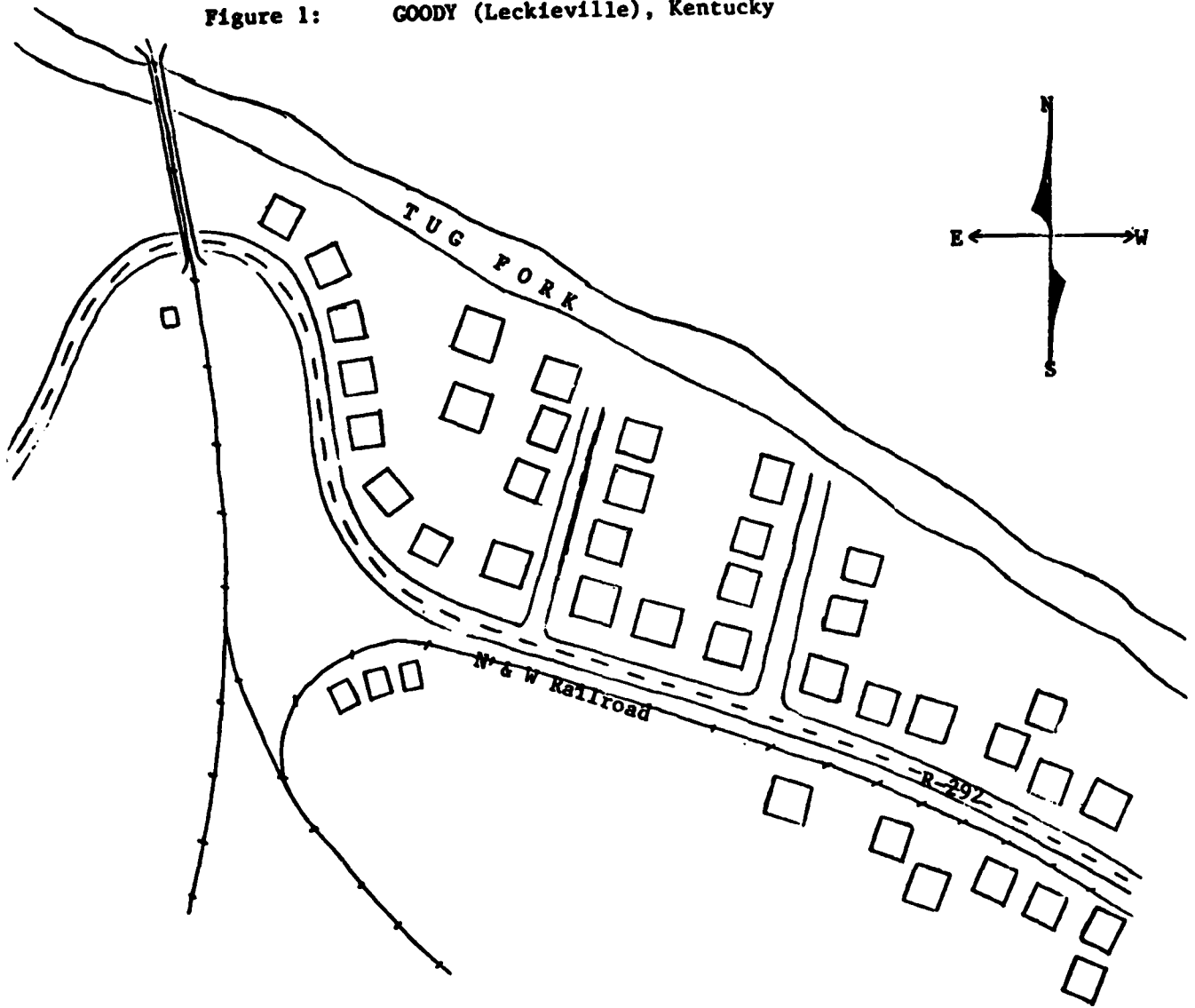
The residential community is a short distance from the mall, off of Rte 119, across RR tracks, and on the

"Goody-Aflex-Burnwell Road" (Rte. 292, a low-type surface road) as shown in the accompanying map (Figure 1). On one side of 292 with the Tug on the other side, is a cluster of homes from coal camp days. Paralleling road and railroad track (and unprotected from trains) are other modest homes. Two Baptist churches are on opposite sides of the street. An auto repair shop (with living quarters above) and a grocery store complete the picture. Whether this residential community alone or together with all or part of the mall constitute Goody is not known.

The identity of Goody is further complicated by a group of 18 houses and 7 businesses on the opposite side of Rte. 119. This cluster is referred to as "Leckieville" by some. However, more than one informant explained that residential Goody came into existence as "Leckieville" to provide housing for miners at the Leckie Colliery (owned and operated by a Mr. Leckie). Because another West Virginia town called "Leckie" caused confusion at both post offices, Leckieville became Goody. (Residents said they preferred the name "Leckieville.") But as recent as May 18, 1977, the Williamson Daily News cited Leckieville as a place where only a few homes escaped flood destruction! Whether Leckieville and Goody are the same and where boundary lines exist remains a mystery.



Figure 1: GOODY (Leckieville), Kentucky



## THE GOODY

## RESIDENTIAL COMMUNITY

An estimated 300 people live in Goody. Unfortunately little information is available about them other than what can be inferred from enumeration district data on Aflex, Burnwell and other communities. Table 3-14 shows that 5 communities with a population totalling 1,805 were socially and economically circumscribed in 1970. More than half of the houses predated 1939. The approximately 40 houses in Goody also looked at least 30 years old (the ones in the coal camp may have been at least that). If housing were indicative of schooling and income, Goody's houses would have suggested lower figures than the E.D. data--for there were no brick homes or small estates as observed from Aflex to Burnwell. However, it is unsafe to speculate. (Informants in an extremely modest home said their income was \$1,200/month based on two pensions!)

### Community Relations

Informants stated that there has been change in Goody's population. The sale of the coal camp houses brought in newcomers long ago. Marriage brings in people from other communities and sends some out. Young people are apt to go away; elders die. Some in the area were born in Goody and are related; their family tie coincides with their geographic location. For others, loyalty is to family and friends and memories of other places.

Table 3-14: Selected Social Characteristics of  
Communities Adjoining Goody in  
Enumeration District 33, Ky., 1970

Population	1,805
Median Schooling	8.65
High School Graduates	22%
Incomes	
Family	\$5,731
Individual	\$ 906
Household Size	3.89
Labor Force	
Percent Employed	44
Percent Unemployed	8
Houses (total)	464
Occupied	98%
Owned	74%
Built before 1939	55%

SOURCE: Abt Associates, Demographic Analysis,  
Vol. 1, April 4, 1979.

Support for these statements is offered in Table 3 - 16 which provides a crude indication of kinship. (See Appendix B:6 "Procedure for Assessing Community Networks," an explication of technique.) The table shows that 24 surnames appeared only once in the Goody listing. That suggests that the bearers had no relatives with the same surname in Goody (who were phone subscribers). Three had no relatives in the area. At the opposite extreme, there was at least one surname that appeared 7 times in Goody indicating that there may be 7 related families in Goody. These 7 families had up to 49 relatives listed in the Williamson portion of the telephone book. This implies that there is a group of people in Goody who are related and who have many relatives in the larger area. It may mean that those in Goody migrated to it or that bearers of the same surname left Goody. This very crude measure indicates that kith and kin may be spread over a large area, that the geographic boundaries are not the family's boundaries.

The looseness of geographic boundary lines is further evidenced by the need for school-age children to attend schools drawing from many communities. Also, one informant was visiting family, having long ago moved from "home" to Florida.

**Table**      Persons with Same Surnames from Goody,  
**3 -16:**      Leckieville and Nearby Areas Listed in  
                  So. Williamson and Williamson C&P  
                  Telephone Directory, May, 1979

Frequency of  
 Goody and  
 Leckieville  
 Given Surnames

		Frequency of a Given Surname in Area					
		0	1-3	4-9	10-24	25-49	50-65
1	G	3	5	7	5	4	-
	L	-	-	-	3	1	1
2-3	G	1	2	1	2	1	1
	L	-	-	-	-	-	-
4-7	G	-	-	-	-	1	-
	L	-	-	-	-	-	-

G = Goody  
 L = Leckieville

\* No. in box = No. of given surnames, e.g., each of following name appeared once with Goody address: Smith, Jones, & James. There were no Smiths, Joneses or Jameses in area.

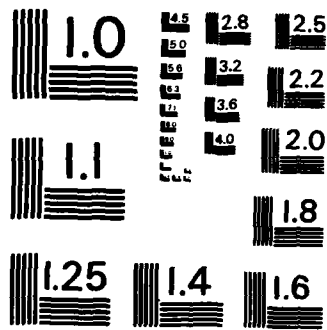
Since Goody is unincorporated, there is no formal political organization or leadership that welds the people together. There was virtually no reference to Goody in the newspapers (except for the flood and hospital admittance). Therefore, social ties could not be discerned. What little that was learned suggests that there are cliques of families and friends and allegiances to church groups. Maybe the two churches, open part-time because their ministers have other jobs, provide some with a sense of community identity.

#### THE 1977 FLOOD

"I've never felt well since the flood--never the same," a residential Goody informant stated. "I don't know what it is--nobody's well since the flood. Water is still in the walls of the houses; maybe that has something to do with it."

Accounts state that the area was severely flooded and many homes were damaged beyond repair. Aflex and Burnwell interviewees reported that their homes were damaged so extensively that they were unliveable. As a result, one was completely renovated and another built a brick home on a higher site. (The latter said that the flood proved to be a blessing for the family--it was better off than ever before!) Perhaps some of the houses in Goody had been completely destroyed. But in the summer, 1979, there was no evidence of substantial home





MICROCOPY RESOLUTION TEST CHART  
NATIONAL BUREAU OF STANDARDS-1963-A



improvements in residential Goody--only coal camp houses were visible--uncluttered, neat, but still coal camp houses.

#### THE ECONOMY

Some of the people in residential Goody earn a living in the mines or on the railroads or at the Appalachian Mall as waitresses, stock boys, etc.. Some are retirees on pensions of one kind or another. Reliable data on how people earn a living there is lacking. Yet archival data and observation provides quite another picture of the economy.

The picture of Goody's economy from these sources mirrors the confusion in defining Goody. The residential community has only one business--an auto repair shop. However, if firms listed in the telephone directory's yellow pages as having Goody addresses are counted, there are 7 (and one in Leckieville). These are located along U.S. 119. Dun and Bradstreet Reference Books include 8 firms under the heading "Goody." Some are the same as in the phone book; others are in Appalachian Plaza and appear in the directory as in Appalachian Plaza, the Kentucky side of Williamson, or South Williamson. What is particularly significant here is the anomalous character of the Goody community as illustrative of what happens when a basically rural area adapts to an urban creation--the shopping mall.

The urban-type economy that the Appalachian Mall and the businesses on Rte. 119 expose residential Goody to is indicated in Table 3 which classifies the businesses. There is a large general store similar to K-Mart or Woolco, a jewelery store, a men's clothing store, four or five fast food operations, fabric and needlework shops, drugstore, and a gift store, as well as groceries. Distribution and production industries are represented by companies doing welding, and dealing with trucks, mobile homes, equipment and mines.

Eight of these firms are currently listed in Dun and Bradstreet. Their number reflects an increase of one firm since 1960 and a rise in three since a drop in both 1970 and 1975. Their credit ratings have substantially risen (attributable largely to the truck and equipment firms increased value). Interestingly, all of these businesses are local ones suggesting the skillful entrepreneurship of area people and the recognition of Goody's existence in the larger society.

There are several implications pertinent to understanding community life that can be drawn from the foregoing discussion. In terms of the economy, the discussion implies that (a) the name of Goody is associated with local concerns that are nationally recognized (despite Goody's amorphous character); (b) there are

Table 3: Comparative Analysis of Dunn and Bradstreet Data on

Types of Business	Number	Percent	Goody			Number	Percent	Chattaroy		
			Total Credit Rating (000)	Percent Branch Credit	Percent 10 Years or Less			Total Credit Rating (000)	Percent Branch Credit	Percent 10 Years or Less
<u>1960</u>										
All Firms	7	100	213	0	43	6	100	210		50
Grocery Stores	1	14	20	-	-	1	17	35		100
Service Station	2	28	23	-	100	1	17	35		100
General Stores	1	14	35	-	-	2	35	70		-
Specialty Shops	1	14	-	-	-	-	-	-		-
Wholesale	-	-	-	-	-	-	-	-		-
Services Construction/Manufacturing	1	14	10	-	100	1	17	35		100
Mines	-	-	-	-	-	1	17	35		-
<u>1970</u>										
All Firms	5	100	-	-	80	7	100	156		43
Grocery Stores	1	20	20	-	100	-	-	-		-
Service Stations	1	20	10	-	100	1	14	-		100
General Stores	-	-	-	-	-	4	56	153		50
Specialty Shops	1	20	20	-	100	-	-	-		-
Wholesale	1	20	-	-	100	-	-	-		-
Services Construction/Manufacturing	1	20	20	-	-	1	14	3		-
Mines	-	-	-	-	-	1	14	-		-
<u>1975</u>										
All Firms	5	100	590	0	20	2	100	55		100
Grocery Stores	-	-	-	-	-	-	-	-		-
Service Stations	1	20	20	-	-	1	50	5		100
General Stores	1	20	20	-	-	1	50	50		100
Specialty Shops	1	20	500	-	-	-	-	-		-
Wholesale	-	-	-	-	-	-	-	-		-
Services Construction/Manufacturing	2	40	50	-	50	-	-	-		-
Mines	-	-	-	-	-	-	-	-		-
<u>1979</u>										
All Firms	8	100	805	-	25	3	100	200	0	1
Grocery Stores	-	-	-	-	-	-	-	-		-
Service Stations	-	-	-	-	-	-	-	-		-
General Stores	-	-	-	-	-	-	-	-		-
Specialty Shops	5	62	805	-	-	-	-	-		-
Wholesale	-	-	-	-	-	1	33	200		-
Construction	1	13	-	-	-	-	-	-		-
Manufacturing	-	-	-	-	-	-	-	-		-
Mines	2	25	-	-	50	2	67	-		1

Crum					Jaeger				
	Percent	Total Credit Rating (000)	Percent Branch Credit	Percent 10 Years or Less	Number	Percent	Total Credit Rating (000)	Percent Branch Credit	Percent 10 Years or Less
16	100	569	-	31	123	100	5,354	15	46
					8	7	345	-	50
2	13	128	-	-	9	7	141	-	78
7	44	400	-	29	11	9	834	75	09
					14	11	795	-	-
					10	8	1315	-	30
5	31	28	-	40	33	27	1090	16	39
2	13	13	-	50					
					38	31	834	-	74
9	100	151	-	44	80	100	3,849	-	38
2	22	-	-	50	7	9	198	-	86
5	55	148	-	60	6	7	133	-	50
					13	16	610	-	38
					8	10	1305	-	13
1	11	3	-	-	16	20	435	-	31
1	11	-	-	-	4	5	183	-	-
					19	23	890	-	32
9	100	365	34.3	56	62	100	64,665	94	47
1	11	10	-	100	5	8	235	-	40
4	44	305	41	50	3	5	205	-	67
					5	8	10,175	98	40
					13	21	890	22	46
					6	10	375	-	17
2					9	15	930	32	22
2					4	-	50,065	99	-
					17	27	1,790	-	82
4	100	375	-	25	71	100	65,410	93	54
					4		250	-	50
					3		10	-	33
3	75	375	-	33	6		10,285	97	33
					19		1,405	24	53
					4		125	-	25
1	25	-	-	-	9		1,225	41	44
					5		50,200	99	20
					21		1,910	-	81

businessmen in the area with a national orientation who consider it of sufficient importance to be listed in the reference books; and (c) there is some reason to identify Goody with the Appalachian Plaza and the local businesses. (Possible reasons may be the convenience of the post office, tax or other economic benefits for an address in an unincorporated community, or family tradition. Further research is needed.)

In terms of community life, the discussion points out that for some people at least, whether they are members of the community of Goody is unimportant--if they even know of it. Goody may be nothing more than a post office address. For those in residential Goody, the Appalachian Plaza Mall appears to be a world apart. Yet the Mall exposes them to the national and international market of consumer products. It draws them into the mainstream of American life with its hygienic supermarkets, pre-packaged groceries, fast food services, and constant emphasis on material goods. The Mall also furthers their contacts with strangers who travel Rte. 119. In addition, the business establishments make jobs available to Goody residents just as the mines in the area do. Yet despite the hubbub of urban activity that the Mall and Highway provide, the isolation of residential Goody enables some preservation of a more rural way of life.

## COMMUNITY DYNAMICS

The name "Goody" refers to a post office for an unincorporated, undefined geographic segment of Pike County, Kentucky. Whether the name is merely a substitute for an earlier name, "Leckieville," or identifies a separable group of people who have a feeling of community cohesion could not be determined. The physically isolated "residential Goody" constitutes a community in the sense that the population is very homogeneous in terms of observable living conditions. (To the extent that type of housing is an indicator of lifestyle, it may be assumed that the people share a similar lifestyle.)

The common lifestyle dates to the building of the coal camp. Historians contend that movement into the camps was the first urbanizing experience the miners had. The camp brought strangers together. The analysis of surnames gives credence to the idea that family and place are not geographically specific, i.e., kin may live in many different geographic areas. The mobility of children to schools and other states and the probable population shifts induced by the flood of 1977 and the ups and downs of the coal industry undoubtedly have caused population and lifestyle changes. These changes are most probably being accelerated by the Appalachian Plaza--new jobs and new wants are being created.

Yet despite all of the above which suggest similar living patterns, the presence of businesses that are local and listed in Dun & Bradstreet is indicative of the wider perspectives that some area people who use the Goody post office have. It may be assumed that some of them have different lifestyles than most of the coal camp residents!

#### SUMMARY

This discussion leads to the conclusion that the anomalous Goody is an amorphous community undergoing slow and gradual changes at the moment. The lack of incorporation signifies the lack of a group of elected officials responsible for community services and well-being. Yet the presence of a post office listing and the Goody listing in Dun and Bradstreet raises questions about the homogeneity of Goody that cannot be answered without further research. At the moment, residential Goody is in many ways a world apart from the Appalachian Plaza Goody. The latter, however, is a medium for introducing change into the former through employment and availability of goods and services of the larger society. If national policies stimulate growth in the area, Goody may well become a bedroom community for Williamson and South Williamson. There is no evidence that residential Goody has the will, desire, or organization to resist changes that state or county political groups or outside interests might favor.

## CHATTAROY, WEST VIRGINIA:

### A BEDROOM COMMUNITY

Two ribbons parallel Route 52 north of Williamson: the Tug Fork River on one side and the ever-present railroad tracks on the other. Invisible from the road, across from the railroad tracks, and less than a five-minute drive from Williamson's city limits is "Buffalo Creek Road," the main street of Chattaroy. (See Figure 3-24 .) Along the road--well-paved in parts and in need of maintenance in other sections--there are clusters of houses and trailers in varying condition, a few scattered occupied and empty business and other structures, school buildings, and churches. As the road leads up the creek to a highway (Rte. 14/2) to Matewan, the grounds and houses become more spacious. Near them is a recreation area (Kewanee Park) that has been converted into a HUD trailer community. Part of the road forms a loop into "Howard Hollow."

### THE DEVELOPMENT OF CHATTAROY

In the post-Civil War period, the "Chatteroi Railroad Company" came into being to link Kentucky and Virginia. Later, it was taken over by Norfolk and Western Railroad to serve its needs and those of the Pocahontas Coal Company. Coal camps were established along Buffalo Creek for miners working for N & W mines, the Pocahontas Coal Co., and the Howard Colliery. The coal camps,



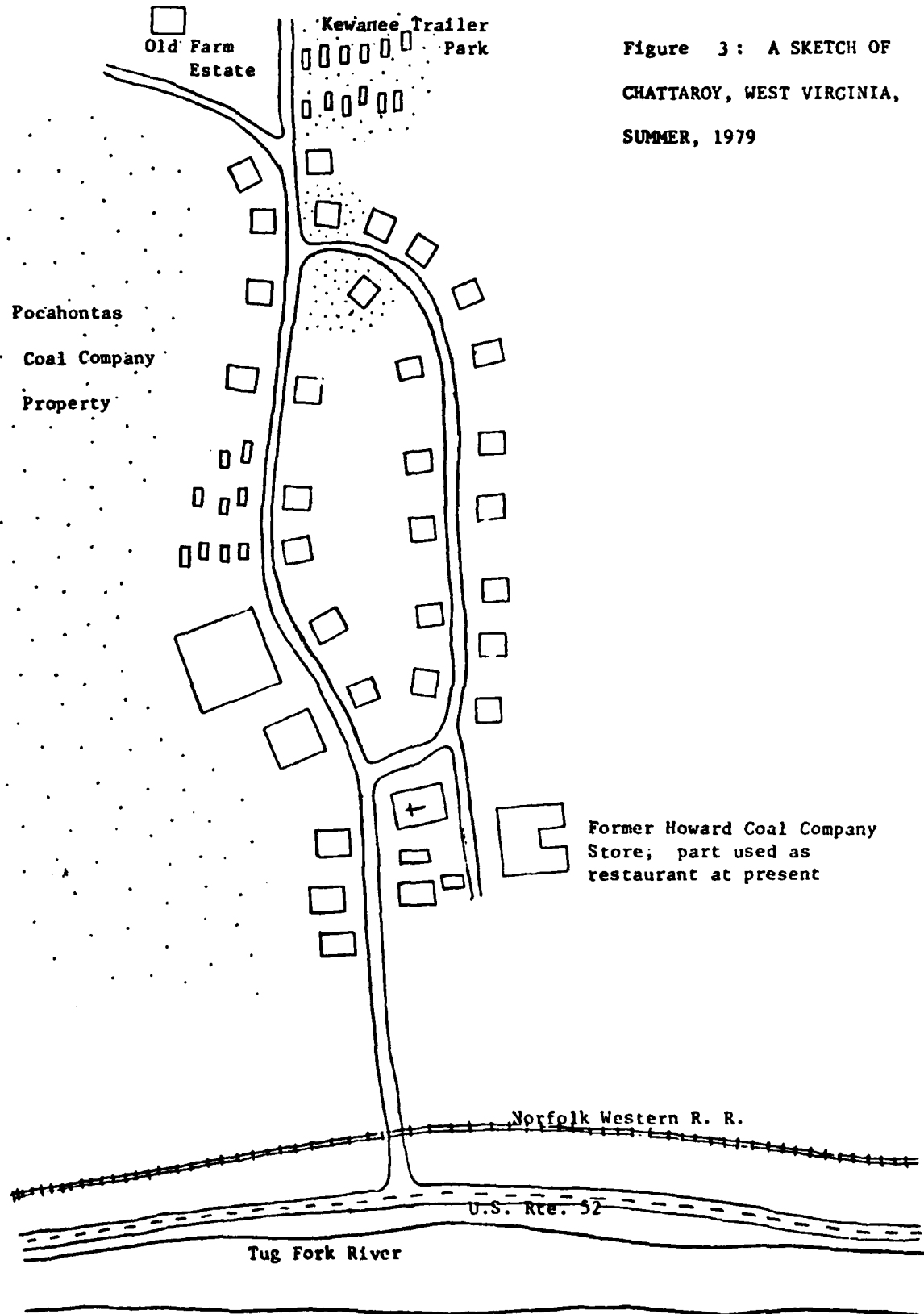


Figure 3: A SKETCH OF CHATTAROY, WEST VIRGINIA, SUMMER, 1979

abutting the lower part of the Creek, were sold when diesels replaced coal-stoked engines and when the coal economy went into a slump in the 1950s. Some of the houses survive to this day in the racially segregated pattern introduced by the companies; others were destroyed by the 1977 flood.

#### THE 1977 FLOOD

The trauma of the mine closings in the '50s was succeeded by another trauma 25 years later--the floods of 1977. The waters of the Tug Fork River backed up into Buffalo Creek. Many downstream buildings were completely lost; others were ruined beyond repair; and still others were heavily damaged. People from all over the area found assistance in Chattaroy. The Head Start schoolrooms in Chattaroy served as a center for the flood victims. Hundreds were helped by community volunteers serving there.

Housing was sorely needed. Since there were several pieces of land available, efforts were made to house both Chattaroy and other flood victims along Buffalo Creek. (The resistances of the coal companies to leasing land still rankles in the citizenry.) The Pocahontas Coal Company, owner of Kewanee Park, permitted a settlement of HUD trailers (about 30) to be sited in the park. A commercial mobile home company also provided housing. Privately-owned mobile homes were interspersed between conventional dwellings.

The flood left its mark on Chattaroy in four ways:

- (a) Psychological trauma was experienced by many people.
- (b) The flood was followed by a change in the population composition of Chattaroy. Some people left the community; i.e., but more significantly, a sizeable number of strangers were brought into the community. They had been uprooted from their former moorings and were clustered in HUD trailers in Chattaroy's sole recreation area. A schism between them and other residents developed and persists.
- (c) Some people despite the traumatic impact of the flood, have been able to improve their homes by using available government funds. Their material comforts have increased.
- (d) The community lost several businesses that served the people there. Their absence loosened an important link to the community.

#### CHATTAROY'S POPULATION

Chattaroy is an unincorporated community with a relatively small population. Although 1970 population figures of 1,145 represent a drop of 340 since 1950, as shown in Table 3-27, crude evidence suggests that the 1980 Census will show that Chattaroy has grown.<sup>1</sup>

The population distribution in terms of age, sex, and marital status is similar to that described in the social profile for Tug Valley. However, unlike most other communities, Chattaroy has a Black population. (In 1970, it totalled 45 people.)

Data on the educational attainment of Chattaroy citizens shows that it is relatively high--like that of

Table 3-27: Selected Social Characteristics of  
Chattaroy, West Virginia, 1970

POPULATION

Total 1,145

Race

White 1,100  
Negro 45

Marital Status

	Total		Male		Female	
	No.	%	No.	%	No.	%
Now Married	448	56	240	62	248	55
Widowed	72	9	10	3	62	14
Divorced	31	4	15	4	16	4
Separated	14	2	6	2	8	2
Never Married	230	29	116	30	114	25
<b>Total</b>	<b>795</b>	<b>100</b>	<b>387</b>	<b>101</b>	<b>448</b>	<b>100</b>

Age

Age	White		Male		Female		Black	
	No.	%	No.	%	No.	%	Male No.	Female No.
Under 5	98	9	49	9	49	8	0	1
5 -- 9	106	9	53	10	53	9	3	3
10 -- 14	128	11	60	11	68	11		
15 -- 19	132	12	59	11	73	12	4	11
20 -- 44	315	28	142	26	173	29		
45 -- 64	254	23	125	23	129	21	4	7
Over 65	112	8	57	10	55	9	8	4
<b>Total</b>	<b>1,145</b>	<b>110</b>	<b>545</b>	<b>100</b>	<b>600</b>	<b>99</b>	<b>19</b>	<b>26</b>

The W. Va. Department of Highways, Advanced Planning Division provides the following population figures for Chattaroy, 1970:

No. of People	1,780	%
Under 16 years old	592	33
16 to 65 years old	998	56
Over 65 years old	190	10

other communities close to Williamson. (Median years of school completed were 9.3; 25% of the population has graduated from high school.) There are approximately 300 children in Chattaroy's elementary school and 30 children in the Head Start program (many of whom are from Williamson and the surrounding area). About 3 percent of Chattaroy's youngsters, presumably from the now affluent section, attend Williamson schools. Since Chattaroy lost a school a few years ago, young people in the upper grades are bussed elsewhere.

The churches of Chattaroy indicate that the people are religious and also divided. There are in this community of roughly 1,200, six different church buildings. (Since it is common in Appalachia for small religious groups to meet in homes, there may be even more churches in Chattaroy.) The Missionary Baptist and the Church of God are the largest and have full-time ministers. The other churches are: Free Will Baptists, United Baptists, Little Rose Regular Baptists, and Presbyterians. The Baptist groups differ from one another in degree of orthodoxy or conservatism. The lines between the groups tend to be sharply drawn so that people are encouraged to associate with their own group thus furthering competition and separation within the community.

## HOUSING

Chattaroy's housing pattern has changed over time. Originally a coal camp, it was surrounded by agricultural land. Over the years parcels have been sold. Traces of the earlier period remain both in the survival of the coal camp cottages and the old farmhouses of the Harris-Thompson and Spano families. They are surrounded by structures built since the early 1900s to the seventies. Some still bear scars from floods; some are modern, expensive houses; some are HUD trailers. Although there is a degree of interspersing of the more and less elegant and earlier and more recently-built dwellings, there is clustering: the coal camp houses; the more expensive, newer, more spacious homes; those over 40 years old; and the HUD trailers. (There probably are another 20-30 trailers scattered through the community individually or in groups of four or five.)

The picture of homeownership and high occupancy rate a decade ago (see Appendix A, Table A3-29) probably persists. There may be an upgrading of the quality of housing attributable to the area's prosperity in the early '70s and governmental assistance following the flood. There definitely are many more trailer or mobile homes.

## THE ECONOMIC SCENE

Chattaroy is a community with few places that offer jobs to its residents. There are several educational/social service centers which hire local people: the elementary school, a mental health clinic, a community center for senior citizens and for a Head Start program, and a respiratory disease clinic.

Dun and Bradstreet Reference Books show that the business community was minimal in its extent and variety in an earlier period and is even moreso today.

In 1960 there was a grocery store and a gas station two general stores, a T.V. service and a mine listed. In 1970 the service station, the T.V. service and the mine had disappeared from the list and besides the grocery store and two general stores a restaurant, a saw mill, and two general stores offeared. By 1979 only 3 firms remained: a general store with a wholesale business in electrical parts and two mines. Only the wholesale business was rated. None of these businesses are branches of outside companies; all are local. (This is shown in Table 3 -- 19.)

That there are a few other potential employers in Chattaroy is indicated by the telephone directory which lists 9 business firms in its yellow pages. In addition,

there are five mines located in or near Chattaroy (two of which have Chattaroy postal addresses) (W. Va. Dept. of Mines, 1978). There are also other mines nearby.

#### The Labor Force

The limited employment opportunities cited above are reflected in the very small labor force (31 percent of the population) in 1970 Chattaroy. (This contrasts with the U.S. figure of 61%.) The median-family income was \$5,426. The W.V. Department of Highways reports that 45 percent of Chattaroy's employed people work for some level of government; approximately one-third work in mines; and 15 percent are in retail trade.

The large number of government employees probably consists of personnel in the community service organizations located in Chattaroy and people working for the county school system. (A sampling of occupations of Chattaroy persons listed in Polk's City Directory, 1975, showed the number of non-teaching school employees (e.g., bus drivers) outnumbering classroom teachers. Many of the occupants of the modern homes are reportedly employed in managerial positions in Williamson.

#### Community Dynamics

Despite its small population, the people of Chattaroy reveal a microcosm of lifestyles. People who show a common lifestyle are prone to have more in common, to



see the world from the same perspective and to unite for action. A range of lifestyles in a community is conducive to community integration if people with one lifestyle perform services for one or more other groups. There is little evidence that people with different lifestyles are functionally dependent upon one another in Chattaroy. This becomes apparent in the discussion that follows. First the lifestyles that emerged on the basis of data on education, housing types, occupations and frequency of surnames in the Williamson telephone directory are identified. Then their relationship to each other is discussed.

#### The Cosmopolitan Lifestyle

People in this category tend to identify with occupations and/or associations that are not bound to a local geographic area. They identify their personal interests with the larger society. Some have come from elsewhere to work in Williamson or nearby; others are local people whose experiences have led them to develop broad interests. They are inclined to be mobile in order to pursue occupational and other typical middle-class American goals. They travel for business, education, and shopping to Huntington, Charleston and even further. As an informant said, "I can buy an article in Charleston

on sale for less money and long before it appears in Williamson." The consumerism of some in this group is reflected in their ownership of the most expensive homes in Chattaroy with their well-maintained yards and outdoor furniture.

These people may work in mining and other businesses nearby or in government-supported or related social services. Although they probably share many of the same personal goals, the business orientation of some may conflict with the social well-being emphasis of others in terms of local issues.

The old families - The guesstimate population of roughly 10 percent consists of two groups of long-time residents--the early farmers who continue to live in Chattaroy after having sold many acres to provide houses for others, and the descendants of early settlers who either worked for the farm families or were in mining or railroading. The first group, composed of heirs whose property originally may have extended over several miles into neighboring communities, may have family ties and loyalties as well as economic interests beyond Chattaroy. (The phone book with given surnames appearing frequently in Chattaroy and even more frequently in its vicinity supports this contention.) The second group are old-timers who are less affluent and more circumscribed in their associations. Many are retired miners or their survivors.

The trailer dwellers - Uprooted by the flood of '77 from their original homes, many of these are people new to Chattaroy. They find themselves amid strangers in more or less segregated sections. Data in Appendix A Table 3-34 show that there is turnover in the trailer community. This means constant change in neighbors. Indications are that many trailer occupants are living in female headed households with very low incomes.

The trailer people, particularly in Kewanee Park, are strangers to Chattaroy, not identified with the community, and responsible for increasing Chattaroy's social problems.

The working people - These are the most numerous residents in the community. Housed in trailers, mobile homes, the old camp site, or the other modest homes in the community, they struggle for a living, belong to the local churches, and have many of the attributes of suspicion toward outsiders, strong pro- or anti-union feelings, and attachment to family. They are miners or retirees, railroaders, volunteer firemen, and semi- and unskilled workers or else widows or families of the same. They may travel great distances to their jobs, but come back home on weekends. Newspaper data indicate that their friends are from neighboring communities, possibly people they've known from days in consolidated high schools.

Table 3 -34: Current Occupied & Vacated H.U.D. Trailers\*

	PRIVATE SITE				COMMERCIAL SITE			
	Occupied		Vacant		Occupied		Vacant	
	No.	%	No.	%	No.	%	No.	%
Chattaroy	9	82	31	74	1	100	5	100
Crum	1	9	6	14				
Iaeger	1	9	5	12				
TOTAL	11	100	41	100	1	100	5	100

\* List is from June '77 to June '79 from the W.V.Governor's Disaster Recovery Office, Courtesy, Ms. J. Solomon.

### When People Meet

Each of the four lifestyle groups has to have contact with others on some occasions. In these instances, members of the community may unite. Several such instances are described below. Then the factors that foster isolation of people with one lifestyle from another are detailed.

As an unincorporated community, Chattaroy has no duly elected spokespersons or channels for dealing with local problems. Lacking these, individual citizens must arbitrarily assume the initiative to arouse people to act. This was illustrated in recent months when residents rallied around two issues. One involved complaints regarding the water system; the other, whether Chattaroy should be incorporated into Williamson. Both issues illustrate the presence of residents who are sufficiently interested to unite and take action. It seems that those favoring incorporation come from the ranks of the cosmopolitans--probably relative newcomers--who have a more urban approach to the amenities of life and are willing to pay the taxes for extension of city services. Other people, for monetary reasons or because they have always lived without municipal services see no need to become involved with the life and problems of Williamson, including the right to have a voice in local decision-making.

The complaint about the failure to render proper water service was directed to a local company by people who did not have their own deep wells. (Therefore, some of the owners of the modern, spacious homes were probably not included.) The people were not interested in improving Chattaroy; rather, they wanted to protect their personal interests. It shows that there are people in Chattaroy who know how to organize and make themselves heard.

That Chattaroy people can and do organize can be traced back to the fight for unions and later, the Kennedy-Johnson war on poverty. Chattaroy people became involved in the Head Start program and the center for senior citizens. Both programs involve outsiders on staff and as participants, but like the school, the two medical centers, and the volunteer fire department, they generate a sense of pride among those citizens who appreciate community services associated with their geographic locale.

Despite this degree of community cohesion among Chattaroy citizens, there is a lack of communality.

Briefly, factors deterring cohesion are:

- (1) The cosmopolitan orientation of some residents as illustrated in the incorporation controversy means that their horizons extend beyond Chattaroy.

- (2) The aforementioned schism between church groups within the same denomination show a lack of common identity.
- (3) The very limited number of consumer services offered forces people to go outside of the community to satisfy their needs thereby weakening their ties locally.
- (4) The differences in lifestyles turn some to church and family and others to occupational and social groups outside of the geographic community.
- (5) The need to attend schools and to work in outside of Chattaroy reduces people's allegiance to their immediate neighbors.
- (6) The absence of self-employed business people or professionals who are economically dependent upon attracting people to their community and their businesses negates the development of local leadership interested in community improvements and loyalty.

#### SUMMARY

Chattaroy, one of the largest communities in the Tug Fork Valley, has a highly diverse population in terms of lifestyles, economic positions, and participation in the labor force. Regardless of status, the people are dependent upon Williamson and other communities for employment and goods and services to meet daily needs. Many have come to Chattaroy from other places because of the coal camps, the flood of '77, or employment. The changes in lifestyles over time is reflected in housing, which appears to be increasingly segregated in terms of type of dwelling. Because it is unincorporated, there is no formally recognized leadership, no civic

improvement associations. There are, however, a few focal points that stimulate a degree of community pride: the role of local people in rising to the crisis created by the 1977 flood; people rallying around issues in recent months; and the provision of community services that extend beyond Chattaroy. But all in all, it is church and family with whom they share their lifestyles to whom most residents feel a sense of loyalty. Those who are more mobile, both socially and physically, like Chattaroy as a suburb of Williamson, as a good place to live until opportunity knocks.

There is no evidence showing that the working people, trailer people, cosmopolitans or old families are in need of services that each might offer the other. Rather, the different patterns of living point to a social rather than physical distance between these groups.

In a nutshell, the people of Chattaroy, whether dependent upon coal or other big organizations or upon acts of nature (like the '77 flood) identify with family, religion, or occupation and status group moreso than with the valley of Buffalo Creek named Chattaroy.



CRUM, WEST VIRGINIA:  
A RURAL TRADE CENTER

Crum is a small (population 300), unincorporated rural community that is relatively isolated from other communities. Although situated in Wayne County, Crum, because of the terrain, is more readily accessible to Mingo County five miles away than to the county Wayne, which administers the Lincoln Magisterial District of which it is a part.

Like other communities along the Tug Fork, Crum's houses border or are between the N. & W. R.R. tracks, U.S. Highway 52, and the river. They also are built up three creeks (the Jenny, Stonecoal and Silver) (see map). The main concentration of dwellings consists of several rows of homes (probably coal camp houses originally) just south of the high school and grade school.

Enumeration district data which includes an additional 1,200 people living in Steeptown, Stonecoal, and their environs, provides a picture of poor communities. Median family incomes were \$2,830; median individual incomes, \$733, in 1970. Only 31 percent of the residents were in the labor force and 8 percent were unemployed. Crum seems to have a large number of elderly and single persons. Half of the people have had over 8 grades of

schooling, but only 14 percent completed high school--even though Crum has a high school and a grade school in it.

The two schools attract students from 10-12 miles away, a distance that is formidable because of poor roads and or treacherous terrain. Approximately 300 students attend the high school. At least half of the attendees drop out before graduation. Out of the 1977 graduating class of 24, 8 went on to the local junior college in Williamson; out of 1978's 24 graduates, only 1 sought a college education. This small number is consistent with a median of 8.11 years for the magisterial district, with 14 percent of the residents having graduated from high school.

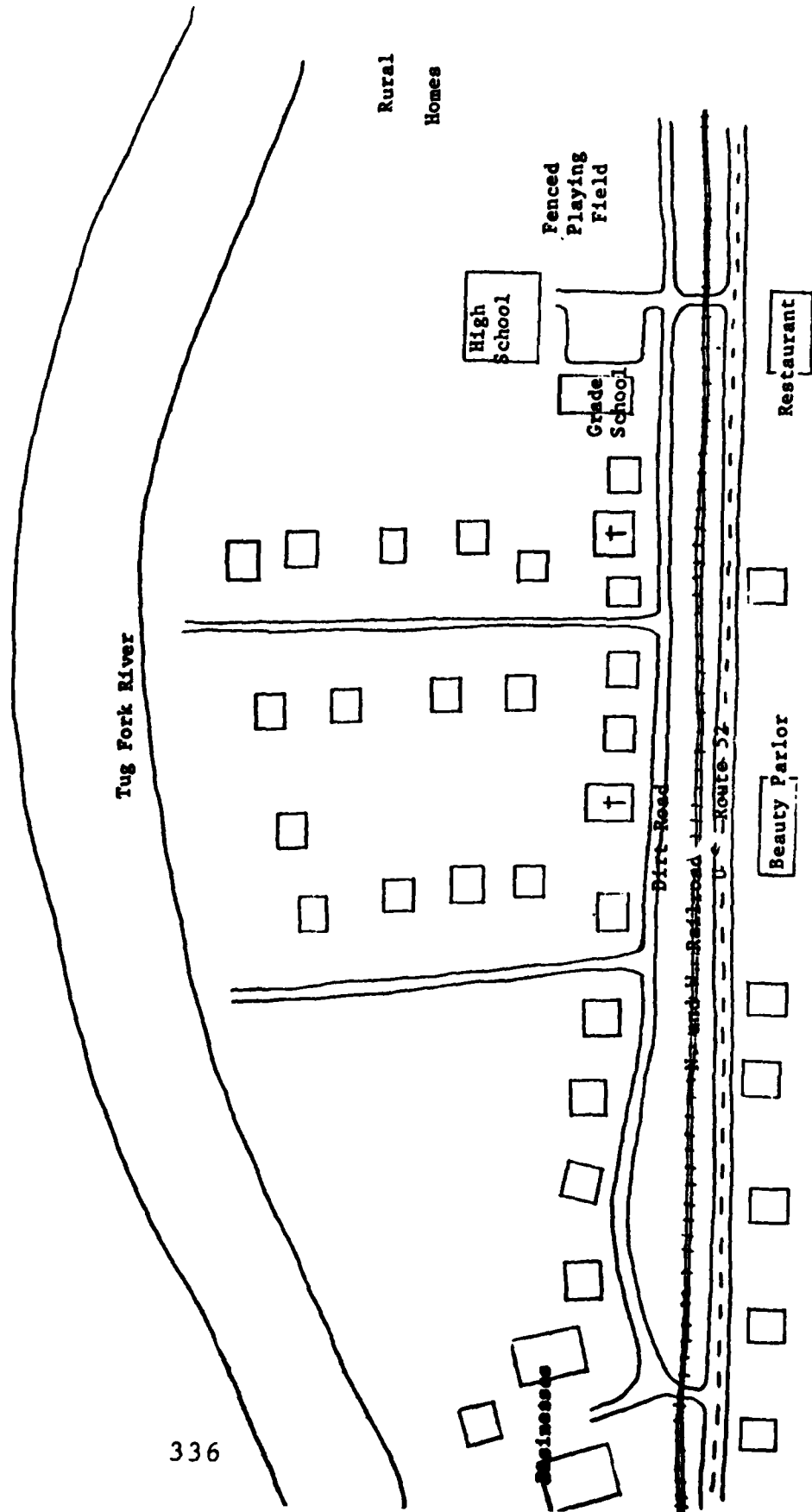
The grade school has 500 children.

#### THE '77 FLOOD AND HOUSING

Sections of Crum were severely flooded in 1977. Most of the community lies between the railroad track and the Tug River, an area inundated with water. Houses across the road which parallels the tracks were probably high enough to get minimal flooding. One informant, living on the fringe of the clustered community provided the following description:

My house is about 25' above the river normally and sits within a few feet of a steep drop to the river. The water rose so that the ground was washed away right to the edge of the house. It also flowed around parts of the front yard, but again, did not seep into the house. We were most fortunate. . .  
(This is paraphrased)

FIGURE 4 : Sketch of Crum, West Virginia



The majority of the 100 houses visible in Crum were small frame structures. On the main street where most are clustered, they are interspersed with small businesses, churches, and a fraternal organization. One building appeared to be an apartment house.

#### THE ECONOMY

Earning a living has been a difficult task for Lincoln magisterial district residents. Family income in 1970 averaged \$2,830 for supporting 3.61 persons. Thirty-one percent of the population were in the labor force and 8 percent were unemployed.

In 1979 there were at least 17 business establishments in Crum. They included:

1 Grocery Store	1 Beauty Shop
3 General Stores	1 Barber Shop
3 Restaurants	1 Cable TV Company
1 Tavern	1 Plumbing Company
1 Auto Repair Garage	1 Recording Studio
1 Poolroom	for Records

In addition to these businesses, the Buffalo Mining Company's March Mine near Stonecoal is one of 3 coal mining companies in Wayne County. As one of the 20 leading coal producers in 1978, it employed 156 people, thereby providing employment to some Crum residents. The two schools are further sources of employment.

Analysis of Dun and Bradstreet data on Crum (See p.19b) in 1960, 1970, 1975, and 1979 shows that in 1960 there were 16 firms listed with 13 rated; by 1970 the

figure dropped to 7 firms; by 1979, only one grocery, 3 general stores, and the cable T.V. company continued to be listed in Dun and Bradstreet. Similarly, the total credit rating went from \$569,000 in 1960 to \$151,000 in 1960, and back up to \$375,000 during the past year.

What do these Dun and Bradstreet figures reveal about Crum? These figures show that Crum changed from a relatively self-sufficient consumer's community with some industry to a much less varied economy with fewer and smaller consumer outlets. Crum in 1979 appeared to be more of a place in which to live and less of an independent trading center. Nevertheless, the high credit rating of the locally owned stores indicates that it still maintains a place in the rural economy. The demise of locally owned businesses shows the kind of survival struggle the small, independent businessman faces.

Contacts in Crum indicated that the small entrepreneur persists in the rural economy by setting up roadside stands--selling everything from clothing to bedspreads--and "stores" in their homes. They may acquire their inventories through discount houses in big cities and sell to friends and neighbors who learn of their activities by word-of-mouth or their visibility on the highway.

## COMMUNITY DYNAMICS

Crum appears to be composed of several cohesive groups closely linked by family ties. Some families live close by one another so that there is daily interaction. The telephone book reveals that there are a number of large families in Crum who have dozens of relatives in neighboring communities. The majority of Crum residents have other people with their own surname not only in Crum but in the area.

Of course, bearing the same surname does not necessarily indicate communality.

Family groups are reenforced if they have the same religious affiliation or are divided along religious lines. People ally themselves with those branches of the family that attend the same church. In Crum, there are at least six Baptist churches reflecting different scriptural positions or degrees of orthodoxy, e.g., Free Will Baptists and United Baptists. (The community has no other denominations.)

Some of the churches discourage mixing with members of other churches. Church announcements indicate Sunday school, Sunday morning and evening worship, and Wednesday nite worship. There are many revivals in the area.

In addition to the sociability of church affairs, family affairs--weddings, reunions, funerals--play an

important part. Other recreation is provided by enthusiastic involvement with high school sports, and visits to the pizza parlor and pool hall.

People who belong to the same family or are members of the same church are more likely to be counted as "the good people" and share the same. (If a stranger is referred to one by a "good lifestyle person" in a particular way, the stranger will be invited into the home. Another type of referral indicates whether one should be dismissed quickly or given some time. A stranger is quickly informed as to who the "good" and "other" people are.

Some of the "others" are those reputed to be 3rd and 4th generation welfare recipients. They make up a very large percentage of the student body of both schools. Many live far away so cannot attend school in inclement weather:

One child lives way back in the hollows. The dirt road can't be used during bad weather. There are times this child leaves the house at 5:30 a.m. to walk to a place where a relative who works in a mine picks her up. By 7:30 a.m. she is able to meet the school bus and ride around to pick up others for another 45 minutes. Despite having to get up before 5:30 to start her day, she is a very good student and comes to school quite regularly, weather permitting.

However, not all students have that kind of motivation. About half of them drop out of the non-accredited high

school. Sports activities are a primary motivating force that holds students in the high school.

Currently, there is a struggle taking place over schools. It illustrates the powerlessness that Crum residents feel in determining educational policies and the plight of the unincorporated community that is distant from seats of power. The decisions are made in the magisterial district offices and in the county officialdom. Since the department of education is the second largest employer in the county (next to mining corporations) with a budget of roughly \$15,000,000, it plays a crucial role in the area.

Feeling has been expressed that Crum schools are used by school officials as the "siberia" of the county, the place where recalcitrant teachers may be sent. The Welch Daily News (Aug. 17, 1979, p. 6) reports that parents "have charged that the board favored the schools at the more urbanized and affluent northern end of the county." They feel that the board has reneged on its agreement to consolidate the Crum and Fort Gay high schools. The County superintendent contends that the school population is not large enough to warrant two foreign languages and other courses that the accreditation board requires. The Crum supporters contend that \$1 million earmarked for a consolidated school is being used for a county vocational school.



The fact that this controversy exists again indicates the different lifestyles in Crum. Apparently there are those who would benefit from a vocational education. Yet there is a group of concerned parents who want to prepare their children for college, who know how to organize and to make their interests known (despite the fact that it is exceptional for a local graduate to attend college. See p.46.) They are education-conscious and have some of the same attributes that Chattaroy's cosmopolitans have but with greater ties to the local area.

Despite the apparent rootedness of many families to the area, the evidence indicates that changes are occurring.

- Young people are prone to leave for the military or jobs elsewhere.
- Crum boasts a cable T.V. station which exposes its viewers to the whole world.
- High school students take a trip to Washington, D.C.
- Family reunions and affairs attract distant relatives and friends.
- Teachers from Pennsylvania have been hired by the school system.
- Housing is in short supply so that people have to go outside of the community.
- The retirees will not be around much longer.
- Highway 52 provides an easy drive to a shopping mall in East Kermit where fast-food eating places and shops make an urban consumers' market available.

--The Crum-Kermit Clinic has introduced people who have had virtually no contact with Catholics, Jews, or Blacks to a Pacific Island physician along with medical services.

--The very limited number of employment opportunities within Crum make it necessary for people to commute or move away to work.

#### SUMMARY

Crum is basically a rural community, isolated and removed from seats of decision-making. Its population is small but because of the location of two schools is enlarged by the presence of youngsters from 10-12 miles away. Many of the local people are clustered in coal camp type homes. They are retirees or working people. There are a few local business people whose "worldliness" has led them to be included in Dun and Bradstreet. The school teachers, too, are people whose horizons have extended through their formal education. They are essentially "cosmopolitans." Crum also has its counterpart of Chattaroy's trailer people--although they may not live in trailers.

The differences in lifestyles are complimented by differences in religious orthodoxy which serve to weaken any sense of community identity. Because of Crum's relative isolation, however, it may be that these differences actually stimulate interaction between the people and some degree of functional interdependence.

Further, politics are said to be active in the Crum area. (Crum is the voting center for several nearby communities.) So the geographic area may have meaningfulness linked to family and religion. If the high school is closed, then family and religion will persist as the basic links between people who are in process of acquiring an urban way of life.

#### IAEGER, WEST VIRGINIA: THE LITTLEST CITY

Iaeger, the only incorporated sample community, has a history of leadership in coal mining and trade. It was one of the new towns that mushroomed at the turn of the century along with Anwalt, Keystone, Kimball, and Welch. Its growth paralleled that of McDowell county: rapid until 1950 and then a decline. At its peak, Iaeger had 1,271 people. Since 1950 it has declined to 822. In its heyday it was an important railroad shop town and mining center. But the six passenger trains that stopped each day and the railroad shop have been eliminated. The old railroad station, approximately 80' x 25', stands vandalized besides the tracks where coal-laden trains still whizz by. Yet Iaeger remains a mining center with 40 coal companies using its post office or having mines located in its vicinity.

The economic strength which the presence of the coal companies suggests stands in sharp contrast to the ecology of Iaeger. As shown in the accompanying map (Figure p. 3- ), the Tug Fork separates the downtown section from

U.S. Highway 52 and several business places including a busy fast-food restaurant. A walking bridge has been installed to link the two. Many of the buildings on the main street are empty and in shambles from the flood of 1977. Built to the water's edge, their basements and first floors were inundated; their contents were destroyed. Nothing has been done to renovate many of them. A flower shop, pool room, large general store, post office, and a few other shops are intermittently spaced between the empty ones. The second stories of some are apartments. Across the three unprotected rows of railroad track are fine old homes, some of which are converted into apartments and other usages. Whereas the community once boasted three drug stores, a few doctors, a dentist and one or two attorneys, none are regularly there at present (although one informant said that a doctor has come out of retirement to serve the people). In striking contrast to the condition of the business section is the only clue to the economic status of the town--a beautiful new bank building.

#### THE PEOPLE OF IAEGER

When Iaeger was a thriving community it was peopled by miners and railroaders, shopkeepers and professionals. Now, many of the people from those days are gone and their children have left the community. Of the professionals, only the teachers are left. It is said that there is a disproportionate number of retirees and social welfare

recipients. The small size of the households (2.84 persons) lends support to the presence of an aging population. The families are much smaller than in the surrounding areas where household sizes range from 3.83 to 4.23 persons. This may be partly attributable to the divorce rate which is higher than in Chattaroy.

#### THE ECONOMY

Iaeger can boast of a more viable economy than most of the communities along the Tug Fork. It is in the heart of coal-mining country, where there are approximately 40 mines near it. (See Appendix A Table .) These mines produce about 16 percent of McDowell County's coal and employ around 300 people, or 22 percent of the county's coal employees. (W. Va. Dept. of Mines, 1978.) This probably contributes to the median family income of \$5,583 (1970 figures), which is higher than that of surrounding communities which are as low as \$2,935. (One area northeast of Iaeger reports a higher income, \$5,820.)

#### The Labor Force

Iaeger can boast a higher percentage (41 percent) of its population in the labor force than most other Tug Fork communities or than those contiguous to it. The range in the surrounding communities is 17 percent to 32 percent. Like most of the communities, it has a larger percentage of females of employable age; however, no data on employment by sex was available.

### A Broad Range of Industries and Businesses

The economy of Iaeger is highly diversified, for a small Tug Fork community. In addition to the mining companies, there is a sawmill operated by a giant out of state corporation, a weekly newspaper, mining construction firms, and four wholesale businesses. In 1979, Iaeger boasted the presence of the following:\*

8 grocery stores	3 restaurant and bars
4 service stations	3 furniture stores
6 department stores	3 radio and TV shops
2 second hand car dealers	2 home appliance stores
2 florists	1 drug store
2 undertakers	1 boat & sporting goods dealer
1 auto repair shop	3 trucking firms
1 electrical service	

Despite the range and variety of businesses today, Iaeger's 71 firms listed in Dun and Bradstreet reflect a drop from the 123 that were listed in 1960. At that time the recommended credit rating amounted to \$5,354,000 with only \$800,000 attributable to branch establishments. The total credit in 1979 was \$65,410,000. Of this amount, approximately \$50,000,000 was from an out-of-town manufacturing firm and \$10,000,000 from a branch merchandising company. Although

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\*This list was derived from Dun and Bradstreet information, newspaper ads, and the telephone directory.

mining firms are not always listed in Dun and Bradstreet, eight locally-owned ones with a total credit rating of \$1,910,000 appeared in the 1979 Reference book. The foregoing evidence from 1960 to the present shows the lessened role of local businesses in contrast to the substantial part they played in an earlier period. Circumstances have markedly changed in more recent years with the entry of a few major corporate enterprises and the demise or absorption of the local companies.

Contrasting with the changes of the sixties and seventies has been the steady growth of the Bank of Iaeger. Recently housed in a modern building in the main business section of Iaeger between the Tug and the Norfolk and Western tracks, the bank provides sharp contrast to the surrounding structures. In 1960 its assets were \$274,000; in 1970 they rose to \$582,000; and by 1979, they topped the \$2,427,000 mark.

#### COMMUNITY DYNAMICS

Just as the economy of Iaeger has undergone drastic changes over the years, so too has the community life. With the closing of the railroad shops and reduction in mining in the fifties, many people left the area in search of jobs. Businesses closed. This meant a reduction in the goods and services not only available to Iaeger residents, but also to the nearby communities like Ike's Fork, Applegrove, Sandy Hill, Litwar and War Eagle which are part of the town's

trading area. Since local business and professional people also left, Iaeger lost people who might have helped today's leadership in actively promoting community development.

With its history of leadership as a thriving incorporated community, Iaeger has political organization that assumes responsibility for the community. There is a mayor and a council of five members. (A local resident is a McDowell County Commissioner.) Elections for these positions are frequently heated contests. This was illustrated during the Summer, 1979 when the right to office of two of the contenders was challenged and, after heated meetings reversed.

The town also differs from other communities in that it has a Rotary Club and a Lions Club. (There are conflicting views as to how much cooperation exists among these various groups of community leaders.) Besides the business organizations, Iaeger has a sorority, Rebekah and Eastern Star Lodges, a Junior Women's club and many church organizations. Among the community's churches are the First Baptist, the United Methodists, and a Calvary Baptist nearby. The United Methodist is the most active according to an informant.

One of the major issues in the community at present is what to do with the downtown section. Some people advocate conversion of the railroad station into a library; others, into sorely needed parking spaces. Not too long ago a 165-foot long steel walking bridge was constructed over the Tug River to link parking spaces along Route 52 with the central business district.



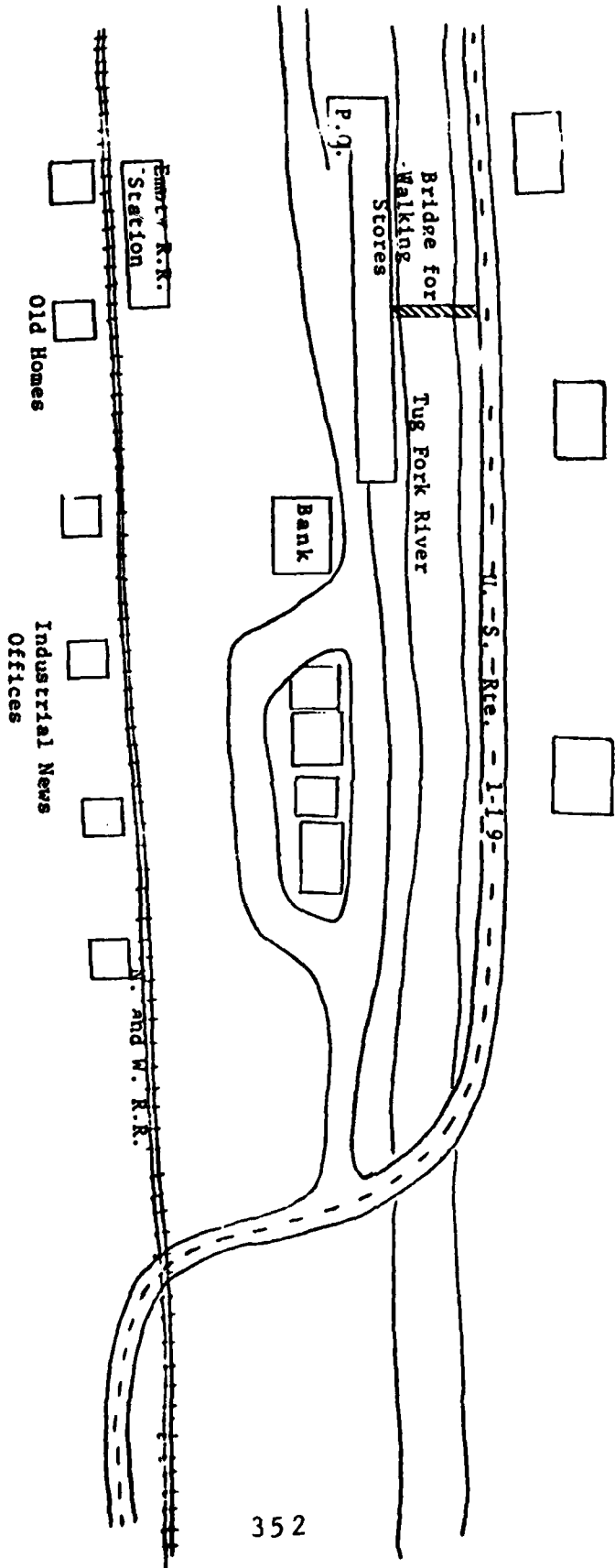
Long-time residents of the community speak with pride of the bridge, the fire protection available, and the local schools. The grade school with an enrollment of some 700 children, is the largest in the county. Ninety percent are bussed from an area bordered by the Wyoming County line, Roderfield, Panther, and Huff's Creek. The high school and junior high are the only ones in the Sandy River Magisterial district. Their enrollment approximates 450 students. The grade school has 30 teachers, including one Black teacher. There are fewer than a half-dozen Black students. (The Black population has been going down in recent years.) An estimated 85 percent of the students are from families on relief. An informant reacted to this situation:

The school furnishes everything for the poor child. Federal guidelines are followed closely. The children stay in school and go on to graduate from high school--more than formerly--because their families are then entitled to survivor's insurance and aid to dependent children. Many people around here who work hard for their meager salaries resent the fact that their children have to provide their own lunches, books, and the like. Since there are so few who aren't on some kind of assistance, the school ought to provide the same things to everyone.

Long-time residents look nostalgically back to the days when Iaeger was a thriving community with many businesses, well-traveled people, "the most active garden club in the state," fine homes and a larger population. They cite the need for parking places, renovation of the business district, the inadequacy of housing, the poor sewage system (the "system" being that the sewage goes directly into the Tug), and the need to rely on other communities for medical care. They

express concern over the large number of welfare recipients and wonder what the entry of foreign corporations on the local mining scene will mean. They wonder if they should move away, too, or remain, hopefully waiting that the renaissance of Iaeger . . .

Figure 5: A SKETCH OF IAEGER, WEST VIRGINIA, SUMMER, 1979



CHAPTER IV: CONCLUSIONS: THE TUG FORK FLOOD PLAIN  
TODAY AND TOMORROW

The six counties along the Tug Fork River have traditionally been viewed as a world apart. Their identities as counties, even as parts of states, were unclear until late in the last century. Proprietors owned land on both sides of the Tug Fork River. Rather than dividing two distinctive states, the River served to unite people by facilitating transportation. The early settlers could farm the fertile valley lands in relative isolation from the rest of the world because of the mountain ridges. These ridges to this day symbolize the barriers that keep the Tug Fork Valley people distant from governmental and other seats of power.

The remoteness of the people in the Tug Valley from the national, state, and even county centers of decision-making--symbolized by the impassable mountain ridges--is attributable to several factors:

1. The lack of available land both for residential and industrial development.
2. King Coal (as referred to by area newspapers).
3. The heritage of cultural and political organization.

### The Lack of Available Land

The steep slopes of the mountains, the flood-proneness of the Valley, and the consumption of space by railroad tracks and highways (especially the new large corridor highways) intensifies competition for what limited land there is. In each of the four sample communities, informants spoke of the difficulty in locating housing and its expensiveness.

We've started looking for a place for my relative who will be coming home from the service in three years. We figure it will take that long to find something decent and affordable.

One result of this lack of available land is that small clusters of homes--once coal camps or rural settlements--persist. They experience slow turnover in occupancy; this gives the semblance of community stability and cohesion. Because residents have to travel along the Tug Fork to their places of work, many communities are bedroom communities like Chattaroy and Goody, offering minimal services to their local residents. This mobility serves to fuse one community with another.<sup>1</sup> Another result is that many people attempt to maintain and improve their property. This was taking place all along Rte. 52 during the summer, 1979. (Perhaps it was made possible with government funds from the floods of 1977 or 1978.) Many well-maintained homes provides a sharp contrast to those of their neighbors whose homes are in disrepair.

The lack of available land also impedes the industrial development of the area. Several businesses were lost after the floods of 1977. Businesses that seek to expand have problems. This was exemplified in Williamson where one of the businesses, damaged by the flood and in need of expanded facilities, left the area. Thus, a circular process is set in motion: little land, floods, etc., inhibit industrial development; lack of industries reduces the attractiveness of the area for some businesses. This combination of factors is particularly effective in deterring industries that require major investments. Businesses that make quick profits--fast food services, discount stores, groceries, and the like, are more likely to come into the area and have been doing so.

#### King Coal

The dominance of a single industry--the mining of coal--places the area in the precarious position of being entirely dependent upon it and its supportive industries--railroading, mining, construction, equipment and repair services, and trucking. Since corporate headquarters located far from the Tug Valley regulate coal production in light of market needs, the entire valley experiences the yo-yo effect (the ups and downs) in national and international demands for coal. The result is that the people have had to adapt their lifestyles to the realities of the situation; they have to be dependent on the coal producers.

The erratic behavior of the coal economy makes it difficult for local businesses to provide the goods and services that the people need for daily living. It is costly for the small entrepreneur to transport products from far away wholesalers and to cope with the fluctuating incomes of the local clientele. Both Dun and Bradstreet data and other sources indicate that small businesses, locally-owned, tend to have limited lives. The gap is being filled increasingly by the chain stores and franchise businesses. The net effect is that here is another instance in which the Tug Fork people are dependent upon outsiders.

King Coal has led to the organization of labor unions in the area. These demonstrate that the people of Tug Valley do organize (both for and against them), that they have the will to assert themselves on behalf of their economic interests. At the same time, the unions represent another group that exercises important controls over the people's lives.

#### The Heritage of Cultural and Political Organization

Historically, the occupants of the Tug Fork Valley flood plain were farmers. The evidence suggests that some had thousands of acres on both sides of the river. There were among them business oriented people (both local and from afar) who saw the advantages of development--railroads, real estate, logging, and later coal. Thus, Welch, Jaeger, and Williamson attracted a class of people whose lifestyles

were more akin to those of their urban counterparts in the growing cities of the East than like people living in out-of-the-way hollows. As mining developed, the hill people joined the ranks of the coal camp residents. It is the culture of dependency that the coal company society created that is generally used to identify the way of life of the Valley. However, that way of life, though practiced by a numerically larger number of people, was just one of the ways of life in the Valley.

The political organization of the area has fostered the persistence of the working people's culture. The county system of decision-making lessens the importance of each community and increases the likelihood of influence by outside interests rather than by the flood plain people. Further, the fact that decisions in the coal country are made outside of the area, means that political leadership can gain little from appealing to the local residents who, by and large, are dependent and poor. This pattern has been reenforced through a lack of local initiative to incorporate communities. This in turn is probably attributable to the lack of locally-owned businesses that service local people. Undoubtedly, the coal camp owners did not encourage the development of civic associations among their residents. That heritage continues.



It must not be assumed that because the kinds of civic organizations that characterize urban industrial centers have not developed in the Valley that the people will not and do not organize. The coal camp proprietors encouraged religious organization. To this day, there are innumerable churches reflecting all kinds of Baptist and other fundamentalists persuasions. (Approximately 200 churches have had advertisements in the Welch Daily News; in Williamson, another 125.) In addition, there are fraternal, business, and labor organizations. In incorporated communities, there are active political groups. Family reunions, which are popular, take a great deal of leadership and organization. What is particularly noteworthy is that most of these organizations are not place-specific. This is significant on two scores. First, people from nearby communities join together to participate in them. Second, localized civic improvement organizations are few.

Another heritage from coal camp days involves the role of education. Here, two contradictory threads are brought together. On the one hand, education is an important part of the county system (probably because of large federal contributions in more recent years large numbers of people are employed by the departments of education; the power to hire and fire rests there. School budgets are big. Undoubtedly a sizeable number of professionals with college degrees

(and corresponding lifestyles) are eager to promote schooling. On the other hand, the traditional role of the coal miner was one that downplayed education. "Brawn, not brains, that's what makes a good miner," a retired coal miner said, with a great deal of pride. This schism was reported in Crum between those who favor the teaching of French and those who want vocational education. The issue highlights the differences in lifestyles of those who live in the same communities in the Valley. It again points to the different population groups that have made up the communities in Tug Fork since the introduction of real estate, railroading, and mining developments along with coal camps and the demise of agriculture.

To understand the nature of community life in the Valley today requires constant recognition of how the above societal forces impinge on both the communities and the individuals in them.

#### SIGNIFICANT CHANGES SINCE WORLD WAR II

Within the past half-century, changes have occurred in the Tug Valley flood plain area that in a sense have loosened it from its moorings and in the past and opened the door to greater flexibility in the future. These changes have been induced by forces beyond the control of people within the local area, but they have filtered to them through the context discussed in the preceding section. The broadest forces have been the State of the Nation: the return of

World War II veterans, the Korean and Viet Nam wars, the relative national prosperity of the '60s and early '70s, the growth of all levels of government, the baby boom, and the current recession/inflation period. The more obvious and direct forces have been the floods within the last 20 years that have devastated the lands and disrupted lives. The changes evoked by these forces are subsumed under the headings (1) migration patterns; (2) adaptations to the economy; and (3) variations in lifestyles.

### Migrant Patterns

Examination of county population trends over the decades shows a relatively steady drop in virtually all counties along the Tug Fork River. The evidence from the enumeration and magisterial district data support the county findings. Similarly, the scanty information on population in the four sample communities supports the over-all finding. However, it is speculated that 1980 census figures will show slight growth taking place in Chattaroy (as well as in those suburbs of Williamson that have not suffered greatly in recent floods).

The quantitative data does not tell about the people who left and those who stayed behind. Age and sex breakdowns indicate that it is mostly the young men. Studies of migration show that migrants generally assess potential opportunities in other places as outweighing the negative factors in their home communities. (In brief, migrants find

the "pull" factors are greater than the "push" factors.) Migrant include those who not only seek employment, but are "educated out of their communities," i.e., seek the kind of life that is not available locally. Frequently they are the children of local people who went away to college and joined firms that send them where needed. By and large, the migrants have to be people who can make it "on their own" in the larger society.

Migration, however, does not only refer to people who leave an area. It also refers to two other groups of people. There are those who enter the area and those who move about within it, the internal migrants. The numbers in the Tug Fork 100-year flood plain may be small, but their impact on the area is noteworthy.

The Entrants - Among the people who have come into the Tug Fork flood plain area, particularly during the '60s and early '70s, have been managers and of branch and franchise retail businesses and government workers. The former are mostly employees of chain outfits that have carefully selected the site as a way of profiting from the local consuming population. These workers are subject to transfer by their parent organization. Like coal mine supervisors, they must abide by the policy decisions made in distant places. The franchise operators have a greater degree of independence (in some ways) and may have a greater interest in winning personal acceptance in the local community.

A number of government employees have come into the Tug Valley and a number have left. For example, McDowell County has some Pennsylvania teachers on its faculty. Some stay; some leave. Or, during the Kennedy/Johnson administrations, people came to work on a variety of social programs in connection with the war on poverty. As these programs became established agencies, some of the workers have stayed on in them--or have found other reasons to stay in Tug Fork Valley. Through the numbers of these outside teachers and government workers may be small, their work involves them with community people.

Others who have come in and influenced local people to varying degrees are people engaged in flood-protection (or relief) programs, veterans affairs administrators, internal revenueurs, and other representatives of the generally expanding role of all levels of the federal government. Regardless of their degree of influence on the communities in which they reside or work, they break down localism and necessitate adaptations to their presence (as well as adaptations on their part).

The Internal Migrants - The lack of housing makes a real movement difficult. Yet some people do move from one location to another. Large-scale movement was necessitated by the flood of 1977. HUD trailers were set up where possible. This meant that people had to leave their home sites and relocate among strangers. The data on Chattaroy's

trailer occupants show not only that many people had to move into the trailer site, but also that many have vacated those trailers and moved elsewhere since the flood. Some of those whose homes were damaged beyond repair managed to build new homes or remodel older ones in other communities. People move when they retire or for "better housing"--as in the case of Chattaroy with in-migrants to the richer homes and in Williamson's retirement home.

There is another type of internal migration that takes place and has an important impact on communities. That is, commuting to work. Some people commute daily, others weekly. This fosters the conversion of communities into "bedroom communities" whose residents have little time (or interest) to be involved in local affairs. People who commute frequently acquire friends in other communities and get used to driving distances for goods and services. Thus the near and more distant shopping malls, made accessible by the highways, make realizable the purchase of products seen in homes via cable TV and in big city newspapers (delivered daily to many homes).

By way of summary, then, despite the general decrease in population throughout the flood plain area, entry of outsiders and internal movement stimulates the urbanization of Tug Fork people and melds the individual communities into a larger whole.

### Adaptations to the Economy

The fluctuations in the coal economy as it reflects national and international politics has brought periods of relative affluence amid longer periods of hardship. The flood of 1977, unfortunately for many, occurred during leaner years. When there is a demand for coal, then miners receive high wages. Some, aware that the demand may be short-lived, continue to live frugally; others improve their material conditions. Some become mine owners themselves and offer non-union miners wages and benefits to compete with union workers. The Dun and Bradstreet Reference books show that a number of locally-owned businesses came into being in the last twenty years--unfortunately, they are not stable. Locally-owned general stores and groceries have to compete with the chain stores. Few are in a position to do so. The lack of locally-owned businesses that cater to community needs impedes the development of civic-conscious interest groups aimed at improving the local facilities. The struggle to earn a livelihood, of course, is characteristic of most of the population. (1969 data showed that from 20 to 50 percent of the families in the six counties were living on less than the poverty level incomes; other data indicated that 12 percent of the families in the eleven-community disaster area of the 1977 flood receive welfare assistance and 21 percent received old age, survivors and disability insurance.)

This strain, meshed with housing problems, fears of flooding, and familial problems akin to those experienced throughout American life, earn the label "multi-problem families and individuals" for many. (See Appendix A, Table A 4-14.)

Yet despite the economic strains on many Tug Valley families, income data show that a small percentage earn \$15,000 and over--a salary reputedly not uncommon for employed miners. Thus, there is diversity in the amount of income earned and the stability of earning it. This same kind of diversity is indicated by the Dun and Bradstreet data. Over-all, West Virginia communities average per capita credit available is \$36,238; Kentucky's, \$4,906. But on closer scrutiny, only six West Virginia towns have over 99 percent of that credit and only 2 Kentucky communities have over 90 percent. Most of this credit is recommended for branches, not local businesses although local businesses outnumber branches! The significance of this is that outside financial control permeates all aspects of Tug Valley business, that their interests lie outside of the local communities, that the communities with high credit ratings are likely to have a segment of the population that is atypical of other communities, and that communities vary in the businesses and services available. The sample city--Iaeger--typifies what this means in terms of the quality of life.



### Variations in Lifestyles

Repeatedly in the preceding pages similarities and differences between people have been pointed out. When the similarities appear to be greater than the differences, as in residential Goody, then the community is homogeneous. Differences are somewhat more marked in Crum, much more marked in Chattaroy and Iaeger. In the array of communities from Welch to Williamson to Louisa, some places appear to be more homogeneous, some less. Although individual indicators, like sources of income, mark people as different from one another, it is the combination of variables that signify a way of life, attitudes and values, and conceptions of appropriate behavior and its performance. In the discussion of Chattaroy and Iaeger, the lifestyles existent in those communities were mentioned. The following is a summation of the lifestyles that appear to be prevalent when the whole valley is considered:

The Cosmopolitans: These people live in a way that takes into account their relationship to the larger society. In the Tug Valley they would be identified by their sources of livelihood, their homes, education, and future-orientation. Employment-wise, they constitute the middle- and upper-management and professionals in large corporations (government and industry) and a few of the self-employed. Relative to other Valley residents, their incomes are highly based on salaries, not wages. They occupy the old homes that are well-maintained or live in the newer very costly ones. Many have had college education elsewhere and have returned because of family ties or the recognition of opportunities. They are well-informed, read big city and national publications, travel to purchase many of the items that they need, send their children to college, and play an active role in church and/or business and professional organizations. They may be influential in community affairs without actually playing visible leadership roles. They are interested in their work; it plays a major role in their lives. Therefore they are likely to move in pursuit of economic, physical, and social opportunities and amenities.

The Old Families or Localites : The line between the Old Families and the Cosmopolitans is a hazy one since they both may be members of the same family and since they live in very much the same way. The difference is largely in terms of the Old Families' more local orientation. They are more closely bound to Tug Valley and their rural heritage. Some have established businesses that are highly successful; others have had to close their businesses. They provide services to meet consumer needs or those of the mining companies. Their livelihoods are closely linked to the Valley and highly dependent upon how the local population fares. Because of this, they may take part in the Tug Valley Chamber of Commerce and other organizations concerned with the economic well-being of the area. Some play visible political roles at the local or county level.

The localites are likely to have many relatives in the Tug Valley. Family reunions, church revivals and other church-related activities, and family cemeteries are important aspects of their lives. Some have left the area for military duty, college, or employment (just as many of their children do), only to return because of family or opportunities that they perceived. Although they are old families in the sense of having lived in the area more than a generation (and may own or be members of families that own substantial acreage), they do not necessarily have the reputation of being community elite.

The Working People: These are the majority of the people in the Valley. They struggle to earn a livelihood. Many have lived in the area a long time, in coal camps, in trailers, in modest and well-maintained homes, in shanties. They like individual dwellings and try to own their own places. Family and church are focal points in their lives. However, family break-up is a common occurrence (as elsewhere in the U.S.). For some, hunting and fishing, for others, the pool room and the bar provide recreational outlets. Their children attend school, frequently into high school where athletic activities are a prime inducement. Some attend the community college in Williamson or the mining courses that are now a prerequisite for mine employees.

These are the people who have to accommodate to news of death on the highways or in the mines, violence, and disease. Many are the commuters to Ohio cities for work during the week and the return home on week-ends. They are prone to feel more comfortable in the Tug Valley than in the urban communities outside of it. They take an active stance regarding unions. Predominantly

fundamentalistic in their religious orientations, they start their own religious groups. The Working People are divided among numerous fundamentalistic religious groups reflecting a broad range of biblical interpretations and degrees of orthodoxy. Those with leadership qualities become leaders in unions or churches. A few have become active in organizations to provide community facilities.

It should be borne in mind that many of the working people have had experiences outside of the Valley--in the armed services, in relation to their jobs or other family members' jobs. They have had personal experiences in the world to which they are exposed on TV and radio.

The 1977 flood had a devastating impact on many. The indications are that they would be willing to move to less flood-prone areas if housing were available. They are not tied to their current home sites; they are tied to the Tug Fork Valley. It is where they feel accepted and at home. (If they did not, they would have been among the out-migrants most probably.) For many, moving is not new, so moving for flood protection and better housing would be acceptable. For a few, the flood was a boon: they were able to improve the quality of their housing with low-interest loans and other funds.

The Trailer Dwellers: This name is used loosely to refer to the multi-problem families in the area. Those who are employed tend to be underemployed; many are unemployed. Family problems, ill health, housing--all add to the complexity of the struggle for survival. Many are accustomed to moving for any number of reasons. Their children are the recipients of public funding of school lunches, books, and the like--if and when they go to school.

The Outsiders: The outsiders are composed of two fairly distinct groups that share many of the same attributes. One group, Outsiders I, is composed of the newcomers, recent arrivals to the communities, and life-long residents of the area who have come to identify themselves with interests and activities akin to those of the newcomers. Counted among them are local professionals and government employees (many of whom came from other states for "interesting" work). Their way of life is similar to that of the Cosmopolitans in terms of many middle-class values and attributes. However, they tend to be socially-conscious and are dedicated to bringing about changes to improve the quality of life in the Valley.

The Outsiders II are basically middle-class in their orientation, too. They have entered the Valley to fill specialized jobs in business and industrial areas. They are the mine employees with college-trained skills, the franchise holders and the managers and supervisors of fast-food places and chain stores; the foreign-born persons who open up businesses or provide health services.

Although the numbers of families and individuals in each of these categories is small, the differentiation in lifestyles that the categories suggest is significant in terms of community life. In the first place, it indicates differences that impede or facilitate communication between people. Although the people live very close to one another, their ways of life are so different that they are basically worlds apart (even though friendly greetings are often exchanged on the street). The Cosmopolitans and the Outsiders are alike in their broad orientation and concerns: they are conscious of their relationship to the larger society and identify with people beyond the Valley. In contrast, because of their dependency on the local economic scene, Trailer People and Working People are more directly dependent upon the valley for daily goods and services and for their daily livelihoods. Since such a high percentage of them have low incomes, they can devote little energy to community improvement.

In the second place, because the numbers in each group are so very small, there probably is a greater dependency on members of the family whose association one enjoys than on one's group. This type of dependency, cutting across occupational and social interest groups, enhances identity

with the Valley rather than with the locale in which any given family may reside. Therefore, attachment to geographic place, i.e., a given community, is probably not as strong as attachment to and identity with areas of the Valley. This implies that people within each group see the Valley (or some portion of it) as their bailiwick.

Thirdly--and probably most significant in terms of community development--are the roles of the Cosmopolitans, Localites (Old Families), and Outsiders in relation to civic responsibility. These people generally constitute the pool from which local leadership is drawn. Since most Tug Valley communities are not incorporated, ergo, lack local civic associations, there is little opportunity to exercise leadership in improving community facilities where they live. Further, the county system of organization means that the local communities that are unorganized are unlikely to have formal channels of influence--as well as financial resources. Further, activity at the county level may have virtually no reverberations at the local level. Then there is the matter of community interest in betterment. The Cosmopolitans are more likely to devote their energies to making their own lives comfortable. The Outsiders may feel that they are temporary residents or else make an effort to change the quality of life despite their small numbers and the opposition they may face. The Localites are too few in number in most communities to have an impact. Further, as heirs to the coal

camp traditions and as persons confronted by the competition of the chain stores, they may see little future in community changes for themselves.

Thus, the people of the Tug Fork Valley, though small in number, have varied lifestyles, varied goals, and varied allegiance to the communities in which they live. Many have had experiences outside of the area or in different locations within the Valley. The ties to family and religion appear to be far stronger than the ties to any specific geographic location.

#### SOME GENERALIZATIONS ABOUT THE PEOPLE

From the foregoing discussions, it appears that the residents of Tug Fork Valley have undergone many changes since the end of World War II and in particular, during the seventies. For during the seventies, they experienced economic hard times and very good times; they suffered through the floods of 1977 and 1978 which, for many, meant that they had to relocate; and they have had their hopes raised and lowered that the nations' energy policy would revitalize the coal company. Further, they saw their friends and relatives leave the area. On the basis of these comments, we conclude:

1. The people of the Valley have become increasingly urban in their lifeways.
2. There is a great deal of variation in the lifestyles of the people. Although the various groups are relatively small in number, their presence is important to recognize because their needs and expectations are different, as are their responses to policy changes and implementations.

3. Within the various groups of people there are variations and differences in networks of association based on family ties, religious affiliation, and proximity.
4. Leadership roles and organizational development are manifested in many ways in these communities. Although there are few of the associations found in more urban areas, people do unite for common interests along religious, political, familial, and economic lines. The organization of many religious groups composed of a small number of members and a religious leader illustrate this point. Also, the strength of unionism is another case in point. Then again, there is active political organization in the incorporated communities with some spillover to the county and magisterial levels.
5. People in the area tend to push the thought of floods out of their minds when the rainy season is over. They express their concerns primarily in terms of economic conditions. Most are preoccupied with daily living. The floods, like the all-pervasive power of King Coal, provide a backdrop to daily living which people prefer to forget if possible.

#### VARIATIONS BETWEEN COMMUNITIES

Just as it is possible to classify the people on the basis of more or less shared lifestyles, so too the communities can be typed. Though there are approximately 100 and all are small, there are variations which are not necessarily associated with size. There are a number of dimensions along which the communities can be classified. One of the most obvious that reveals something about the life of a community is whether it is incorporated or not. Those that are have a mayor and 4 or 5 commissioners. In terms of community cohesion and organization this is revealing for it means that there is a political organization and elections, that the community has people responsible for its functioning as a unit, that it has a role in the larger political organization of the state and

nation. It also means that at some historical moment a group of people were able to unite sufficiently to seek incorporation that they had the silent, if not active, support of their constituents. The available histories of Iaeger, Williamson and Welch show the importance of one or more individuals who, for personal reasons, see the advantages of developing incorporated population centers. The development of these communities as railroading and mining centers (not simply rural trade centers) was significant.

A second procedure for classifying the communities is in terms of the services which they provide. In this connection, the combined listing of Dun and Bradstreet for each community and businesses identified in the telephone directory and through other sources is useful. As indicated in the social profile of the Valley, some communities provide a number of services--they meet consumer needs with grocery stores, auto sales and repairs, clothiers, jewelers, etc., and economic needs by having industries which provide job opportunities. Such communities are referred to as balanced; in contrast are those communities which provide few services or employment opportunities to their citizenry. These communities are specialized. The evidence indicates that there tends to be a relationship between the type of economy and population size. As with any generalization, it does not always hold. Thus, Chattaroy, one of the largest communities in the area, is a specialized community, offering minimal services to its people. On the



other hand, when all places identified as being within Goody are included, it provides a picture of a balanced community!

It must be borne in mind that these terms are used in relation to the Tug Fork communities. In reality, none of the communities offer the broad array of services found in more urbanized trade centers. Further, the balance may be attributable to the presence of one or more branch stores or mines so that many goods, services, and alternative economic opportunities are not available to the local people. Yet relative to one another in the Tug Fork Valley, some communities have a broader economic base than others. (See Table 4 -22).

It should also be noted that those communities that have branches of large corporations in their midst tend to be more stable economically. However, this does not mean that they provide employment for the people. The reason: they may have mines that are highly mechanized. Further, these communities, because of the presence of outside branches, may provide competition to local business or may in other ways dominate the economic scene.

Borrowing the terminology from an earlier study by Motz a third classificatory system can be introduced. However, slight variation in meaning is warranted. This classification is in terms of community "openness" and "autonomy." The open community is one in which there is no strong, centralized local leadership that screens who (particularly in the sense of businesses) may enter the community. Therefore, virtually

Table 4 -22: Comparison of Balanced and Specialized Economies

Balanced Economy			Specialized Economy	
Town	Population	Total Per Capita Credit	Town	Population
Fort Gay	792	631.31	Crum	300
Kermit	716	1536.31	Naugatuck	200
Nolan	350	457.14	Borderland	300
Williamson	5300	72,223.02	Chattaroy	1200
Matewan	964	2702.28	Rawl	75
Wharnecliffe	75	-----	Lobata	150
Iaeger	822	79,574.21	N. Matewan	700
Roderfield	1100	918.18	Blackberry City	200
Davy	993	956.70	Thacker	100
Welch	3800	57,946.05	DeLorme (Edgerton)	400
Warfield	350	1071.43	Meador (Devon)	75
Lovely	700	15,042.86	Fanther	300
			Hensley	250
			Beauty	450
			Hatfield	140
			Turkey Creek	600
			Goody	300
			McCarr	500
			Freeburn	400
			Majestic	400

Source: Dun & Bradstreet Reference Book, March 1979

anyone with who desires to come into the community can do so since there is no organized group protecting community interests. In the Tug Valley this is to some degree the case because the communities are unincorporated. In contrast, the autonomous community is one which has a strong leadership that stands serves as gatekeepers determining who may come in. This is done by the leaderships' determination of tax benefits, land availability, zoning, and the like.

Because power is vested in the counties and magisterial districts of Tug Fork Valley, it is largely the counties, rather than the communities, that need to be analyzed in terms of these two categories. However, in terms of the localities, some appear to be more open to the possibility of county determination of what may go on within them than others. Here, incorporation would be a factor in determining how much dependence from the county a community may exercise. Thus, county representatives have to deal with the leadership of Williamson; in Chattaroy there appears to be no such leadership.

Another consideration in the Tug Valley is the presence of corporate land owners and the limited amount of land. This precludes local control.

The fourth procedure for classifying the communities along the Tug was suggested within as was done in the context of this report: (a) amorphous communities, (b) bedroom communities, (c) rural trade centers, and (d) "cities." More intensive

analysis of the many communities along the Tug Fork would further establish the appropriateness of this approach. They, like the other classificatory systems, suggest that the Tug Fork Valley is not composed of a number of small communities that are basically alike. Rather, each community is different from the others, yet has some characteristics in common with others so that they can be viewed as similar.

#### SOME GENERALIZATIONS ABOUT THE COMMUNITIES

It is obvious that there are many differences between Tug Fork communities, yet it must be remembered that they are all very small, that they are all dependent communities, dependent upon King Coal, that they all suffer from limited land for industrial and residential development. There are a few significant points to be emphasized:

1. The data show that the economic picture of a community does not necessarily indicate the state of well-being of its population. Thus, Iaeger presents a picture of a community with very high per capita credit rating, indicating that businesses are relatively stable and prosperous. Yet the lives of most of the people in Iaeger are such <sup>that</sup> the same generalization could not be made about the people of Iaeger's economic position.
2. Although people may consider the image of their community important to them, place does not seem as important as relationships--and those tend to be strongest to family and religion.
3. The high rate of out-migration shows that the base for community organization is constantly shifting thereby making the communities unstable in their ability to maintain ties within their boundaries.
4. As a result of the floods of 1977, some communities experienced a number of changes. Some communities found that their population mix was altered. In other communities, new people came in and others had

to leave. People improved their property as if planning to stay. Some communities have been beset with social problems that are relatively new to them. Some developed new relationships with federal and state agencies. Thus, like the residents, the communities of Tug Fork are constantly subject to change.

#### LOOKING TO THE FUTURE

The fate of the communities and the people in them in the Tug Fork Valley is inextricably tied to national policies regarding the production of coal and the responsiveness of major corporate producers. In the following pages, three alternatives are presented. The first assumes that the "in limbo" situation of today prevails; the second, that West Virginia and Kentucky coal is sought; and the third, that a national policy that by-passes coal production in the Tug Fork Valley is introduced.

#### The In-Limbo Situation

Two important occurrences are likely to take place:

- (1) change will occur at an accelerating pace in the lives of the communities and the individuals in the Valley; and
- (2) there will be population shifts within the Valley.

The acceleration in changes, set in motion during the seventies, will occur.

Both of these factors will take place for some of the same reasons. The seventies saw the initiation of several highway corridors which have caused relocation of some of the people. The 1977 flood did the same thing. These shifts have forced people to re-orient their lives, to adapt to new

situations. Their new locations have put them in contact with new conditions. At the same time, the new roads will make it possible for them to travel beyond the Valley. They will also bring other people into the Valley and create demands for goods and services which these newcomers want. Since housing will probably continue to be scarce, the newcomers are likely to be transients so that commercial enterprises to meet their needs rather than those of the local populations are likely to come into being. (These, however, will provide limited job opportunities to some of the local people.) If these businesses develop, then some community-interested leaders may perceive the need to improve water and sewage systems, roads, and schools.

On the other hand, local people may use the highways to leave the area, leaving behind the dependent elderly and the poor. The highways, too, will make it possible for those who can afford, to live in larger cities or outside of the flood plain and commute to their places of work. In that case, more and more of the communities will deteriorate. Those close to the established communities like Welch, Iaeger, and Williamson and Matewan are likely to become bedroom communities of them.

#### A Positive U.S. Coal Policy

If the national policy is one requiring more coal, then many small communities may benefit--in the long run. Over the short run they may experience over-crowding, deterioration of services, and the like. But in order to meet national needs, it is highly likely that federal and corporate assistance

will be available to establish housing sites out of the flood plain. (Of course, in this process, some small communities will be by-passed and lose their identity--as well as their populations. This is likely to work an extreme hardship on the aged and dependent.) It is likely that the gap between communities will become greater with new planned communities providing goods and services (and including an infrastructure) that will house the more skilled and higher paid workers while the older communities will be left to struggle on their own. Unless the older communities have strong leadership able to assert their interests, they are likely to be by-passed.

#### A Negative National Policy

If for some reason coal production in the Tug Fork Valley is not promoted within the next few years, there is likely to be a continued exodus from the area. Increased mechanization underground and strip mining will further that direction. Many of the communities will die; others will be skeletal. However, because of the new highways and the beauty of the area, it is likely that tourism will gradually enter it.

#### Summary

In sum, potential changes in the area are very much dependent upon the national and international economic scenes which will dictate the opportunities for the Tug Valley. The people of the Valley are increasingly having to adapt to changes. If economic opportunities are made available to them and if they have the opportunity to select reasonable

housing sites, many are likely to be eager to move out of the flood plain. After all, history shows that they have been undergoing the process of urbanization for a long time. The evidence in this report indicates that they are not immutably tied to specific geographic sites. Family ties and religious ties reenforce each other and are the basis for the cohesion that exists in the Valley.



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APPENDIX A: TABLES

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TABLE A-8: NUMBER OF COMMUNITIES AND POPULATION DENSITY, TUG FORK VALLEY COUNTIES, 1970

	Square Miles	Population Density <sup>1</sup>	Number of Communities in Tug Fork Valley*	Number of Communities in County**	Total Population
West Virginia					
Wayne	513	73.3	9		37,581
Mingo	423	77.5	34		32,780
McDowell	533	95.1	19		50,666
Kentucky					
Lawrence	425	25.2	4	9	10,726
Martin	231	40.6	5	6	9,377
Pike	732	78.1	12	22	61,059

SOURCE: U.S. CENSUS OF POPULATION

\* Based on Motz-Van Der Slice Survey  
 \*\* Kentucky 1978 Official Highway and Parkway Map, Kentucky Dept. of Public Information, Frankfort, Ky.

<sup>1</sup>U.S. Population density in 1970 = 57.5



Table A1-9: Tug Fork Valley Settlement Patterns by Average Miles between Communities, by Counties in W. Va. and Ky.

	Mean Miles	Median Miles
Wayne	4.3	5
Mingo	4.3	2
McDowell	2.4	2
West Virginia	2.6	2
Lawrence	10.0	11.0
Martin	3.7	3.9
Pike	2.7	3.5
Kentucky	4.3	3.8

Table A2-8a: POPULATION BY COUNTIES\* AND MAGISTERIAL DISTRICTS CONTIGUOUS TO THE TUG FORK RIVER;  
1920-1970

	1920	1930	1940	1950	1960	1970
West Virginia						
Wayne County	26,012	31,206	35,566	38,696	38,977	37,581
Magisterial Districts						
Butler	4,520	4,116	5,058	4,717	4,324	4,237
Lincoln	5,074	5,629	6,268	5,536	5,294	3,998
Mingo County	26,364	38,319	40,802	47,409	39,742	32,780
Harjoe	1,949	2,275	3,275	3,928	3,925	3,093
Kerit	1,707	1,974	2,538	3,267	2,739	2,271
Mannolia	6,023	7,805	7,917	9,810	8,284	6,489
Stafford	3,191	4,084	5,877	7,625	6,947	5,886
Tug River				5,983	4,711	3,907
Williamson	6,819	9,410	8,366	8,224	6,746	5,831
McDowell County	68,571	90,479	94,354	98,887	71,359	50,666
Brown's Creek	22,922	28,952	29,786	31,956	21,693	15,686
Sandy River	5,920	9,971	13,907	15,285	14,546	11,600
Kentucky						
Lawrence	17,643	16,713	17,275	14,418	12,134	10,726
Martin	7,654	8,584	10,970	11,677	10,201	9,377
Pike	49,477	63,267	71,122	91,154	68,264	61,059

\*County figures include other magisterial districts than those along the Tug Fork River

Table A2-8b : POPULATION CHANGE, 1960-1970 AND 1970-1976 FOR COUNTIES

	1960 Population	1970 Population	% Change in Population 1960-1970	% Change in Population 1970-1976
McDowell	71,389	50,666	-29.03	51,600 +2
Mingo	39,742	32,780	-17.52	35,500 +8
Wayne	38,977	37,581	-3.58	39,700 +5
Martin	10,201	9,377	-8.08	11,300 +17
Pike	68,264	61,059	-10.55	71,900 +15
Lawrence	12,134	10,726	-11.06	12,500 +15

SOURCE: CENSUS OF POPULATION, 1970



Table A2-8c Residence in 1965, for Counties

	Total Population 5 years old or older	Lived in Same House		Lived in Different House in Same County		Lived in Different House in Different County in U.S.		Lived Abroad		Moved, 1965 Residence Not Reported	
		Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
McDowell	46308	30150	65.11	11079	23.92	3447	7.44	84	.18	1548	3.34
Mingo	29725	17861	60.09	7280	24.50	3280	11.03	48	.16	1256	4.22
Wayne	34289	20554	59.95	7790	22.72	4425	12.90	108	.31	1412	4.12
Martin	8410	5046	60.00	1410	16.76	589	7.00	20	.24	1345	15.99
Pike	55502	34002	61.26	13283	23.93	5141	9.26	122	.22	2945	5.31
Lawrence	9879	5895	59.67	2577	26.09	1147	11.61	12	.12	248	2.51

Source: Census of Population, 1970, Table 119.

Table A2-9 Place of Work, for Counties, 1970

	Total Number of Workers	Worked in County of Residence		Worked Outside of County of Residence		Place of Work Not Reported	
		Number	Percent	Number	Percent	Number	Percent
McDowell	10611	8870	83.59	990	9.33	751	7.08
Mingo	6804	4858	71.40	1492	21.93	454	6.67
Wayne	11021	3893	35.32	6427	58.32	701	6.36
Martin	1962	1148	58.50	306	15.60	508	25.90
Pike	14757	10168	68.90	1904	12.90	2685	18.19
Lawrence	2484	1526	61.4	633	25.4	325	13.08

Source: Census of Population, 1970, Table 119.

TABLE A2-14 : DUN AND BRADSTREET CREDIT RATINGS AND STABILITY RETURNS\* OF LOCAL AND BRANCH FIRMS IN THE 100-YEAR FLOOD PLAIN OF THE TUG FORK RIVER IN WEST VIRGINIA AND IN KENTUCKY, 1979

	Tug Fork Valley of West Virginia	Tug Fork Valley of Kentucky	Tug Fork Valley Totals
Population	18,677	4,540	23,217
Total No. Listed	567	75	642
No Branches Listed	67	7	74
Total No. Rated	272	22	294
No Branches Rated	43	2	45
Total Credit (000)	676,815	22,275	699,090
Total Branch Credit (000)	536,340	20,000	556,340
Total Per Capita Credit	36,238	4,906	30,111
Per Capita Branch Credit	28,717	4,405	23,963
Per Capita Local Credit	7,521	501	6,149
Total Firms 10 Yrs. or Less	252	55	307
Branch Firms 10 Yrs. or Less	2	2	4

\*Stability patterns refers to changes in management or entry of new firms between 1969 and 1979.

Table A4-14: CHARACTERISTICS OF 1,014 RESIDENTS OF HUD MOBILE HOME OCCUPANTS, TUG FORK VALLEY, W. VA., AND MINGO AND MC DOWELL COUNTIES, W. VA. , 1977

Characteristic	Tug Fork Valley, W. Va.	Mingo County	McDowell County
<b>Mobile Home Location</b>			
Private Site	54.8%	64.4%	42.3%
Group Site	29.5%	26.1%	22.0%
Private Rental	9.9%	7.4%	20.3%
Commercial Site	5.8%	2.2%	15.4%
<b>Age of Head of Household</b>			
Under 40 yrs.	52.5%	50.1%	61.3%
41 -- 60	28.4%	29.0%	23.2%
Over 60	19.2%	20.8%	15.5%
<b>Total Family Gross Income Per year</b>			
Under 4800	37.0%	37.4%	31.9%
4801-9600	31.0%	30.4%	32.5%
9601 -14,400	18.3%	19.1%	17.7%
14,401-19,200	8.6%	7.5%	13.7%
over \$19,200	5.1%	5.6%	4.1%
<b>Transportation Available</b>			
Yes	80.5%	-	-
No	19.5%	-	-
<b>Occupation</b>			
Social Security Pension, Unemployment, Welfare	50.9%	51.2	47.5
Mining	38.6%*	16.3	29.3
Other (Transportation, Govt., Business, Other)	30.5	32.6	23.4

SOURCE: "Basic Findings of Housing Survey," Unpub. Ms., Courtesy of J. S. Bowles, Governor's Disaster Recovery Office, Charleston, W.Va. 1977.

\*As given in source. Probably should be 28.6%.

Table A-2-17 Selected Social Characteristics of Tug Fork Valley  
Enumeration Districts by County, 1970

Kentucky		Lawrence County	Median Yrs. of School	Percent H.S. Graduate	Median Family Income	Persons per Household	Percent in Labor F.	Percent Unemployed	Percent Owner Occupied
Enumeration District	Total Population								
11	630	9.00	35	6386	3.15	41	0	57	
12	839	8.09	8	2669	3.30	25	9	72	
Total	1469								
Martin County									
5	1098	6.76	7	2045	3.85	31	5	68	
2	1258	5.67	7	3182	3.34	41	6	70	
3	1424	8.34	14	4188	3.88	34	4	68	
9	361	8.71	3.3	5500	4.51	29	16	64	
Total	5833				4.25		7	NA	
Pike County									
1	810	8.80	33	6570	2.48	46	2	34	
30	1231	8.97	21	7023	3.76	45	1	72	
31	1805	8.90	35	5405	3.16	42	13	75	
29	700*				3.00	34	7	60	
32	605	8.02	21	5763	3.84	44	8	74	
33	1805	8.65	22	5731	3.32	41	9	73	
35	1236	7.69	13	6684	3.32	29	9	61	
38	1263	7.29	12	4306	3.09	39	5	66	
39a	1309	7.37	15	7036	3.69		4		
Total	10,814								
Kentucky		18,116							

\*Rand and McNally estimate

Table A-17: Selected Social and Economic Characteristics by Enumeration Districts along Tug Fork River, McDowell County, 1970.

West Virginia McDowell County		Total Population	Median Yrs. of School	Percent H.S. Graduate	Median Family Income	Persons Per Household	Percent in Labor F.	Percent Unemployed	Percent Owner Occupied
Enumeration District									
26	1728	7.07	13	4511	4.13	32	15	52	
28	966	6.96	13	2935	3.83	27	13	65	
23	861	8.34	35	5583	2.84	41	9	63	
25	1602	8.36	18	5820	4.02	17	1	74	
18	1054	8.55	19	4829	3.76	26	3	55	
22	2323	7.92	15	5607	3.44	34	1	68	
34	714	9.85	39	7928	2.76	44	7	80	
14	1123	8.50	11	3896	3.45	35	9	46	
10	1375	10.56	40	8987	3.04	52	5	70	
11	1160	10.03	33	5345	2.25	44	3	34	
12	694	12.50	65	8966	2.38	61	0	43	
13	770	12.57	74	9964	2.83	54	0	73	
29	1254	8.15	15	4412	3.96	29	9	64	
<b>Total</b>	<b>15,624</b>								

Table A 2 - 17: Selected Social Characteristics of Tug Fork Valley Enumeration Districts, by County, 1970

West Virginia Mingo County		Enumeration District	Total Population	Median Yrs. of School	Percent H.S. Graduate	Median Family Income	Persons per Household	Percent in Labor F.	Percent Unemployed	Percent Owner Occupied
	3	641	10.73	42	6842	3.46	45	9	57	
	5	595	8.62	25	3522	3.48	31	5	42	
	7	1007	8.33	26	4478	3.65	22	4	60	
	13	678	7.59	18	4393	3.48	36	11	63	
	14a	531	8.66	28	5441	3.63	33	10	75	
	14b	1146	9.30	25	5426	3.34	31	0	71	
	15	756	11.66	49	8125	2.95	49	3	49	
	16	792	7.65	16	3212	3.37	29	3	74	
	17	628	10.00	34	6536	3.00	47	0	65	
	18	1319	10.71	40	7564	2.94	43	3	67	
	19	987	9.23	37	3862	2.43	38	2	53	
	20	668	8.24	14	3962	2.18	38	10	17	
	21	998	12.00	50	7182	2.61	56	2	35	
	22	1194	11.47	46	8302	3.28	59	2	50	
	23	661	8.92	32	3900	3.55	36	0	43	
	24	576	8.62	19	5364	3.67	17	4	68	
	27a	524	6.07	22	6300	3.52	44	13	79	
	27b	825	7.47	15	5211	3.25	31	0	72	
	28	999	9.01	8	3817	3.76	20	4	60	
	29	849	8.36	20	5420	3.51	29	8	77	
	31	1050	7.37	13	6206	3.83	32	14	49	
	35	1176	5.62	13	4867	3.97	15	5	72	
	<b>Total</b>	<b>18,600</b>								

Table A2-17. Selected Social Characteristics for Tug Fork Valley  
Enumeration Districts by County, 1970

West Virginia Wayne County												
Enumeration District	Total Population	Median Yrs. of School	Percent H.S. Graduate	Median Family Income	Persons per Household	Percent in Labor F.	Percent Unemployed	Percent Owner Occupied				
42	852	8.46	23	6543	3.25	41	3	62				
46	1620	8.36	20	3890	3.88	32	2	72				
48	1774	8.15	14	3844	3.76	27	6	68				
49	394	7.04	7	3477	3.25	19	0	62				
50	1547	8.11	14	2830	3.61	31	8	63				
Total	6137											



Table A2-19: Per Cent of Civilian Labor Force Employed in Each Industry for U.S., West Virginia and Kentucky Counties, 1970.

	United States %	Wayne Co. %	Mingo Co. %	McDowell Co. %	Lawrence Co. %	Martin Co. %	Pike Co. %
Agriculture	3.07	1.71	0.64	0.64	8.53	3.24	0.34
Mining	0.82	1.48	24.24	43.14	3.86	17.74	34.38
Construction	6.22	9.02	4.83	2.69	11.32	12.67	7.51
Manufacturing	26.09	24.35	6.65	4.16	20.62	6.99	4.19
Transport, Communications	6.69	9.43	8.18	3.36	5.47	4.66	6.37
Wholesale	4.05	4.23	2.95	2.0	3.06	0.41	2.38
Retail	16.06	15.05	18.83	15.1	13.43	13.18	11.78
Finance, Insurance, Real Estate	4.19	1.97	1.19	1.43	2.33	1.98	1.91
Business & Repair Service	3.14	1.90	2.09	1.04	2.22	2.03	1.54
Educational	5.42	6.79	11.82	9.25	8.42	17.79	9.38
Public Administration	7.78	3.61	4.83	4.10	6.20	5.58	3.71
Other	6.14	20.38	13.75	13.09	13.54	13.73	16.51
TOTAL	100	100	100	100	100	100	100

Based on U.S. Census data, 1970.

Table A3 -29: Selected Housing Characteristics of Chattaroy and Iaeger,  
West Virginia, 1970

	Chattaroy	Iaeger,
<b>HOUSING UNITS</b>		
Total number	334	287
Owner Occupied	236	152
Renter Occupied	85	103
Vacant	3	3
1 Unit Structure	311	225
2+ Unit Structure	9	57
Mobile Homes	14	5
<b>Number of Rooms</b>		
1 - 2 Rooms	0	7
3 - 4 Rooms	136	101
5 - 6 Rooms	173	142
7 + Rooms	25	37

	Chattaroy	Iaeger
<b>Facilities of Housing Units</b>		
Housing Units with Phones	218	193
Housing Units with all Plumbing	290	234
Housing Units with most Plumbing	44	55
Housing Units with Private Flush Toilet	309	218
Housing Units with Shared Flush Toilet	0	9
Housing Units with No Flush Toilet	25	20

Source: U.S. Census 1970, Fifth Count for Zip Codes, Counties,  
and Smaller Areas

**APPENDIX B:**  
**METHODOLOGICAL EXPLANATIONS**

## Criteria for Selection of Communities for In-Depth Analysis

The following criteria were used to select the communities for intensive study:

- 1) Location in the flood plain: (a) in flood area; (b) partially/ extensively flooded in 1977.
- 2) Presence/absence of Post Office
- 3) Population size
- 4) Location on the Tug Fork (distance from mouth, i.e., Fort Gay.)
- 5) Proximity to other neighborhoods/communities
- 6) County (all Tug Valley W.Va. counties; 1 Ky.)
- 7) Incorporated/unincorporated

The rationale for using the above criteria stemmed from an early windshield tour of the area and analysis of maps and demographic data. The immediately observable differences in settlement patterns--despite similarities in population size--suggested differences in patterns of behavior. Therefore, communities of relatively comparable size with different ecological patterns were sought.

A second criterion was population size. We would surmise that people in a settlement of approximately 1,000 would have a different set of relationships with neighbors than those in smaller groups. Further, the group that is incorporated is likely to have a degree of community organization, formalism, leadership, and an identity that enable it

to take this action and that differentiates it from the unincorporated. Fourthly, the presence of a post office is another indicator of community identity. Similarly, the presence or absence of a local newspaper tells something about a population. Finally, and of great importance, the quality of life of a community is evidenced by the kinds of businesses and their credit ratings as indicated in Dun and Bradstreet reference books. Lastly, communities with varying degrees of flooding in the past and with a flood-proneness as suggested by the "Tug Valley Flood Plain Maps" of the USACE may differ in terms of people's perceptions of their homes, willingness to move, and identification with their neighbors.

On the basis of very careful examination of all Tug Fork communities which we could identify in terms of these criteria, we narrowed the selection and conferred with Mr. John Justice. The following cities met our criteria:

Iaeger (McDowell County) P.O. 822 Inc. 110.0 river mi/Ft. Gay  
Major sections of city in flood plain; part of city  
extensively flooded in '78; relatively isolated.

Chattahoochee (Mingo County) P.O. 1200 Uninc. 52.9 river mi/Ft. Gay  
In flood plain extensively flooded in '78.  
Contiguous to Borderland and Goodman (300 & 200 resp.)

Crum (Wayne County) P.O. 300 Uninc. 28 river mi/Ft. Gay  
In flood plain; flooded in '78 to some extent.  
Relatively isolated from other communities & neighborhoods

KENTUCKY

Aflex	(Pike Cty.)	100 P.O.	Uninc.	59.5 river mi./Ft. Gay
Leckieville	(Pike Cty.)			58.5 river mi./Ft. Gay
Goody	(Pike Cty.)	300 P.O.		58.6 river mi./Ft. Gay

In flood plain; extensively flooded in '77--Leckieville and Aflex, not Goody. Contiguous communities.

The selection of these particular cities provides an opportunity to compare communities of varying sizes as well as those more or less equal in size, communities that are isolated and contiguous, incorporated and unincorporated, extensively flooded and less so. Further, some communities are alongside the highways whereas others are perpendicular to them. Railroad tracks adjoin or penetrate each settlement.

## Analyses of Dun and Bradstreet

Dun and Bradstreet has been serving the business community since 18 . It collects information on the credit reliability of various business firms in many towns and cities throughout the United States. Most of the businesses in the United States are either listed or rated by their staff. The listing and rating are carried out uniformly and give a picture of the number and recommended credit limits of businesses over the past 100 years.

They help one individualize the growth and death of business firms in a way that the U.S. Censuses of Business, Manufacturing and Agriculture are not permitted to do. Incidentally the Library of Congress is probably the only place outside the company office where this historical material is available.

Dun and Bradstreet seems to give the widest coverage of business firms of any of the private business aids. Dun and Bradstreet give the number of firms listed, the recommended limit of credit for each rated business, the specific type of business operation and the year in which these businesses were established or changed responsible ownership.

From this basic data one can obtain the mean and median recommended credit limit for each type of business, the total recommended credit limit for each type, and the

total recommended credit limit for all businesses in a particular town in each of the years studied. The businesses that are branches of companies within and outside the state are listed.

The relationship of these data and their analysis to the social impact study is based on a number of hypotheses.

It hypothesizes:

- a. That the Dun and Bradstreet data give a reasonably accurate record of the (credit) financial strength of these businesses.
- b. That the size of the recommended limit of credit is an accurate indication of the size and strength of the business unit.
- c. That the size and strength of the unit is a major factor in the manner in which it is operated and the value of the relationship between employees and management.
  1. Large companies tend to be more bureaucratic, relationships with employees are more impersonal and based on efficiency and salary reward.
  2. The size of the business and its home base are considered in this judgment and the dividing line is set at \$500,000 lines of recommended credit and above.
- d. The different degree to which the major businesses in a town are branch businesses or home based businesses is one measure of the local orientation or the cosmopolitan orientation of the town and its populace.
- e. The different degree to which the major business in a town are branch business is a measure of that town's openness to penetration from the outside.

In summary, Dun and Bradstreet Reference Books make an important contribution in the determination of a typology of communities.



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HUMAN COSTS ASSESSMENT - THE IMPACTS OF FLOODING &  
NONSTRUCTURAL SOLUTION. (U) ARMY ENGINEER INST FOR  
WATER RESOURCES FORT BELVOIR VA D J ALLEE ET AL.

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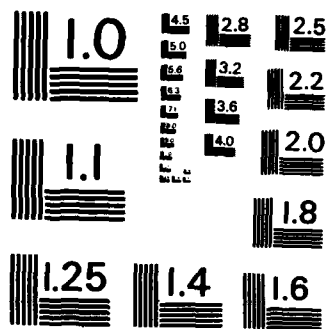
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MICROCOPY RESOLUTION TEST CHART  
NATIONAL BUREAU OF STANDARDS-1963-A

## PROCEDURE TO ASSESS COMMUNITY NETWORKS

Scholars of Appalachia have pointed out the presence of large families and the importance of family ties. Presumably, many kin would have the same surname. On the basis of this assumption, we postulated that if the same name appears several times in a given community, the bearers may be related; further, they would be prone to consider their geographic location important to their familial survival. On the other hand, if a given name appears only once in a given community, then it could be assumed that the individual had (a) no relatives in the community, ergo was not tied to the geographic area, (b) relatives through marriage with a different surname, (c) married children with different surnames, or (d) unmarried children living at home. As a crude yardstick to test these assumptions, local telephone directories were used in the following manner:

1. A community was identified in the telephone directory, e.g., Goody.
2. The frequency of a given surname was tallied, e.g., the name Smith appears three times.
3. The frequency with which the name is listed in the same section of the phone book is tallied, e.g., in the Williamson part of the phone book, 25 Smiths living in Chattaroy, Williamson, etc., are listed.
4. The conclusion is drawn, e.g. there are few Smiths in Goody but many Smiths in the surrounding area. If there are few residents with a given surname in the specific community, that geographic locale is not crucial to the family. Whatever community cohesion occurs in the geographic area is not wholly tied to the presence of cohesive families. Conversely, family cohesion is not necessarily related to where people live geographically.

Listing of Numbers of Enumeration Districts and  
Major Communities within Them

West Virginia

McDowell County

Enumeration District	Town
26	Douglas, Hull, Litwar, Johnnycake, Panther
28	Krollitz, Apple Grove, Union City
23	Iaeger
25	Sandy Huff
18	Roderfield
22	Erin, Twinbranch, Mohegan, Antler
34	Coalwood
14	Davy
10	Welch
11	Welch
12	Welch
13	Welch
29	Carlos, Garland, Wilmore

Wayne County

Enumeration District	Town
42	Fort Gay
46	Nursery Gap, Salt Petre, Coleman, Echo
48	Glenhayes, Radnor, Fleming, Effie
49	Tripp, Webb
50	Steptown, Stonecoal, Crum

Mingo County

3	Kermit
5	Grey Eagle, E. Kermit
7	Naugatuck, Maher
13	Nolan, Hatfield
14a	Borderland
14b	Chattaroy
15	Goodman, Fairview, Cinderella
16	Rawl, Merrimac, Sprigg, Lobata
17-22	Williamson
23	Matewan
24	Surosa
27a	-----
27b	N. Matewan
28	Thacker
29	Delorme, Vulcan, Cedar, Devon, Edgerton, New Thacker, Hinch
31	Lindsey, Glen Alum, Junction, Glen Alum
35	Wharnecliffe, War Eagle

**Kentucky**

**Pike County**

<b>Enumeration District</b>	<b>Town</b>	<b>Total Pop. of E.D.</b>
1	Sidney, Canada	810
30	Rogers Park, Turkey Creek	1231
31	New Camp	1805
29	South Williamson	700
32	Road Fork, Belfry	605
33	Aflex, Toler, Hardy, Stringtown, Burnwell	1805
35	Buskirk, McCall, Ransom	1236
38	Boardtree	1268
39b	Majestic, Woodman, Bell Siding, Stopover	1309

**Lawrence County**

11	Summit, Chatman, Gallup, Georges Creek, Ben Bow	630
12	Clifford, Peach Orchard, Patrick	339

**Martin County**

1	Warfield	361
5	Job, Add, Calf Creek	1098
2	Hode	1258
3	Beauty, Lovely, Pilgrim	1692
9	Laura, Three Forks, McClure	1424

Source: Abt Associates

GENERAL APPENDICES

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APPENDICES TO THE TUG FORK STUDY

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APPENDIX I:  
DESCRIPTION OF SAMPLE

Synopsis of Meeting with Professor Dan Solomon (January 30, 1980)

1. Regarding the question of allocating households in HUD trailers or minimum damage sample to flood frequency zones using a weighting scheme:

No (unbiased) weighting scheme can be designed unless we know what fraction of the HUD trailer and minimum damage households came from each of the flood frequency zones. The idea would be to distribute the households proportionally according to what fractions came from each zone.

2. RE: Making influences from sample to population as a whole:

The Stanley survey is not a random sample because it excludes households originally there but which moved to trailers. (For example, our sample of households in the 5 year zone is not a random sample of the population in 5 year zone. Rather, it is a random sample of households in 5 year zones whose homes were damaged, but not destroyed.) If we leave the variable as is, we would have to relabel our tables and restate the group to which we are making influences in the following way:

HUD trailer sample - houses demolished  
5 year zone - houses damaged, not demolished  
20 year zone - houses damaged, not demolished  
50 year zone - houses damaged, not demolished  
100 year zone - houses damaged, not demolished  
500 year zone - houses damaged, not demolished  
SPF - houses damaged, not demolished  
Minimum damage sample - houses not damaged.

3. Solomon's suggestion:

Recategorize the sample into 3 groups:

	HUD trailers
Maximum flood proneness	5 year zone
	20 year zone
	50 year zone
Medium flood proneness	100 year zone
	500 year zone
Minimum flood proneness	SPF
	Minimum damage

We'd be pretty safe in doing this since it's most probable that the HUD trailer sample came from 5 year or 20 year zone, and that minimum damage sample came from 500 year zone or SPF.

4. Other comments:

- all crosstabs done to this point included missing values in calculation of statistics.
- strength of chi-square test is diminished when number of observations in a cell is very small. Therefore, in some cases we should combine categories or put them with missing values.

	<u>Total</u>	<u>%</u>	<u>Sample</u>	<u>%</u>
HUD				
5-year	2522	43	135	48
20-year				
50-year	1944	33	55	20
100-year				
500-year	1416	24	78	28
SPF				
Minimum				
Damage				
Unknown	<u>-</u>	<u>-</u>	<u>10</u>	<u>4</u>
TOTAL	5882	100	278	100

#### Data Collection

A wide variety of sources of information was used to shed light on the flood management problem of the Tug Fork Valley. For this part of the study particular emphasis was put on two sources: key informant interviews and household survey interviews. Several concepts were used to construct these two different samples.

#### Selection of Key Informants

For the purposes of background information and construction of the survey questionnaire, perceptions of persons knowledgeable in the housing and psychological trauma aspects of flood recovery in the Tug Fork Valley were sought. The procedure was to start with persons whose positions in the official organizations of the two states and the federal agencies suggested that they should be knowledgeable. Each of these was then asked to name others that they thought would be particularly informed on the questions that we had asked. Those most frequently referred to were sought

out for interviews. In the majority of cases, these individuals were members of organizations that had played a role in the flood recovery efforts of the valley. A few were knowledgeable about comparable efforts elsewhere or were expected to be helpful because of their interest and expertise.

Table A1. Type of Organizations Represented by Key Informant Interviews

Federal	6	13%
State	11	23
Regional	7	15
Local	16	34
Other	<u>7</u>	<u>15</u>
	47	100%

The use of a combination of referral and formal governmental structure is the best mechanism devised so far by social scientists to study a network of people that are involved in a particular policy issue. The success of such a technique depends upon the skill of interviewers to provide objective information. Because of the open-end style of interviewing involved, and the qualitative selection process, this method does not lend itself to statistical tests of significance.

Each key informant was given a summary of the objectives of the study and asked if he or she had had personal experiences that were pertinent. The examples offered were then used as a basis for further questions.

Reports and other reference material were sought, as well as the names of other knowledgeable people. Obviously, far less structure was possible in such interviews than in the household sample.

#### Selecting the Household Sample

The core of the household sample was the 150 residences selected by the firm of Stanley Associates for a study of flood damage done immediately after the 1977 flood. This study was conducted for the purpose of calibrating the flood damage estimation procedures used by the Corps of Engineers. For each household visited by Stanley's enumerators, damage estimates and other data were available. These should have been more accurate than the two-year recollections that would have been available in 1979. Also, it seems doubtful that the fact that these households had been interviewed in 1977 would affect their responses in 1979 or any intervening behavior. This sample had been drawn to assure reasonable representativeness by flood frequency zone and was largely restricted to the areas with actual flood damage in 1977. Thus, the Stanley survey provided 150 interviews to represent the over 4700 homes damaged but not destroyed in 1977, or 3.2 percent. None of the 600 households whose homes were completely destroyed in 1977 were included in the sample design. As a result, it was felt to be desirable to supplement the Stanley survey both with households where damage had been complete and, as a control group, with households that had suffered no damage.

Air photo mapping prior to the 1977 flood could have been used to identify houses that were completely destroyed in 1977, after which a search could have been mounted to locate the household for an interview. Such a procedure would assure statistical representativeness for the group

at interest. Careful examination of this approach showed that the time and cost per interview would be excessive for this study. An alternative approach was expected to give satisfactory results, if not the same assurance of representativeness, for the target group desired.

The U.S. Department of Housing and Urban Development sent more than 800 mobile homes into the Tug Fork Valley to provide emergency housing after the flood. It is likely that most of the 600 households whose homes were destroyed in the flood were housed in these trailers for varying periods of time. (Multiple families living in a single destroyed residence probably account for most of the difference between the 600 residences destroyed and the 800 mobile homes put to use.)

After a year of rent-free occupancy, residents could purchase the mobile homes from HUD for a nominal fee. Two years after the flood, some of these trailers are still being used for housing -- many in trailer parks, some on individual sites. Households residing in the HUD trailer parks were included in the sample, as well as households living on individual sites in the easily-identified homes. This provided 76 interviews to roughly represent the heavily-damaged group, or about 10 percent of the households whose homes were completely damaged.

These households were selected to supplement the Stanley sample on the thesis that residents of HUD mobile homes would represent totally-destroyed homes not included in the Stanley sample. It is likely that those who remained in HUD accommodations for two years had fewer resources with which to adjust to the disaster. Therefore, they might be more prone to traumatic response than the average completely damaged household. However, a sample of this size would lend itself to statistical verification of such expectations, and appropriate adjustments could be made. In any case, the

larger number of interviews that could be done in the time available with this approach was compelling in the choice.

Finally, the Stanley sample was supplemented at the other end of the spectrum -- 52 households that had not been damaged. These, added to the Stanley sample, assured adequate numbers for comparison between households with varying degrees of exposure to a flood within a total of 278 cases.

#### Sample Stratification

Simple random sampling would result in a sample distribution across residential classes which is similar to the population distribution. This can lead to excessively small numbers of samples in some cells. Furthermore, simple random sampling fails to acknowledge that sampling should be more heavily concentrated in cells which display the greatest variability in damage. In this light, sample stratification by classes was deemed desirable.

Since damage was not known for the population, variability within classes was measured by variability of structural value. The sum of squares about the mean was used as the measure of variability. The percentage of the 200 samples drawn from each structure class was set equal to the class sum of squares divided by the total sum of squares. Results of the stratification analysis are displayed in Table A2.

Table A2. Sample Stratification

Stories	Basement	Value Sum of Squares	Percent of Total	Number in Sample	Aver. Structure Value (\$000)	Standard Deviation (\$000)
One	No	222,249	39.4	79	\$12.6	\$ 8.7
One	Yes	58,391	10.4	21	17.0	9.1
Two	No	129,016	22.9	46	16.6	10.5
Two	Yes	96,2788	17.1	34	22.3	11.0
Split Level	No - Combined with Two-Story-No Basement				34.2	7.0
Split Level	Yes - Combined with Two Story-Basement				41.3	15.8
Mobile Home	No	57,868	10.3	20	5.4	2.1

Source: Stanley Consultants



### Sample Selection

Using the categorical stratification described, sample properties were selected randomly from the total population of properties remaining in use after the 1977 flood until each cell was filled. Contacts were then made by field personnel at each of the properties constituting the sample. In cases where residential property owners were not at home, a follow-up contact was made at a later time. Where the follow-up contact also yielded negative results, field personnel used data and maps available from the initial field survey to substitute a nearby property of the same structural type and approximate value. The same substitution method was used in cases where the property owner refused to allow the survey.

APPENDIX II:

KEY INFORMANT INTERVIEWS

Adams, Nancy. Tug Valley Recovery Center, Williamson, W. Va.

Anderson, Jim. Mingo County Farmers' Home Administration, Williamson,  
W. Va.

Belford, William. FDAA Operations Center, Washington, D. C.

Bianchi, Robert. W. Va. Division of Housing, Charleston, W. Va.

Boldt, David. Kentucky Development Cabinet, Frankfort, Louisville, Ky.

Boone, Linda. U. S. Dept. of Housing and Urban Development, Louisville  
Ky.

Burch, George. N. Y. State Board of Worker's Compensation, Albany, N. Y.

Butler, J. Bradway. Arnold and Porter, Washington, D. C.

Carling, John G. Pennsylvania Department of Community Affairs,  
Scranton, Pa.

Deaton, Dan. Matewan National Bank, Matewan, W. Va.

Doody, William. Housing Authority of Mingo County, Williamson, W. Va.

Eriksen, Dianna. Kentucky Housing Corporation, Frankfort, Ky.

Furrow, Dwight. Peter Creek Presbyterian Church, Phelps, Ky.

Gidez, Robert. Appalachian Regional Commission, Washington, D. C.

Green, Bonnie. University of Cincinnati Medical School, Central  
Psychiatric Clinic, Cincinnati, Ohio

Hamrick, Larry. Mingo County EOC, Williamson, W. Va.

Hayes, Charles. Appalachian Regional Commission, Washington, D. C.

Henne, Mark. Region I Planning and Development Council, Princeton, W. Va.

Hildebrand, Jerry. Tug Valley Recovery Center, Williamson, W. Va.

Jones, Capt. Tom. Division Headquarters, Salvation Army, Washington, D. C.

Holliday, William. U. S. Army Corps of Engineers, Huntington, W. Va.

Justice, John. U. S. Army Corps of Engineers, Huntington, W. Va.

Keaton, Wendell. Regional I Planning and Development Council, Princeton, W. Va.

Keeney, Ronald. U. S. Army Corps of Engineers, Huntington, W. Va.

Kelley, Keith. Appalachian Regional Commission, Pikesville, Ky.

Kerns, Robert. W. Va. Department of Mental Health, Charleston, W. Va.

Kexel, Duane. Stanley Consultants

Kirkman, David. U. S. Dept. of Housing and Urban Development, Washington, D. C.

Langan, Dr. C. J. Director, Southern Highlands Community Mental Health, Inc., Princeton, W. Va.

Lynch, Wesley. Cooperative Extension Housing Specialist, Charleston, W. Va.

McNeer, Marshall. Division of Economic Services, West Virginia Department of Welfare, Charleston, W. Va.

Neely, Conrad. Region II Planning and Development Council, Huntington, W. Va.

Peters, Lloyd. State Relations Representative, American National Red Cross, Huntington, W. Va.

Price, Rev. John F. Director, West Virginia Council of Churches, Charleston, W. Va.

Reinke, Donald. W. Va. Disaster Recovery Office, Charleston, W. Va.

Rock, Vincent. U. S. Farmers Home Administration, Washington, D. C.

Rosenbaum, David. Director, Division of Water Resources, Frankfort, Ky.

Rouesche, Jim. Region II Planning and Development Council, Huntington, W. Va.

Sabritt, David. Kentucky Development Cabinet, Frankfort, Ky.

Scaggs, Dr. Logan-Mingo Area Mental Health, Inc., Chatteroy, W. Va.

Simpkins, O. Norman. Marshall University, Department of Anthropology and Sociology, Huntington, W. Va.

Spence, Beth. Tug Valley Recovery Center, Williamson, W. Va.

Steele, Charles. W. Va. Housing Development Fund, Charleston, W. Va.

Steele, Jim. Executive Director, Housing Authority of Williamson,  
Williamson, W. Va.

Thomas, Frank. U. S. Water Resources Council, Washington, D. C.

Tuck, Deborah. Executive Director, Coalfield Housing, Inc., Beckley

Thomas, William. CHASE Options, Martin, Ky.

APPENDIX III:

QUESTIONNAIRE FOR TUG FORK SURVEY

INTRODUCTION FOR THE INTERVIEW SCHEDULE

We're conducting a fairly large study of flood-related problems in Tug Fork Valley this summer under the direction of Bill Westbrook at Marshall University. We're taking into account several features of the flood problem in the valley, including the personal human side of the thing. We are giving attention to people's ideas and preferences about new housing development opportunities.

Earlier studies came up with answers to solve parts of the problem. But this study is to get at remaining questions and possibilities which might help a combination of agencies get together on an overall solution. The organizations who have asked us to do the study; to guide their cooperative effort include West Virginia, Kentucky, ARC, the Huntington Corps.

There are four sections to the interview and before we start each one I'll explain what kinds of questions are in it and the reasons the team of agencies need it to put together a solution to the flooding problems.

This questionnaire is the result of a sponsored research project at Cornell University and conforms to the requirements of human subject research review.

HOUSEHOLD DATA (age, relationship and gender of household members.)

Household Member	Age	Relation to Respondent	Gender	3-8 Location at time of flood	18 Health status	Marital status	Employment status	Occupation	Industry	School Completed
Respondent										
2										
3										
4										
5										
6										
7										
8										
9										
10										

House # \_\_\_\_\_

Reach \_\_\_\_\_

Map \_\_\_\_\_

Flood Information

(If respondent did not live in the Tug Fork Valley during the Spring 1977, omit these questions and skip to question 68.)

First, I'd like to ask you some questions about your experiences in the flood of Spring, 1977. These items will help us to understand the effect the flood had on individual families. We need to know this so that we can establish evidence on the human costs of flooding, rather than just property.

1. Were you living here when the April, 1977, flood took place?

1. Yes

2. No

2. If not, where were you living at the time of the '77 flood?

---

3. Where were you when the 1977 flood struck? (See matrix)

1. At home

2. At a neighbor's home

3. At a relative's home

4. Out of town

5. Other

4. Did you have any warning of the 1977 flood?

1. Yes

2. No

(If answer is YES, ask questions 5 thru 8; if NO, skip to question 9.)

5. Who warned you? (Use as probes: family member, friend, etc.)-and how?

6. Did the warning give you enough time to do something to protect yourself?

1. Yes

2. No

7. Where were the other members of your household when you first learned about the flood? (See chart on page 1.)

8a. Were any of these places hit by the flood?

1. Yes

2. No

8b. Which ones?

---

---

9a. Have you ever experienced a flood other than the Spring, '77 flood?

1. Yes

2. No

9b. When? \_\_\_\_\_

9c. Where? \_\_\_\_\_

10. What did you do when you first realized that the 1977 flood was coming?  
(Use as probes: gathered possession, ran to higher ground, drove away from the area.) Number choices in order mentioned by respondent.



11. Were you forced to leave your home during the flood?

1. Yes

2. No (Skip to question 15)

12. Where did you stay during this time away from your home?

Location: \_\_\_\_\_ With whom: \_\_\_\_\_ Length of time: \_\_\_\_\_

Location: \_\_\_\_\_ With whom: \_\_\_\_\_ Length of time: \_\_\_\_\_

Location: \_\_\_\_\_ With whom: \_\_\_\_\_ Length of time: \_\_\_\_\_

13. While you were away from home, what did you have to do without?  
(Use as probes: clothing, water, sleeping quarters, electricity.)

14 a. How long was it before you were able to go back to your home after  
the 1977 flood?

\_\_\_\_\_

14 b. If never, where did you move? Where was it in relation to where you  
had been?

\_\_\_\_\_

15. What kinds of things did you have to do to your house to make it  
liveable again?

Describe: \_\_\_\_\_

\_\_\_\_\_

Any problems? \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

16. The following questions are to give us an idea of what people experience in disasters and the kinds of assistance they get from helping organizations and agencies which they support with their taxes.

Which of the following organizations did you contact and what problems did they help you with, and what percent of the cost came out of your own pocket?

<u>Organization</u>	<u>Type of Assistance</u>	<u>How much you got</u>
---------------------	---------------------------	-------------------------

Hospital or clinic		
Private Physician		
Medicare		
Salvation Army		
Red Cross		
Mennonites		
Church		
1.		
2.		
3.		
Senior Citizens		
Town Government		
Health Department		
Department of Welfare		
1. ADC or AFDC		
2. Food stamps		
3. Conselling		
4. Medicaid		
5. Other		
ECD		
HUD		
Individual Family Grant Union		
Social Security		
Pension		
Legal Aid		
Logan County PRIDE		
Council of Southern Mountains		
Mingo County OEC		
IRS		
Commission on Aging		
*SBA Loans		
Other		

\*% of loan repaid \_\_\_\_\_

17. How would you describe your health now and the health of other family members? (See chart on page 1.)

- 1. Excellent
- 2. Good
- 3. Fair
- 4. Poor
- 5. Very bad

18. Has your (their) health gotten any better or worse because of the 1977 flood?

- 1. Better
  - 2. Worse
  - 3. Same
- Comment \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

19. Were you or any members of this household made ill or physically injured in the 1977 flood?

- 1. Yes
- 2. No

20. (If yes) Could you tell me in more detail about these illnesses or injuries?

<u>Relationship in the family:</u>	<u>Nature of injury/illness</u>	<u>Injury days</u>
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

21a. We know that officially no one died as a result of the April '77 flood. Were there any deaths among family members, relatives or friends that may have been due to the flood?

- 1. Yes
- 2. No

21 b. Who?

1. Immediate family
2. Relative
3. Friend

22. In general, what's been the state of mind of your family members since the flood? (Use emotional as a probe.)

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INTERVIEWER: I don't want to know the particulars - just some general information about whether this concerns money, family, health.

23. What's been your state of mind?

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24. How else has the flood upset you?

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25 a. Have your relationships with your friends and neighbors changed since the flood?

1. Yes If yes, in what ways? \_\_\_\_\_

2. No \_\_\_\_\_

25 b. Have relationships among members of your family changed as a result of the flood?

1. Yes If yes, in what ways? \_\_\_\_\_

2. No \_\_\_\_\_

26. What organizations do you and/or your spouse participate in? (PTA, union, church)

Respondent:

Spouse:

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27. Have you been more or less active as a result of the flood?

1. Less active

2. More active

3. No change

28. Did you or any household members miss work because of the flood?

1. Yes

2. No

29. If yes:

Household member

How much?

How long?

For whom?

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30. How badly was your home damaged in the 1977 flood?

1. Completely ruined
2. Severe
3. Moderate
4. Little
5. None

31. What part of your total costs in property losses and damages would you estimate were covered by insurance?

---

32. What kinds of insurance do you have?

	<u>Before the flood?</u>	<u>Now?</u>	<u>Change because of the '77 flood</u>
Flood			
Life			
Homeowner's			
Medical			
Other			

33. Did you lose anything which had sentimental value that you don't consider replaceable?

1. Yes
2. No

34. (If yes to 33) What did you lose which was like that to you?

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CURRENT HOUSING AND NEIGHBORHOOD INFORMATION

Now I'd like to ask some questions about your home and the neighborhood you live in. This will help us to understand what people like and don't like about their present housing and what kind of housing they might like in the future in the Tug Fork area.

35. How long have you lived in this county?

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36. How long have you lived in this home?

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37 a. Since you've been in this house have you ever looked for another place to live?

1. Yes
2. No

37 b. If yes, when?

---

37 c. Where?

---

37 d. Why?

---

38 a. Has the family ever moved from the Tug Fork Valley?

1. Yes
2. No

38 b. If yes, why?

---

38 c. Where?

---

39 a. Has one of the wage earners in the family ever lived in another place to work?

1. Yes

2. No

39 b. Who?

---

40. Did they return home at least once a month? (Interviewer: Have they been included in family description on page 1.)

1. Yes

2. No

41. How many rooms do you have in your house? What are they?

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42. What would you say you like most about your house? Why is that?

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43. Are there any particular things that you don't like about your house?  
If so, what?

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44. How big is the lot your house is on?

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45. What do you and the family generally use the yard for? (List in order mentioned)

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46. Is there anything you would like to change about your yard?

1. Yes

Changes? \_\_\_\_\_

2. No

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47. Could you describe to me the ideal home you'd like to live in?

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48. I'd like to show you pictures of some different kinds of housing. Imagine that you could live in any one of these for the same amount of money you are paying, or have paid, in your present home. Which of these would be your first, second, third and fourth choices?

1st choice \_\_\_\_\_ Why? \_\_\_\_\_  
2nd choice \_\_\_\_\_  
3rd choice \_\_\_\_\_  
4th choice \_\_\_\_\_  
5th choice \_\_\_\_\_

**NEW HOUSING**

49. Suppose that you could find a satisfactory home that you could afford in another location where you would never have to worry about going through another flood. Would you want to move?

1. Yes (Ask questions 51-54)
2. No (Skip to question 55)

50. If you wanted to move, how soon would you like to move? Why?

\_\_\_\_\_  
\_\_\_\_\_

51. If you wanted to move, how far would you be willing to move? (Use as probes: out of the neighborhood, out of the county, out of the state.)

\_\_\_\_\_

52. Specifically, do you have a location in mind that you would like to move to?

\_\_\_\_\_  
\_\_\_\_\_

53. Would it matter whether your neighbors moved to the same place with you?

1. Yes

If yes, why? \_\_\_\_\_

2. No

\_\_\_\_\_

3. Doesn't matter

\_\_\_\_\_

54. What are your reasons for wanting to stay where you are?

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

55. Would you be interested in apartments built especially for the elderly for yourself or someone in your family?

1. Yes

2. No

56. If you needed money to buy a home, where would you go for it?

\_\_\_\_\_

57. If you found a home that you liked, how much of a down payment do you think you could make on it? (Use as probes: less than \$1000, \$1000 to \$3000, \$3000 to \$5000, More than \$5000.)

#### NEIGHBORHOOD AND COMMUNITY

58. The word "Neighborhood" means many different things to people. What does the word "Neighborhood" mean to you?

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

59. Overall, how satisfied are you with living in this neighborhood?

1. A lot
2. A little bit
3. Not at all

60. On the average, how often do you:

1. Talk to your neighbors outdoors, just to chat or past the time of day \_\_\_\_\_
2. Get together socially outside the neighborhood \_\_\_\_\_
3. Borrow things from each other \_\_\_\_\_
4. Drop in for a visit, at either your home or theirs \_\_\_\_\_
5. Do favors for each other \_\_\_\_\_

61. If you ever moved, how much would you miss the neighborhood right around here?

1. A lot
2. A little bit
3. Not at all

62. Where do you go to:

1. Do your grocery shopping \_\_\_\_\_
2. Get gas for your car \_\_\_\_\_
3. Take your car for servicing or repairs \_\_\_\_\_
4. Do your banking \_\_\_\_\_
5. Go to the doctor \_\_\_\_\_

6. Buy your clothing \_\_\_\_\_
7. Spend your free time \_\_\_\_\_
8. Attend church \_\_\_\_\_
9. Work \_\_\_\_\_
10. Go to school \_\_\_\_\_

63. Since the flood of 1977, is there anything better or worse about this area?

A. Better

B. Worse

C. Why?

64 a. Do you subscribe to a local newspaper?

1. Yes

2. No

64 b. Which one(s)? \_\_\_\_\_

65 a. Do you subscribe to any other newspapers or magazines?

1. Yes

2. No

65 b. Which one(s)? \_\_\_\_\_

66. What amount best describes your family's total income last year from all sources before taxes were taken out? (Use as probes: Less than \$2,500, \$4,000-7,499, \$10,000-\$14,999, \$20,000-\$24,999, \$30,000-\$34,999, \$35,000 or more.)

67. What would you estimate the increase or decrease in your savings to be now as a result of the flood? (Use as probes: 1/2, 1/4.)

68. Before the flood did you have credit established with any stores or hold any credit cards? I'm not going to ask with whom or where.

1. Yes
2. No

69. (If yes to 68) Have you increased or decreased credit on these accounts as a result of the flood?

1. Increased
2. Decreased
3. No change

70. Are there any ways in which you have changed the kinds and amounts of things you buy as a result of the flood?

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71. Do you own or rent your present home?

1. Own (Ask questions 73-80)
2. Rent (Ask questions 81-83)
3. Other \_\_\_\_\_

#### HOME-OWNER QUESTIONS

72. What year did you buy your house? \_\_\_\_\_

73. About how much did it cost then? \_\_\_\_\_

74. Do you have a mortgage on your home?

1. Yes

2. No

If yes to question 74:

75. Who is the holder of your mortgage? \_\_\_\_\_

76. What are your monthly mortgage payments? \_\_\_\_\_

77. Does this include taxes and insurance?

1. Yes

2. No

78. If not, what do you pay a month for taxes and insurance?

Taxes \_\_\_\_\_

Insurance \_\_\_\_\_

79. What is your average utility cost per month? \_\_\_\_\_  
(Gas, water, telephone)

RENTER QUESTIONS:

80. What is your monthly rent? \_\_\_\_\_

81. Are utilities included in your rent?

1. Yes

2. No

82. If no, what are your approximate monthly expenses for utilities? \_\_\_\_\_  
per month.

83. Do you feel that things have gotten back to normal in your household since the flood?

1. Yes

What seems to be different now? \_\_\_\_\_

2. No \_\_\_\_\_

84. Did you feel you'd met a great challenge in getting through the flood and were the better for it?

1. Yes

2. No

85. Now I would like to ask you just a little more information about your family. (See chart on page 1.)

86. Are there any other experiences you had during the 1977 flood that you would like to tell us about?

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

87. May I record you name and address? It might be helpful for us if we need to check back with you someday.

\_\_\_\_\_  
Name

\_\_\_\_\_  
Address

Thank you very much for spending so much time with me. Your answers may be helpful in any decision to be made in the future regarding assistance projects for this valley.

(Be sure to leave the letter from the Colonel with the respondent.)



APPENDIX IV:

FREQUENCY TABLES -- TUG FORK SURVEY DATA

I. Household Characteristics

Table 1. Sex of Household Head

Category	Number	Percent
N.A.	1	0.4
Female	79	28.4
Male	197	70.9
N.R.	1	0.4
TOTAL	278	100.0

Table 2. Employment Status of Household Head

Category	Number	Percent
N.A.	3	1.1
Employed, full-time	119	42.8
Employed, part-time	4	1.4
Full-time homemaker	20	7.2
Unemployed	17	6.1
On strike, laid off	3	1.1
Retired	64	23.0
Other	24	8.6
N.R.	24	8.6
TOTAL	278	100.0

Codes: N.A. = Not applicable

N.R. = No response

Table 3. Education of Household Head

Category	Number	Percent
N.A.	6	2.2
None	6	2.2
Less than 8 years	52	18.7
8 years	42	15.1
9-11 years	52	18.7
12 years	69	24.8
More than 12 years	41	14.7
N.R.	10	3.6
TOTAL	278	100.0

## II. Housing Characteristics

Table 4. Year the House was Purchased

Category	Number	Percent
Before 1920	4	1.4
1920-1939	9	3.2
1940-1959	43	15.5
1960-1979	118	42.4
N.A.	85	30.6
Don't Know	7	2.5
No Response	12	4.3
<b>TOTAL</b>	<b>278</b>	<b>100.0</b>

Table 5. Do You Have a Mortgage?

Category	Number	Percent
N.A.	86	30.9
Yes	63	22.7
No	117	42.1
N.R.	12	4.3
<b>TOTAL</b>	<b>278</b>	<b>100.0</b>

**Table 6. Who Holds the Mortgage?**

Category	Number	Percent
N.A.	202	72.7
Commercial bank	31	11.2
Finance company	1	0.4
FmHA, SBA, etc.	29	10.4
Other	2	0.7
N.R.	13	4.7
<b>TOTAL</b>	<b>278</b>	<b>100.0</b>

**Table 7. Total Number of Rooms in House (excluding bathrooms, utility rooms, basements, etc.)**

Category	Number	Percent
1	1	0.4
3	10	3.6
4	51	18.3
5	90	32.4
6	69	24.8
7	32	11.5
8	16	5.8
9	2	0.7
10	5	1.8
N.R.	2	0.7
<b>TOTAL</b>	<b>278</b>	<b>100.0</b>

Table 8. Total Number of Bedrooms in the House

Category	Number	Percent
N.A.	2	0.7
1	10	3.6
2	92	33.1
3	119	42.8
4	39	14.0
5	6	2.2
6	2	0.7
N.R.	8	2.9
<b>TOTAL</b>	<b>278</b>	<b>100.0</b>

Table 9. Do You Have a Bathroom?

Category	Number	Percent
Yes	228	82.0
No	46	16.5
N.R.	4	1.4
<b>TOTAL</b>	<b>278</b>	<b>100.0</b>

### III. Housing and Moving Preferences

Table 10. How Long Have You Lived in this Home?

Category	Number	Percent
1 year	54	19.4
2-5 years	66	23.7
6-10 years	36	12.9
More than 10 years	122	43.9
<b>TOTAL</b>	<b>278</b>	<b>100.0</b>

Table 11. How Long Have You Lived in this County?

Category	Number	Percent
N.R.	1	0.4
1 year	1	0.4
2-5 years	16	5.8
6-10 years	11	4.0
More than 10 years	249	89.6
<b>TOTAL</b>	<b>278</b>	<b>100.0</b>

Table 12. Would You Ever Move?

Category	Number	Percent
Yes	184	66.2
No	91	32.7
N.R.	3	1.1
<b>TOTAL</b>	<b>278</b>	<b>100.0</b>

Table 13. How Soon Would You Move ?

Category	Number	Percent
N.A.	90	32.4
Right away	42	15.1
Soon as possible	99	35.6
After children grow	1	0.4
At retirement	2	0.7
Doesn't matter	6	2.2
Other	21	7.6
N.R.	17	6.1
<b>TOTAL</b>	<b>278</b>	<b>100.0</b>

Table 14. How Far Would You Move ?

Category	Number	Percent
N.A.	91	32.7
Neighborhood	31	11.2
Out of neighborhood	42	15.1
Out of valley	30	10.8
Out of county	25	9.0
To adjacent state	22	7.9
Out of region	18	6.5
Don't care	8	2.9
Other	4	1.4
N.R.	7	2.5
<b>TOTAL</b>	<b>278</b>	<b>100.0</b>

Table 15. Do You Have a Location in Mind?

Category	Number	Percent
N.A.	91	32.7
Yes	112	40.3
No	61	21.9
N.R.	14	5.0
<b>TOTAL</b>	<b>278</b>	<b>100.0</b>

Table 16. Have You Ever Looked for Another Place to Live?

Category	Number	Percent
Yes	93	33.5
No	184	66.2
N.R.	1	0.4
<b>TOTAL</b>	<b>278</b>	<b>100.0</b>

Table 17. If Yes, When Did You Look ?

Category	Number	Percent
N.A.	184	66.2
Before the flood	11	4.0
After the flood	66	23.7
Both	5	1.8
Other	2	0.7
N.R.	10	3.6
<b>TOTAL</b>	<b>278</b>	<b>100.0</b>



Table 18. If Yes, Where Did You Look ?

Category	Number	Percent
N.A.	184	66.2
Locally	16	5.8
In the valley	43	15.5
Outside the valley	15	5.4
Other	8	2.9
N.R.	12	4.3
<b>TOTAL</b>	<b>278</b>	<b>100.0</b>

Table 19. Why Have You Looked For Another Place?

Category	Number	Percent
N.A.	184	66.2
Get away from floods	35	12.6
Employment-related	2	0.7
Better house	18	6.5
Other	25	9.0
N.R.	14	5.0
<b>TOTAL</b>	<b>278</b>	<b>100.0</b>

Table 20. Has the Family Ever Moved From the Valley?

Category	Number	Percent
Yes	64	23.0
No	210	75.5
N.R.	4	1.4
<b>TOTAL</b>	<b>278</b>	<b>100.0</b>

Table 21. If Yes, Why ?

Category	Number	Percent
N.A.	211	75.9
Get away from floods	3	1.1
Employment-related	33	11.9
School-related	1	0.4
Change in family	7	2.5
Other	6	2.2
N.R.	17	6.1
<b>TOTAL</b>	<b>278</b>	<b>100.0</b>

Table 22. If Yes, Where?

Category	Number	Percent
N.A.	211	75.9
Within the county	2	0.7
Within the state	10	3.6
Within Appalachia	11	4.0
Other	29	10.4
N.R.	15	5.4
<b>TOTAL</b>	<b>278</b>	<b>100.0</b>

Table 23. How Big Is Your Lot?

Category	Number	Percent
N.A.	3	1.1
No bigger than house	24	8.6
Less than 1/8 acre	81	29.1
1/8 - 1/4 acre	45	16.2
1/4 - 1/2 acre	27	9.7
1/2 - 1 acre	24	8.6
Over 1 acre	11	4.0
Don't know	47	16.9
Other	8	2.9
N.R.	8	2.9
<b>TOTAL</b>	<b>278</b>	<b>100.0</b>

Table 24. Would You Want to Change The Yard?

Category	Number	Percent
N.A.	4	1.4
Yes	149	53.6
No	118	42.4
N.R.	7	2.5
<b>TOTAL</b>	<b>278</b>	<b>100.0</b>

Table 25. Reason For First Choice of House?

Category	Number	Percent
N.A.	42	15.1
Like appearance	95	34.2
Want own house	3	1.1
Amount of privacy	25	9.0
Less expensive	4	1.4
Pleasant surroundings	41	14.7
Quality, durability	4	1.4
Other	37	13.3
N.R.	27	9.7
<b>TOTAL</b>	<b>278</b>	<b>100.0</b>

Table 26. Where Would You Go For a Loan ? (First Response)

Category	Number	Percent
N.A.	20	7.2
S&L, Commercial bank	162	58.3
Ins., finance co.	2	0.7
FuHA, government	13	4.7
Friends, relatives	3	1.1
Own resources	13	4.7
Nowhere	23	8.3
Don't know	21	7.6
Other	7	2.5
N.R.	14	5.0
<b>TOTAL</b>	<b>278</b>	<b>100.0</b>

Table 27. Where Would You Go For a Loan?(Second Response)

Category	Number	Percent
N.A.	251	90.3
S&L, Commercial bank	2	0.7
FmHA, government	8	2.9
Friends, relatives	2	0.7
Own resources	1	0.4
N.R.	14	5.0
<b>TOTAL</b>	<b>278</b>	<b>100.0</b>

IV. Flood Characteristics

Table 28. What is the Family's State of Mind ? (First Response)

Category	Number	Percent
N.A.	55	19.8
Depressed, cry a lot	22	7.9
Worried, upset	50	18.0
Fearful of flood	75	27.0
Trouble sleeping	2	0.7
Same as before	42	15.1
Other	2	0.7
N.R.	30	10.8
<b>TOTAL</b>	<b>278</b>	<b>100.0</b>

Table 29. What is the Family's State of Mind ? (Second Response)

Category	Number	Percent
N.A.	181	65.1
Depressed, cry a lot	6	2.2
Worried, upset	35	12.6
Fearful of flood	1	0.4
Trouble sleeping	21	7.6
Other	4	1.4
N.R.	30	10.8
<b>TOTAL</b>	<b>278</b>	<b>100.0</b>

Table 30. What Is Your State of Mind ? (First Response)

Category	Number	Percent
N.A.	4	1.4
Depressed, cry a lot	29	10.4
Worried, upset	61	21.9
Fearful of flood	95	34.2
Headaches, ulcers	4	1.4
Trouble sleeping	5	1.8
Same as before	48	17.3
Other	10	3.6
N.R.	22	7.9
<b>TOTAL</b>	<b>278</b>	<b>100.0</b>

Table 31. What is Your State of Mind ? (Second Response)

Category	Number	Percent
N.A.	161	57.9
Depressed, cry a lot	1	0.4
Worried, upset	8	2.9
Fearful of flood	37	13.3
Headaches, ulcers	2	0.7
Trouble sleeping	41	14.7
Other	6	2.2
N.R.	22	7.9
<b>TOTAL</b>	<b>278</b>	<b>100.0</b>

**Table 32. Have Relationships With Friends, Neighbors Changed?**

Category	Number	Percent
N.A.	4	1.4
Yes	14	5.0
Yes, better	44	15.8
Yes, worse	30	10.8
No	183	65.8
N.R.	3	1.1
<b>TOTAL</b>	<b>278</b>	<b>100.0</b>

**Table 33. Have Family Relationships Changed?**

Category	Number	Percent
N.A.	5	1.8
Yes	6	2.2
Yes, better	22	7.9
Yes, worse	18	6.5
No	162	58.3
N.R.	65	23.4
<b>TOTAL</b>	<b>278</b>	<b>100.0</b>



**Table 34. Have You Become More Or Less Active Since the Flood?**

Category	Number	Percent
N.A.	16	5.8
Less active	44	15.8
More active	18	6.5
No change	169	60.8
N.R.	31	11.2
<b>TOTAL</b>	<b>278</b>	<b>100.0</b>

**Table 35. Did Anyone Miss Work?**

Category	Number	Percent
N.A.	7	2.5
Yes	149	53.6
No	120	43.2
N.R.	2	0.7
<b>TOTAL</b>	<b>278</b>	<b>100.0</b>

**Table 36. How Badly Was Your Home Damaged?**

Category	Number	Percent
N.A.	3	1.1
Completely ruined	89	32.0
Severe	83	29.9
Moderate	53	19.1
Little	12	4.3
None	33	11.9
N.R.	5	1.8
<b>TOTAL</b>	<b>278</b>	<b>100.0</b>

**Table 37. Percent Losses Covered by Insurance**

<b>Category</b>	<b>Number</b>	<b>Percent</b>
N.A.	37	13.3
None	201	72.3
Up to 25%	10	3.6
26 - 50%	2	0.7
51 - 75%	2	0.7
76 - 99%	2	0.7
Other	7	2.5
N.R.	17	6.1
<b>TOTAL</b>	<b>278</b>	<b>100.0</b>

**Table 38. Did You Have Flood Insurance Before the Flood?**

<b>Category</b>	<b>Number</b>	<b>Percent</b>
N.A.	3	1.1
Yes	33	11.9
No	220	79.1
N.R.	22	7.9
<b>TOTAL</b>	<b>278</b>	<b>100.0</b>

**Table 39. Do You Have Flood Insurance Now ?**

<b>Category</b>	<b>Number</b>	<b>Percent</b>
N.A.	3	1.1
Yes	183	65.8
No	77	27.7
N.R.	15	5.4
<b>TOTAL</b>	<b>278</b>	<b>100.0</b>

**Table 40. Did You Lose Anything of Sentimental Value?**

<b>Category</b>	<b>Number</b>	<b>Percent</b>
N.A.	4	1.4
Yes	202	72.7
No	71	25.5
N.R.	1	0.4
<b>TOTAL</b>	<b>278</b>	<b>100.0</b>

**Table 41. What Did You Lose ? (First Response)**

Category	Number	Percent
N.A.	74	26.6
Pictures, photos	161	57.9
Furniture	15	5.4
Books, bibles	3	1.1
Jewelry, clothes	6	2.2
Tools	1	0.4
Toys, games	3	1.1
Special collections	6	2.2
Other	7	2.5
N.R.	2	0.7
<b>TOTAL</b>	<b>278</b>	<b>100.0</b>

**Table 42. What Did You Lose ? (Second Response)**

Category	Number	Percent
N.A.	121	43.5
Pictures, photos	1	0.4
Furniture	38	13.7
Books, bibles	27	9.7
Jewelry, clothes	20	7.2
Toys, games	5	1.8
Special collections	25	9.0
Other	40	14.4
N.R.	1	0.4
<b>TOTAL</b>	<b>278</b>	<b>100.0</b>

Table 43. What Did You Lose? (Third Response)

Category	Number	Percent
N.A.	212	76.3
Books, bibles	7	2.5
Jewelry, clothes	8	2.9
Toys, games	4	1.4
Special collections	19	6.8
Other	27	9.7
N.R.	1	0.4
<b>TOTAL</b>	<b>278</b>	<b>100.0</b>

APPENDIX V:

CODING OF TRAUMA CONTRIBUTING FACTORS

Trauma contributing factors

General health

Coded

Has health changed as result of flood?

- worsened .....1
- same, better .....0

Physical injury

Was anyone injured or made ill during flood?

- yes .....1
- no .....0

What was the nature of the injuries?

- high blood pressure, heart problems,  
psychological distresses .....1
- colds, sprains and strains, broken  
bones, back ache .....0

Mental stress

Did you receive any warning of the flood?

- no warning .....1
- warning .....0

Did the warning give you time to protect yourself?

- warning not sufficient .....1
- sufficient warning .....0

Have you had any previous flood experiences?

- no .....1
- yes .....0

Do you know of anyone who died as a result of the flood?

- yes .....1
- no .....0

Did you experience any change in relationship with friends  
and/or neighbors as a result of the flood?

- yes, worsened .....1
- no change; better .....0

Did you experience any change in relationships among  
family members as a result of the flood?

- yes, worsened relationship .....1
- no change; better .....0

cont'd.

Coded

- How badly was your home damaged by the flood?  
- some damage to completely ruined .....1  
- no damage .....0
- Did you lose anything of sentimental value in the flood?  
- yes .....1  
- no .....0
- How would you describe your family's state of mind since the flood?  
- worsened in some way .....1  
- same as before the flood .....0
- How has your state of mind changed as a result of the flood?  
- worsened .....1  
- same as before the flood .....0
- In what other ways has the flood experience upset you?  
- other concerns related to the flood .....1  
- none .....0

Hassle factors

- Were you forced to leave your home during the flood?  
- yes .....1  
- no .....0
- What things did you have to do without during the flood?  
- clothing; water; utilities; food; sleeping quarters; all of above .....1  
- nothing .....0
- How long was it before you could return to your home?  
- more than a day .....1  
- 1 day or less .....0  
- if never returned to their home because of extensive damage .....1
- What things did you have to do to your home to make it livable again?  
- new furnishings, rewiring, plumbing, new furnace, cleaning .....1  
- none or very little .....0
- What problems, if any, did you encounter during clean-up?  
- financial, physical, mental, other .....1  
- no problems .....0
- Did anyone in family miss work because of the flood?  
- yes .....1  
- no .....0

cont'd.

Coded

Extended effects

Have things returned to normal in your household since  
the flood?

- no; somewhat .....1
- yes; unsure .....0

Do you feel that by experiencing the flood, you have met  
a great challenge?

- yes .....1
- no, unsure .....0

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