

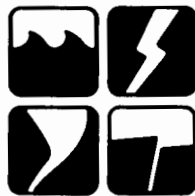
Natural Hazard Research

TECHNICAL SERVICES FOR THE
URBAN FLOODPLAIN PROPERTY MANAGER:
ORGANIZATION OF THE DESIGN PROBLEM

by

Kenneth Cypra
and
George L. Peterson

1969



Working Paper #12

PREFACE

This paper is one in a series on research in progress in the field of human adjustments to natural hazards. It is intended that these papers will be used as working documents by the group of scholars directly involved in hazard research as well as inform a larger circle of interested persons. The series is now being supported from funds granted by the U. S. National Science Foundation to the University of Colorado, Clark University and the University of Toronto. Authorship of papers is not necessarily confined to those working at these institutions.

Further information about the research program is available from the following:

Gilbert F. White,
Institute of Behavioral Science,
University of Colorado,
Boulder, Colorado 80302,
U. S. A.

Robert W. Kates,
Graduate School of Geography,
Clark University,
Worcester, Mass. 01610,
U. S. A.

Ian Burton,
Department of Geography,
University of Toronto,
Toronto 5, Ontario,
Canada.

Requests for copies of these papers and correspondence relating directly thereto should be addressed to Toronto.

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Kenneth Cypra and George L. Peterson*

INTRODUCTION

Floodplain management in the United States is presently in a state of relative flux with current trends being characterized by (1) an increased involvement in and responsibility for floodplain management at state and local levels, and (2) an increased emphasis upon the non-structural alternatives (i.e., zoning regulations, insurance) for adjusting to the flood hazard.

These trends, in themselves, have important implications for the floodplain property manager (i.e., an individual, partnership, or corporate entity charged with the management of a parcel of floodplain land and structures therein), both present and prospective. First, an increased involvement at the local level engenders a climate wherein the flood problem is a community problem to be solved with the co-operation of individuals within that community. Secondly, the means to a solution which entails regulations regarding land-use places the burden of compliance directly upon the prospective property manager and, to some extent, upon the present property manager as well.

* Kenneth Cypra, formerly associated with Northwestern University, Evanston, Illinois, now with Bauer Engineering, Inc., Chicago, Ill.; George L. Peterson, Ph.D., Associate Professor, Department of Civil Engineering, Northwestern University.

This work was supported in part by a traineeship grant from the National Science Foundation (U.S.) to Northwestern University.

Furthermore, several recent developments at the Federal level have produced the above trends which will likely continue. The report of the Task Force on Federal Flood Control Policy¹ has reshaped the Federal approach to floodplain management and includes due recognition of land-use control and regulation as part of the overall floodplain management program. To bolster the implementation of Task Force recommendations at the Federal administrative level, Executive Order 11296² was issued in conjunction with the Task Force report. Briefly, this Order requires Federal agencies to take cognizance of flood problems in administering Federal activities such as the building of Federal facilities or the guaranteeing of privately underwritten mortgages. In addition, the passage of the Flood Insurance Act of 1968³ has put insurance closer to implementation than ever before and, more importantly, the Act specifies that such insurance will be administered only within the framework of a comprehensive approach to floodplain management.

In short, the present trends in floodplain management, abetted by the cited Federal developments, support a shift in responsibility to those occupying the floodplain, and it seems very likely that the floodplain property manager will be required to make more conscious and deliberate decisions regarding the use of the floodplain than he has in the past. Consequently, a program of technical services consisting of

¹U.S., Congress, House, Task Force on Federal Flood Control Policy, A Unified National Program for Managing Flood Losses, 89th Congress, 2nd Session, August 10, 1966, House Document No. 465.

²U.S., President, Executive Order No. 11296, Federal Register, August 10, 1966.

³National Flood Insurance Act, Statutes at Large, Public Law 90-448, Title XIII, sec. 1315 (1968).

education, information, and technical assistance to aid the property manager in making such decisions becomes a timely consideration which has significance in the overall approach to floodplain management.

The concept of technical services as part of the floodplain management effort is not new; it has been applied in some geographic areas for over a decade. Two major technical services programs for urban floodplain areas are (1) the Local Flood Relations Program of the Tennessee Valley Authority (TVA), and (2) the Floodplain Management Services Program of the U.S. Army, Corps of Engineers.

From its development in the early 1950's, the TVA technical services program has grown to be the most successful program to date. Services include floodplain information reports which contain flood hazard maps, a compendium of the community flood problem, and some suggested approaches to a solution. In addition, technical assistance and advice are supplied to community leaders and interested individuals as the need arises. The success of this program can be attributed in part to the good working relationship between TVA personnel, the state and local planning agencies, and the community leadership. Also enhancing success is the spirit of the TVA as an agency concerned primarily with the economic development and well-being of the Tennessee Valley.

The Corps floodplain management program, started in 1961, appears to be modeled after the TVA program. Technical output is similar to that of the TVA program (i.e., floodplain information reports and limited technical assistance and advice). In the Corps program, however, the close working relationship between Corps and local personnel does

not seem to measure up to that found in the TVA program, possibly because the Corps is not as oriented toward regional development as is the TVA.

Most importantly, neither program includes significant provision for technical services to the property manager. The major emphasis within each program is upon the provision of services to community leaders and officials, with the major technical output being addressed to the flood problem at the community scale. Quite possibly, within present administrative frameworks, the task of providing services to the property manager is seen as a state, regional, or local responsibility using the Federal technical output as the basis for such services. Unfortunately, there may be little initiative or capability on the part of state and local governments to fulfill this responsibility. However, the provision of technical services to the property manager has been recommended as a necessary part of the overall floodplain management effort,⁴ and as such, steps should be taken to implement these services on a more comprehensive basis than that which presently exists.

The purpose of this paper is stated simply as that of organizing conceptually the problem of designing a program of technical services for the floodplain property manager in a manner which provides one basis for subsequent attempts to develop such a program. Sheaffer⁵ is

⁴Task Force on Federal Flood Control Policy, see Recommendation No. 9.

⁵Sheaffer, J. R., Program Guidelines for Flood Plain Management Services, Center for Urban Studies, University of Chicago (draft).
_____ et al., Toward Relevance in Flood Plain Management, University of Chicago (in preparation).

currently studying a similar problem as a consultant for the Corps' Floodplain Management Services Program. His work is directed toward technical services and their influence upon community decision-making in a wider scope. In contrast, this paper attempts to focus upon services for the property manager, his receptivity toward such services, and the relevance of such services in an overall prevailing approach to floodplain management.

This discussion is organized into three sections. In the first, a program framework is developed which identifies a range of program objectives and a range of technical service possibilities. Using this framework as a basis, the second section discusses major design factors which would relate the framework to the needs of a particular design situation. In the third and final section, the applicability of technical services to other hazard situations is briefly considered.

A PROGRAM FRAMEWORK FOR TECHNICAL SERVICES

The purpose of this section is to describe a program framework for property manager technical services by visualizing such a framework in terms of a range of possible program objectives and a range of technical services possibilities. Preceding such discussion, a working definition for technical services is proposed.

A Definition

Technical services for the urban floodplain property manager can be conceived broadly as those services rendered by a floodplain management agency or related professional agencies in the form of education, information, and technical assistance which encourage, guide, and assist

the urban floodplain property manager in the "proper use" of his floodplain property.

"Proper use" can be considered to be situationally defined; it is not the same for all floodplains. In determining proper use, one must consider the community or area goals, the goals of the individual inhabitants, and the impact of the flooding hazard upon the floodplain resource in question. Although proper use is neither ubiquitous nor easily derived, its importance to floodplain management must be recognized. The specification of such proper use will provide the basis for any subsequent floodplain management endeavour.

For the present, it is assumed that "proper use" would be defined for working purposes within a given floodplain management area, that it can be taken as given, and that it is reflected in the planning and administration of the given floodplain management program.

A Range of Objectives

Three closely related objectives governing the design of a technical services program broadly cover the range of program purposes.

- (1) The program should attempt to foster an awareness and perception of the flood hazard such that the hazard is viewed more meaningfully and rationally by the property manager.
- (2) The program should encourage the property manager to exercise a more effective role in meeting the hazard by acquainting him with the possible courses of adjustment and by assisting him with whatever information and advice are necessary to implement such courses of adjustment.
- (3) The program should communicate to the property manager the

requirements pertaining to occupancy and choices of adjustment which are prescribed by public controls and regulations in floodplain management and should assist the property manager in conforming to these requirements. In a related fashion, the technical services program might also assist in gaining property manager acceptance of such public controls and regulations.

Briefly the objectives are (1) to foster hazard awareness, (2) to encourage efficacy in property manager action, and (3) to complement a program of public control and regulation by facilitating property manager compliance. The extent to which any or all of these objectives would be stressed in a particular design would depend upon the particulars of the design situation. The first two objectives, those which promote awareness and encourage efficiency, could be most emphasized in a situation where controls and regulations vis-à-vis the flood hazard play a minor role in the development and use of the floodplain. On the other hand, when such controls and regulations play a major role, as they commonly do in the emerging approach to floodplain management, the third objective, that of utilizing technical services to complement such regulations and controls would receive commensurate emphasis.

A Range of Technical Services

Having described program objectives, the framework is now rounded out by developing a range of technical services which are possible within the set of program objectives. Table 1 relates these service possibilities to the aforementioned objectives in tabular form. In

TABLE 1
SELECTED PROPERTIES OF TECHNICAL SERVICE POSSIBILITIES

TECHNICAL SERVICE POSSIBILITY	OBJECTIVES SERVED	EMPHASIS UPON	SCALE OF COMMUNICATION
Education in public schools	Variable--can serve all	Education	Impersonal/Public
Discussions, lectures, films at public meetings	Variable--can serve all	Education Information	Impersonal/Public
Education through mass media	Variable--can serve all	Education	Impersonal/Public
Physical hazard markings placed conspicuously	Foster awareness	Information	Impersonal/Public
Flood warnings	Foster awareness	Information	Impersonal/Public
Distribution of literature pertaining to choice of adjustment	Improve efficacy, complement public programs	Information Education	Impersonal/Private
Distribution of literature pertaining to public programs	Complement public programs, improve efficacy	Information Education	Impersonal/Private
General advice and technical assistance	Variable--could serve all	Technical Assistance	Personal/Private
Advice pertaining to structural change and design	Improve efficacy, complement public programs	Technical Assistance	Personal/Private
Advice pertaining to emergency preparedness	Improve efficacy, complement public programs	Technical Assistance	Personal/Private
Advice pertaining to purchase of insurance	Improve efficacy, complement public programs	Technical Assistance	Personal/Private
Advice pertaining to backing of investment	Improve efficacy, complement public programs	Technical Assistance	Personal/Private

addition Table 1 also serves to identify other major characteristics of the service possibilities, namely 1) the mode of emphasis--education, information, or technical assistance--and 2) the scale of communication--impersonal/public, impersonal/private and personal/private. In the the impersonal/public category are services which are primarily impersonal in nature (e.g., films, literature, maps, lectures) and which are implemented on the scale of the public at large. The impersonal/private category would consist of services which are primarily impersonal in nature but which are specifically addressed to the problem on the level of the property manager and involve direct communication with that individual. Finally, the personal/private category consists of services communicated on a one-to-one basis; that is, these services are highly personalized and may be likened to a doctor-patient or consultant-client relationship. The scale of communication characteristic, as just outlined, would be important in program design as each category would be uniquely appropriate to a particular point in time or space. For instance, impersonal/public and impersonal/private services may be prerequisites to the dissemination of personal/private services; that is, advice (a personal/private service) may not be appropriate until a foundation for such a service has been established through impersonal services at both the public and private scale.

In closing, it is unlikely that a technical services program would include all of the possibilities mentioned in Table 1; it is more likely that only a few of these possibilities would be incorporated. Furthermore, the listing in Table 1 is by no means complete; other services are possible. The listing does, however, cover a wide, realistic

range of service possibilities which can be incorporated into design and does serve to establish a working program framework.

MAJOR DESIGN FACTORS

In the matter of design, two major factors are considered to be necessary inputs. When incorporated into the design process, they can result in technical service programs tailored to the needs of specific geographic areas. The two design factors considered are (1) the overall floodplain management effort, itself, within which the technical services program is housed, and (2) the receptivity of the property manager recipient toward such services. Paramount to the question of design is the idea that without a properly designed technical service facility, existing technical services would be both sluggish and ineffective. Figure 1 serves to identify the aforementioned design factors and their inherent relationships.

On one hand, the floodplain management effort is a constraining factor "from above." Such items as the public choices of adjustment (e.g., land use regulations, insurance) and individual choices to adjustment (e.g., structural adjustments and emergency action) as prescribed, or at least implied, in the overall management operation will presumably govern private response and thus should influence the set of technical services which will contribute to the realization of that response. In addition, design is further constrained from above by existing technology and institutional arrangements and would be further influenced by the attributes of the hazard itself.

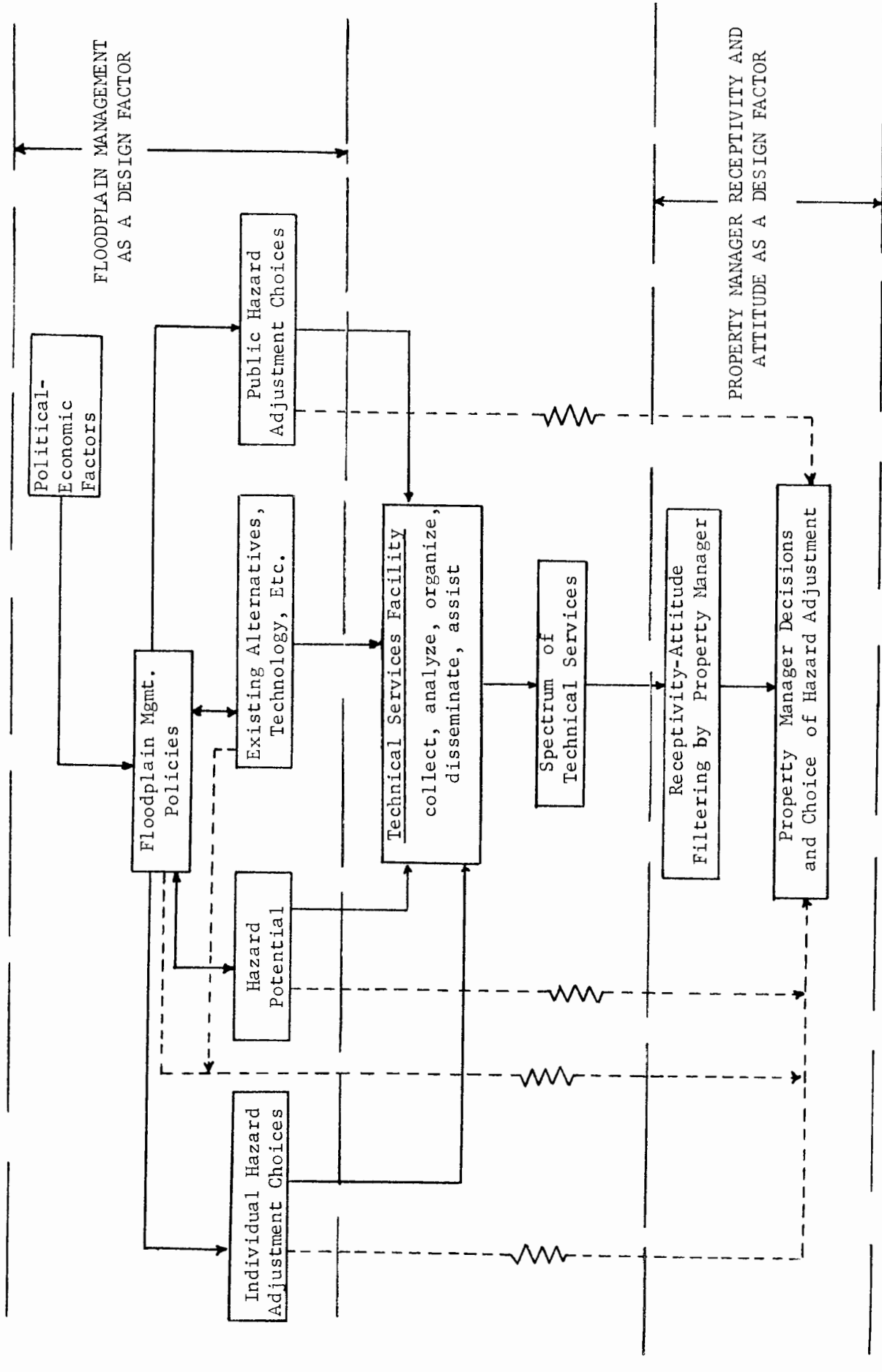


FIGURE 1. TECHNICAL SERVICES AND THE MAJOR DESIGN FACTORS

~ alternative communication to a technical services facility

"From below," the designer must contend with the property manager, the recipient of such services. There is assumed to be a "filtering" of technical services by the property manager in accordance with his receptivity toward such services. Therefore it is important to identify his receptivity and its implications for technical services dissemination; otherwise, efficiency and effectiveness will suffer.

In short, the services are simultaneously limited from above by the floodplain management effort and its supporting state of the art and from below by the recipient's attitudes toward such service. A facility design (represented by the dashed lines in Figure 1) which fails to recognize this dual set of limitations (even with the recognition that the limitations can be changed) would constitute a less effective design.

Floodplain Management as a Design Factor

Because it is expected that a technical services program would be an integral part of a particular floodplain management effort and would have compatible objectives, it is necessary to consider the particular floodplain management effort, itself, as a major design factor.

It is important first to recognize that floodplain management at the governmental level can take on several major forms as follows:

1. It can take on a form whereby the emphasis is upon the control of the flood hazard, itself, through measures such as channel improvements, levees, and reservoir systems.
2. It can take on a form whereby the emphasis is upon the control, regulation or conscious influence of floodplain land use.
3. It can consist of some combination of hazard control and control

of land use; in essence, a mix of the two forms mentioned above.

4. It can take on a form of little meaning or impact, that is little attempt is made to control land use with respect to its susceptibility to flooding and no measures are taken to control the hazard (either because such measures have not been investigated or because such measures have been investigated and have been found to be economically unfeasible).

Added to the governmental forms of management as just outlined are those of private interest influences which contribute to sound floodplain management. For example, there are the influences exerted by those in banking, mortgaging and insurance, which place additional risk premiums upon investment in the floodplain.

The major dimension to be considered in the design of a particular technical services program is the degree of public control and influence upon development and use of the floodplain in question. Ultimately, technical services should contribute to a "proper use" of the floodplain by fostering a change in property manager behavior such that "proper use" will result from this change. On one extreme, behavioral change would be entirely voluntary, that is there would be no regulatory forces prescribing such change, but rather, such change would result only from the initiative of the property manager. At the other extreme, behavioral change (or more technically, behavior itself) would be rigorously prescribed with stiff penalties for failure to comply and with very little freedom for adaptation to individual circumstances. In realistic floodplain management, however, neither extreme is common; it is more likely that in some respects behavior in terms of floodplain development and use

would be specified while in others there would be room for individual maneuverability.

Nevertheless, it is instructive to consider the directions that technical services can take under two somewhat artificial floodplain management situations, the first characterized by little or no control over development practices or choices of adjustment with regard to the flood hazard, and the second characterized by a significant degree of such control.

In that situation characterized by little or no public control over flood plain use vis-à-vis the flood hazard the property manager is the primary initiator of actions intended to result in proper use. No penalties are imposed for overinvestment or actions which may not contribute to the public interest. Incentives and influencing forces (such as those exerted by financiers) may or may not be present.

From the range of objectives presented above, those most applicable are (1) improvement of property manager awareness of the hazard itself, and (2) improvement of property manager efficacy in taking action to meet that hazard.

Services likely to be included in this type of situation would include (1) flood warnings, (2) maps, onsite markers, and literature which communicate the magnitude and real extent of the hazard and (3) literature and advice which guide and assist the property manager in undertaking such measures as structural adjustments and preparedness for emergency action. Also, technical services could be used to gain public support for more sound and thorough floodplain management at the public level.

To some extent this is being done in both the TVA and Corps programs and should be continued.

The opinion that technical services can prove effective in promoting better use of floodplains in the absence of a wider framework of controls, regulations, and incentives is open to question. It must be recognized that in the absence of such controls, regulations and incentives, the property manager must exhibit the initiative. In some cases, the property manager would seek and utilize technical services. Goddard cites examples where the TVA Local Flood Relations Program has had such results⁶ and property manager initiative in seeking such services has been reported elsewhere.⁷ On the other hand, Kates, in his comprehensive study of property manager attitudes, has indicated that technical services (specifically, information in the absence of a wider FPM effort) would yield less than desirable results.⁸

In essence, beyond the heuristic belief that a better informed floodplain populace will be more likely to take action to reduce damage potential, there is little concrete documentation of the effect of such technical services upon subsequent property manager actions. Thus, before technical services could be used to provide the major impetus to the property manager's wise use of the floodplain, there would be a need to

⁶James E. Goddard, "The Co-operative Program in the Tennessee Valley," in Papers on Flood Problems, ed. by G. F. White, Research Paper No. 70 (Chicago: Department of Geography, University of Chicago, 1961).

⁷Letter from John W. Weathers, Chief of Local Flood Relations, TVA, dated December 9, 1968.

⁸R. W. Kates, Hazard and Choice Perception in Floodplain Management, Research Paper No. 78 (Chicago: Department of Geography, University of Chicago, 1962).

understand more fully the impact of such services.

As controls, regulations and incentives are introduced into the floodplain management effort, the direction taken by technical services would undergo a shift. Instead of placing the responsibility for behavioral change squarely upon the property manager, this responsibility now shifts to the floodplain management decision-makers with the prospect that property manager behavior will be more rigidly specified in order to attain proper floodplain use.

In this type of situation emphasis could be placed upon technical services which (1) inform the property manager of the controls, regulations, and incentives; (2) inform him of the associated penalties; (3) guide and assist him in implementing measures which will meet prescribed requirements; and (4) gain his acceptance of this type of approach to floodplain management through education and promotional activities.

One could consider the following to be basic technical services: (1) flood warnings which are desirable in any situation; (2) maps, onsite markers, and literature which describe the hazard; and (3) information and educational materials which describe the control and regulation measures, the associated penalties, and insofar as possible, the reasoning behind the adoption of such measures.

Additional services would be directly related to the type and context of the particular controls, regulations and incentives which are, in fact, adopted. For instance, the adoption of floodplain zoning codes and building regulations might create the need for services relating to

the adoption of structural adjustments, emergency action and development alternatives (such as locating outside of the floodplain). Related to flood insurance would be services regarding the purchase of insurance itself and services regarding the action that can be taken to reduce the hazard, thereby reducing the cost of such insurance.

In addition to the particular form of floodplain management, there are other administrative policy factors pertaining to controls and regulations which affect design. To be considered in such light are (1) priority of a technical services program in relation to other aspects of floodplain management and to other governmental programs in general; (2) the division of responsibility for administration among governments and non-governmental entities; (3) the degree of complexity and comprehensiveness to be incorporated as dictated by available resources; and (4) the allocation of program costs between the public sector and the property manager recipient. These aspects, although they would affect design, would not be resolved at the design level. Instead they would more likely be resolved in the political arena.

To summarize, floodplain management itself is a design input to a technical services program in that the objectives of both should be compatible and the technical services program should operate in harmony within the superstructure of the floodplain management scheme. One might think of two sets of services which can be offered, one which is independent of the floodplain management public programs of control and regulation, and one which is dependent upon the type and context of such control and regulation. Without public control and regulation vis-à-vis

the flood hazard, the former set of services would be most relevant. Except for real time services such as flood warnings, this set of services may not result in property manager behavior which will, in fact, reduce flood damage potential or other social costs of flooding. On the other hand, as public controls and regulations are introduced, the second set of services could be considered for inclusion depending upon the type and context of the public programs. Here technical services should facilitate property manager adjustment within the framework of such controls and regulations, and furthermore, the technical services could be employed to gain property manager acceptance of such measures. Finally, other aspects affecting design may be identified; they would primarily affect administrative policy and would probably be resolved at the political level instead of at the design level.

Property Manager Receptivity as a Design Input

While it is important to consider the overall floodplain management effort as a design factor, it is equally important to consider another such factor, the receptivity of the property manager toward such services, because the effectiveness of technical services will be limited by the willingness and ability of the property manager to receive and utilize such services. Of major concern is the dissemination of relevant services which are both timely and effectively communicated.

Initially, relevant services could be viewed as those services for which the property manager exhibits receptivity (i.e., a willingness to receive such services coupled with a perception that such services will be useful) for it is expected that a disparity will exist between

those services for which the property manager exhibits receptivity and those services which would be relevant to the overall floodplain management scheme. When identified, this disparity can provide the key to two design questions as follows: (1) which services can be disseminated initially in response to initial property manager receptivity, and (2) which services, although they may be relevant in terms of overall floodplain management, cannot be disseminated initially, but could be disseminated only after measures have been taken to educate the property manager as to their relevance and their use.

The identification of relevant services might be best approached through a comprehensive study, perhaps within a setting more general than that of a particular geographic floodplain management area.

Such a study could measure relevance in terms of receptivity, that is in terms of a willingness to pay for such services, a willingness to act in order to receive such services, or in terms of other variables that measure receptivity. Other factors (which in turn could be measured in such a study) could be hypothesized to relate to receptivity. Such factors could include, but are not limited to, property manager efficacy in meeting the problem of flooding, the flooding expectation of the property manager, the flooding experience of the property manager, the amount and pattern of adjustment already undertaken by the property manager, the amount of investment within the floodplain, and perhaps demographic characteristics such as income, education and life cycle. No attempt is made within the scope of this paper to formulate, defend, or reject the hypotheses of relationship between these factors and

receptivity. Instead it is more important to recognize that a well conceived study of this kind, which measures receptivity and which ties such receptivity to associated factors, would contribute to the practical problem of technical services design and administration and furthermore could yield significant theoretical contributions as well (perhaps in terms of theoretical extensions of work by Kates,⁹ and others).

In the design of technical services, timeliness should be a major consideration as the property manager does not continually include the problem of flooding at the forefront of his concerns. Hence, it is desirable to identify opportunities in which the property manager may consciously or incidentally make a decision regarding the flooding problem. Two sets of such opportunities can be identified. One set is created by a major change in the floodplain management program which requires a significant change in property manager behavior and the other is created when the property manager himself either undertakes to change occupancy or initiates action which has a bearing upon a possible choice to adjustment. Examples of the first set of opportunities are (1) the inception of a flood insurance program in a given locale, (2) the inception of significant change in local zoning, building and subdivision regulations, and (3) the inception of redevelopment programs. Examples of the second set of opportunities would include (1) the contemplation of development and construction in the floodplain, (2) the contemplated renovation of an existing structure in the floodplain, and

⁹Ibid.

(3) the actual occurrence of a flood with opportunities for the dissemination of technical services in both pre-flood and post-flood stages.

Upon the thorough identification of such opportunities, one is then prepared to design the timing of dissemination to coincide with such opportunities. This would help to insure that technical services are made available to the property manager when the greatest opportunities for use of such services are present. To structure dissemination without accounting for such opportunities would, in all probability, yield less effective results. There are, however, services which need not necessarily conform to such opportunities in time. Such services would be educational in nature and may be disseminated as a continuing activity irrespective of the aforementioned opportunities.

Finally, effective communication is of primary importance as the property manager is a layman relative to most professionals in floodplain management. As such, the services would have to be tailored to the layman's level, yet by doing so, detail may be sacrificed which would be useful in property manager decision-making. The problem, then, would seem to be one of attaining a balance in communication between simplicity (to placate the layman) and the preservation of useful detail (to make the services useful for decision-making).

In order to research this problem, it may be necessary to draw upon a wide range of talents including technical, sociological, journalistic, psychological, and artistic. Perhaps, too, much can be borrowed from related fields of communication in marketing and advertising. Most

importantly, it must be understood that effective communication is crucial to a successful program, for even if all other facets of design can be surmounted, the success of a technical services program will ultimately be limited by the extent to which these services are meaningfully communicated.

In summary, property manager receptivity toward technical services is important to design because the property manager will indeed be a constraining factor on the effectiveness of such a design. It would be desirable to approach the question of receptivity as generally as possible (independent of any one particular geographic area) in order that a more complete understanding of property manager receptivity and underlying factors may be practically applied to services design. Of special importance are relevant services which are both timely (i.e. dissemination is appropriately correlated with opportunities for use) and effectively communicated.

TOWARD WIDER APPLICATIONS

This closing discussion concerns the possibility of extending the ideas developed thus far to other hazard contexts.

In essence, there are two underlying purposes governing the adoption of a technical services program within a natural hazard setting which may operate either simultaneously or unilaterally. The first purpose is to discourage unnecessary exposure to the hazard through judicious utilization of land subject to that hazard. This can be achieved by informing the affected property manager of the hazard, of its

implications for losses and inconveniences, and of possible actions to reduce exposure. The second is to encourage the property manager to accept the responsibility for the consequences of exposure (probably through public programs which include constraints and penalties with respect to land utilization) and to provide the education, information and technical assistance necessary to enable him to assume that responsibility.

To some extent, the general design problem is that depicted in Figure 1. That is, the program design would be influenced "from above" by public programs which affect the utilization of lands exposed to the hazard in question and "from below" by the receptivity toward the technical services exhibited by people exposed to the hazard.

In attempting to extend these ideas to other natural hazards such as mudslides, earthquakes, hurricanes, and tornadoes, one must recognize that each of these hazards presents its own unique set of characteristics. For instance, tornadoes and hurricanes, while they are both associated with heavy rains and high wind velocities, are each unique in many respects. Hurricane paths can be predicted with relative accuracy; consequently, up to several days of warning can be given to those in the predicted path. On the other hand, a tornado is much less predictable, the area immediately affected is very small, and warnings are generally not adequate for sufficient actions to be taken. These and other characteristics of a particular natural hazard would considerably affect the type and scope of public programs, the individual perceptions of the hazard, the responsive actions taken by those so exposed, their

receptivity toward information, education and advice, and consequently, the design of the particular technical services program.

The two underlying purposes cited above can perhaps be more generalized to apply to other hazard situations which are man-made. This would require an emphasis upon influencing behavior in general rather than behavior in terms of land utilization. In addition, the individual would be encouraged to accept responsibility for behavior in the more general sense. One such hazard in which the purpose of technical services might be to affect behavior would be that of crime. In many cases, individuals needlessly expose themselves to the consequences of crime. To some extent, technical services may be employed to make individuals aware of these cases and to accept responsibility for reducing the needless exposure as necessary.

In short, the concept of technical services has potential applications in many hazard situations both natural and man-made, and the further investigation of such potential should be encouraged.

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