THE COGNITIVE STRAWMAN PLANNING METHODOLOGY: PUBLIC INPUT

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INTRODUCTION

Consideration of human welfare in broader terms rather than in solely national economic efficiency has been an evolving trend in water resource planning and project evaluation. Quality of life, aesthetic enjoyment, leisure time opportunities and environmental quality are included as important goals for project planners. While this trend to broaden the planning perspective is being discussed and reviewed, attempts to develop methodologies to quantify non-economic criteria have been ongoing. The historical development of multi-objective planning usually begins with the report of May, 1950 known as the "Green Book" which sets forth benefit-cost analysis and consideration of objectives other than the "general economic welfare." This proposed practice called for identification of all beneficial and adverse effects of a project in both tangible (i.e., monetary) and intangible terms. The Green Book was never adopted by any federal body, but the basic philosophy of benefit-cost analysis was embodied in Budget Circular A-47 issues by the U.S. Bureau of Budget in 1952. Congress then began calling for a liberalization of the benefit-cost system. Senate Document 97 was a response to this need. It called for the three prime objectives of water and related land resource projects to be development, preservation and the well being of people. However, the unwritten rule of the Office of Management Budget was to maintain as their standard for approval the tangible benefit-cost ratio. Various positions proposed by the Water Resources Council in 1968 culminated in two publications called the "Orange Books." These gave the purposes of water and land planning as the enhancement of: national economic development, regional development, the quality of the environment, and social well being. Developments have continued in this general area of multi-objective planning, but none so closely linked to the governmental decision making process. Similar efforts to the Orange Books were Goals for Americans (The President's Commission on National Goals, 1960) and Toward Balanced Growth: Quantity with Quality (National Goals Research Staff, 1970). A third approach by the National Planning Foundation defined six broad goal areas: health and safety, education, skills and income, human habitat, finer things and freedom, justice and harmony, and gross national product.

Another type of related effort to this style of planning methodology is the identification of social indicators. The HEW circular Toward a Social Report (1969) dealt with identification of social indicators to measure the performance of society in meeting social needs. Social Indicators (Bauer, 1966) focused on the potential of using statistical information

in decision-making related to social goals. The Technical Committee of the Water Resources Centers of the Thirteen Western States, on the basis of these developments, formulated an applied systems oriented approach to present a comprehensive multi-goal methodology. The result was their report entitled Water Resources Planning and Social Goals: Conceptualization Toward a New Methodology, hereafter referred to as "Strawman."

The Strawman Planning System is a modeling concept relating water resource use to "social goals." The core of this planning system is a hierarchical array of societal goals with nine prime goals at the top, descendingly disaggregated into further categories called sub-goals and concluding with measurable physical indices called social indicators.

Figure I presents a schematic of this general plan. This report is the foundation of our work in its philosophy and design. The nine prime goals of the Strawman are:

1. Collective Security
2. Environmental Security
3. Individual Security
4. Economic Opportunity
5. Cultural and Community Opportunity
6. Aesthetic Opportunity
7. Recreational Opportunity
8. Individual Freedom and Variety
9. Educational Opportunity

It is the purpose of this paper to describe a further development of multi-objective planning methodology, the Cognitive Strawman.

COGNITIVE STRAWMAN

It was determined during a year long study by a tutorial team at the University of Arizona that in order for the Strawman to be effectively used and accepted as a valid planning tool, it needed revision in several areas. Two of these areas needing improvement were 1) the Strawman should reflect the way people, planners, and specialists think and 2) a system of weights or trade-offs must be determined between the various goals and sub-goals to reduce confusion resulting from the use of the Strawman.

The first area of concern resulted from the observation that the original Strawman attempted to link social, or rather technical, indicators directly with sub-goals of society. In order to obtain input directly from lay persons as well as

specialists it would be necessary to create a new connection between social indicators and sub-goals. As a result an intermediate concept was developed which is called a mental indicator. Thus, the public should be asked about these mental or perceived indicators to ascertain their perceptual dimensions of selected sub-goals. An example may make this clearer. In the original Strawman, the achievement, or lack of achievement, of the sub-goal water aesthetics was measured by the social indicator turbidity. Such a term is physically descriptive but conveys little knowledge of perceived conditions to most people. We intend to introduce mental indicators as the lowest order sub-goals to circumvent this problem. In this example, one of the mental indicators for water aesthetics could be clarity, a term familiar to the general public.

The desire to achieve a weighting system is even more basic. To make the Strawman operational, a system is proposed to determine for specific groups of people their desired weights and trade-offs between the various sub-goals. Determining weights is necessary to reduce the amount of information from a taxonomy of 300+ social indicators to a more useful number of quantified sub-goals. This effort to define a system for producing weights on social goals has been called for by many experts in the field. Terrence P. Curran in "Water Resources Management in the Public Interest" calls upon the social scientist "to make greater efforts to describe community goals and social needs in measurable terms." (Curran, 1971, p. 38) A brief explanation of such a system has been proposed in an article entitled "What Will You Pay for Amenity?" The author states that figures used in planning analysis by civil servants should "mirror the community's underlying pattern of preference and value." (The Economist, May 23, 1970, p. 76) The public too is apparently aware of such a desire. David Brinkley, a prominent news correspondent, recently stated the need for a national poll to set budgetary priorities (Brinkley, 1973) Locally, the City of Tucson's Planning Department developed a Comprehensive Planning System whose objective was to identify problems, choose alternatives, and finally, select the best solution through extensive public input (City of Tucson Planning Division, 1972, p. 7).

The specific concern is to develop evaluative criteria for human goals. The steps needed to accomplish such an objective include the following: 1) human objectives must be enumerated and described, (note: the philosophy and design of this comes from the Strawman, although we will alter the specific terms and their description to better fit public perception) and 2) the various objectives must be compared in terms of their relative importance to each other and to human welfare in general. To structure these steps, we propose a planning paradigm which is based on the following statements.

1. Societal goals can be described by a dendritic structure consisting of nine main goals and numerous branches of sub-goals and sub-sub-goals.

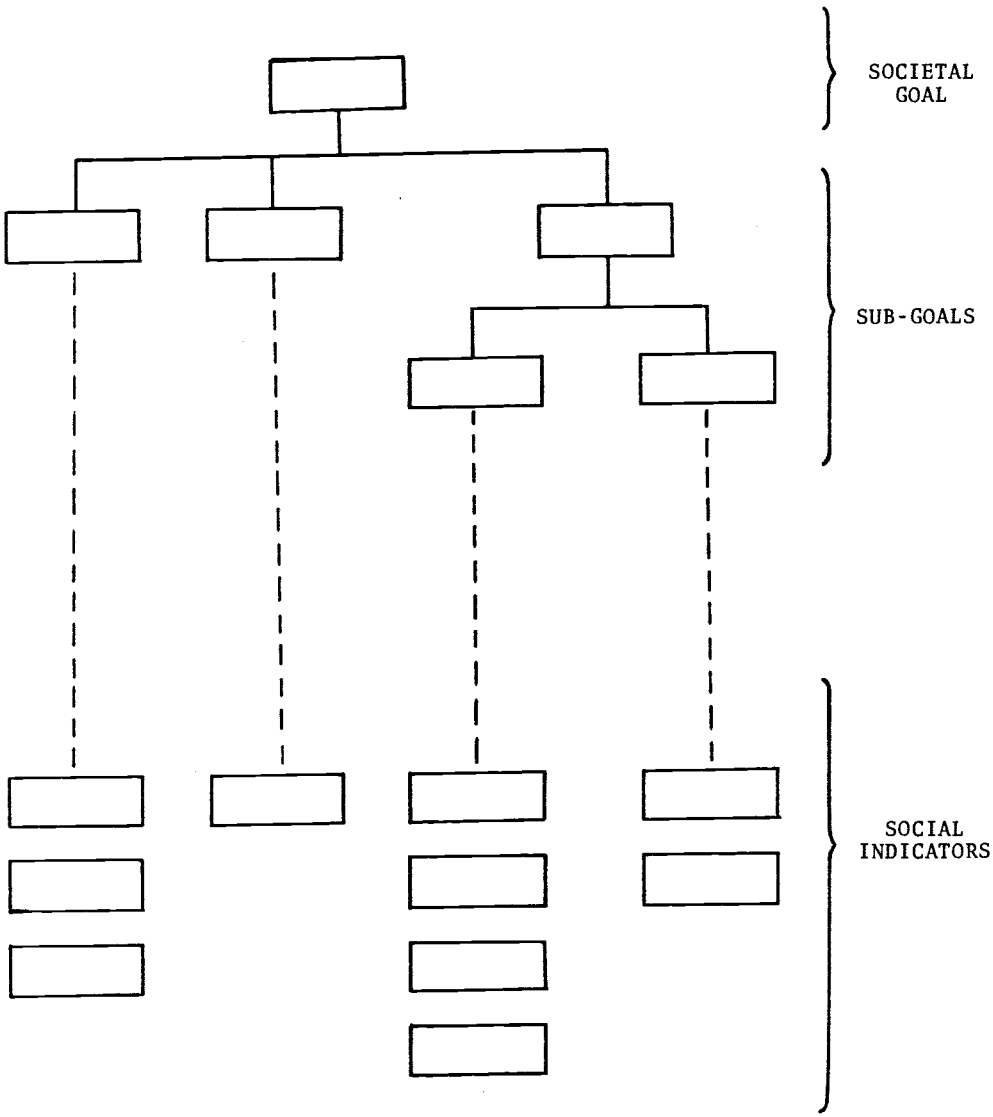


Figure I. General Design of the Strawman Planning System

2. People react to physical, economic, and social facts through their perceptions of these facts which are processed through their belief system.

The basis for acceptance of statement #1 is found in the Strawman. Statement #2 bases public reaction upon perception or cognition and requires further analysis.

PERCEPTION, ATTITUDES, BELIEFS, AND VALUES

Literature on the organization of human value systems is voluminous and confusingly overlapping. However, a recognized expert, Milton Rokeach,(1970) has presented a complete text on the subject in his book Beliefs, Attitudes and Values, A Theory of Organization and Change. Figure II, based on an analysis by Rokeach and Schiff, depicts the psychological process for preference attainment, or weight formation.

The mental process of weight formation (preference) begins with the subject or criteria to be evaluated. The first operation is physical perception (Schiff, 1971, p. 7) which is the mental-physical response to the stimulus. The next operation, social perception, is all inclusive and unique to the evaluator (Schiff, 1971, p. 8). This process makes use of three cognitive systems, attitudes, beliefs, and values, to interpret recognition or physical perception. Rokeach's definitions of these terms are:

> Attitude - an organization of beliefs around a subject. Virtually all theorists agree that an attitude is not a basic irreducible element within the personality, but represents a cluster or syndrome of two or more interrelated elements (p. 112).
>
> Belief - an inference made by an observer about underlying states of expectancy or any simple proposition, conscious or unconscious, inferred by what a person says or does. Rokeach conceives these beliefs to be arranged along a central-peripheral dimension containing five classes. They are:
>
> A) Primitive Beliefs - 100 percent Consensus. Non-controversial psychologically incontrovertible beliefs with unanimous social consensus, i.e.,"I believe this is a table."
>
> B) Primitive Beliefs - Zero Consensus. Psychologically incontrovertible potentially controversial beliefs without social approval, i.e., "No matter what others believe, I believe in God."
>
> C) Authority Beliefs. Potentially controvertible beliefs based on acceptance of personally known reference persons, i.e., family, class, peer group, religious group, etc.

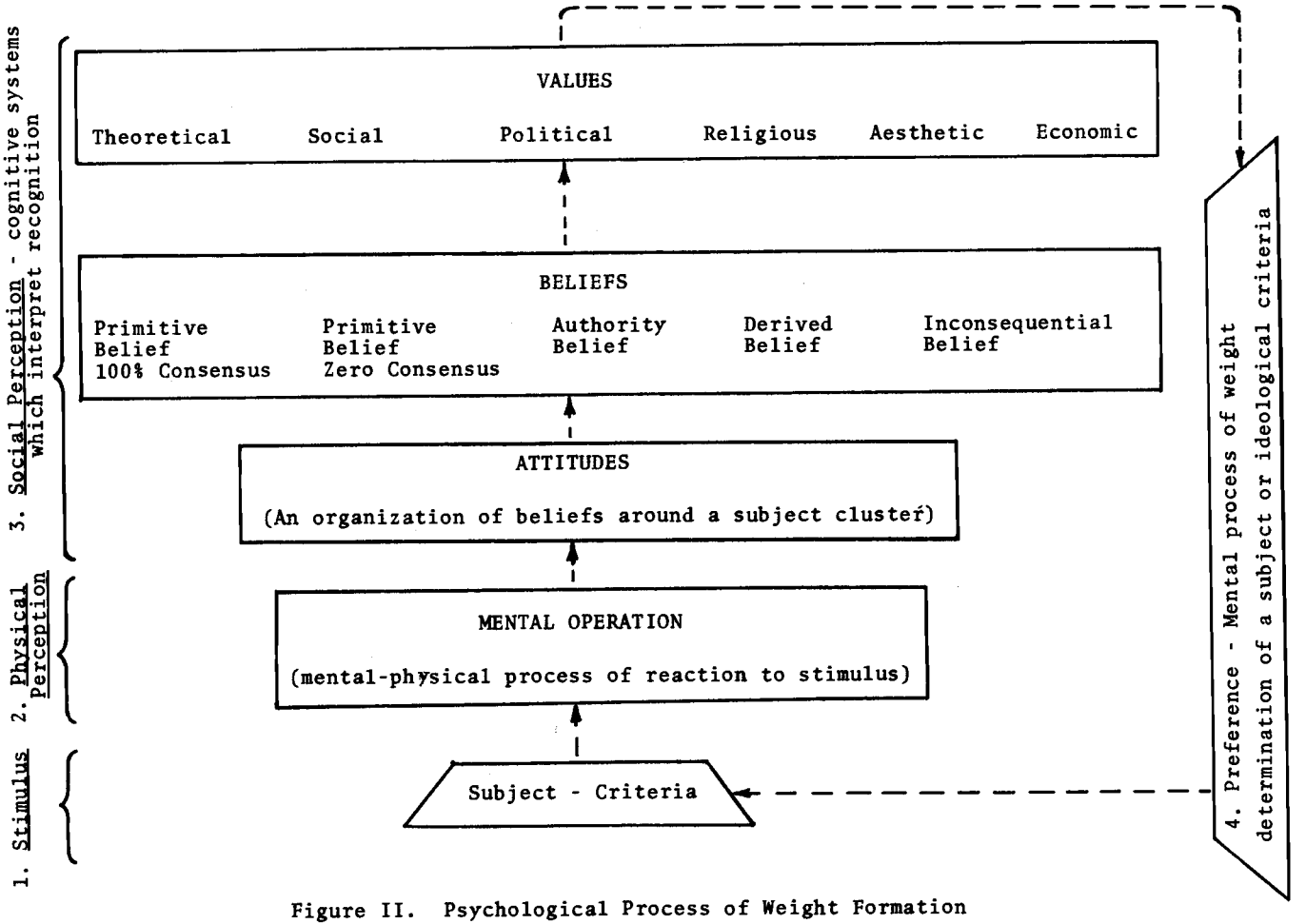


Figure II. Psychological Process of Weight Formation

D) Derived Beliefs.
Potentially controvertible beliefs derived second-hand through processes of identification with authority.

E) Inconsequential Belief.
Beliefs which represent arbitrary matters of taste.

(Note: In context of this planning paradigm only the last four categories of beliefs are relative to evaluation of social goals.)

Values - A type of belief, centrally located within one's total belief system (or cognitive system), about how one ought or ought not to behave, or about some end state of existence worth or not worth attaining. Values are thus abstract ideals, positive or negative, not tied to any specific attitude object or situation, representing a person's beliefs about ideal modes of conduct and ideal terminal goals. The Allport-Vernon-Lindzey Scale of Values distinguishes six classes of values: theoretical, social, political, religious, aesthetic, and economic (Rokeach, p. 125).

Proceeding with the process of preference formation, social perception begins with attitude evaluation of the recognized subject area. Processing this attitude, so as to be consistent with one's fundamental belief system, results in the potential for evaluation based on one's value system. The result can be considered to be a weighted preference on the subject.

ELITIST VERSUS POPULIST INPUT

Given the above structure for formulation of weighted preferences, two alternatives exist for enumerating and describing human goals and sub-goals. One is the elitist approach as taken by the Technical Committee in the original definition of the Strawman. The philosophy here is that specialists (i.e., the planning elite) are more capable of evaluating realities based on fact rather than cultural interpretation. Upon re-examination of Figure II, we note that the cognitive systems which are utilized in preference formation must be processed through one's fundamental beliefs and value systems. Thus, the planning specialist would have no inherent abilities over anyone else when it comes to evaluating abstract social goals. As Lowell E. Gallaway (1971) has noted, beneath the assumption of the elitist approach lies a belief in the minds of those who suggest it that they are possessed of a superior capacity for determining what "ought to be done" by others. In short, he says, it is a manifestation of a basically autocratic, if not authoritarian, mentality.

The second alternative for evaluating community goals is the direct use of public opinion for criteria assessment and weight assignment. According to Terrence P. Curran (1971)

probably the most visible and immediate force pervading the water resources profession today is public concern for the environment. This concern, he feels, is leading to important changes in basic ideology. Curran notes that United States citizens in the last several years have become increasingly disenchanted and alienated (steming from disruptive events such as the Viet Nam War, student unrest, etc.) from the traditional political process, and he concludes that, if social needs are to be met, the public must be involved. Curran makes the observation: "The greatest challenge to those in the water resources field is to fully and forthrightly inform the public." (Curran, 1971, p. 34) Actually the idea of citizen participation is a little like eating spinach, no one is against it in principle because it is good for you. That is, in theory, participatory democracy rings true. However, implementation strategies cover a wide range of philosophies.

Sherry R. Arnstein (1969) describes a typology of eight levels of participation ranging from complete citizen power to citizen manipulation (see Table I). The typology itself is a descriptive continuum and the Cognitive Strawman, utilizing public input, would seemingly be located on Rung No. 4, Consultation.

Degrees of Citizen Power

8. Citizen Control
7. Delegated Power
6. Partnership
5. Placation
4. Consultation
3. Informing
2. Therapy
1. Manipulation

Table I. Eight Rungs of a Ladder of Citizen Participation

Public Opinion Defined. The term, public opinion, is in everyday usage, thus it contains features that weaken it as a tool of analysis. The usage of public opinion includes at least the implicit assumption that public opinion emerges as a dominant force qualitatively superior to the view of any single individual (Truman, 1951, p. 211). With the demand for more verifiable methods of studying social phenomena, this view, which was dominant during the 19th century poetic reverence of public opinion, has largely disappeared from academic literature, though not from the press. Thus we can say the following statement belongs to another period of academic exuberance:

"Towering over Presidents and state governors, over Congress and State legislatures, over conventions and the vast machinery of party, public opinion stands out, in the United States, as the great source of power, the master of servants who tremble before it." (Bryce, 1891, p. 255)

We can best approach the analytical view of public opinion by dividing the concepts into its component segments. For John Dewey (1927) the public are non-participants, or in his words, "Some human actions have consequences for others who are not immediate participants in these actions, the public are those 'others' who perceive or can be made to perceive these consequences." (Dewey, 1927, p. 17)

Opinion may be thought of in the simplest terms as the expression of an attitude on an issue or proposition (Truman, 1951, p. 219). (Note: opinion requires less mental processing than preference, see Figure II.) An individual may be said to have an opinion not only if he has expressed an attitude, but as well if he can express one when called upon to do so. Public opinion, therefore, consists of the opinion of the aggregate of individuals making up the public under discussion. It does not include all the opinions held by such a group of people, but only those relevant to the issue or situation that defines them as a public. Public opinion, it follows, is specific to a particular set of conditions.

Public Opinion Input. The history of public input to government policies in the United States has been primarily by interest group. The two, public input and interest group input, are so related that Katherine Warner (1971), in her report "Public Participation in Water Resources Planning" equates the two terms. Public input is not theoretically so restricted. Both direct communication with an elected official or bureaucrat (by letter, telegram, phone, etc.) and formal testimony by private citizens during a public hearing can represent public input unconnected to an interest group. But in general, the best organized and certainly the largest amount of public input originates with the well coordinated articulate advisory arguments of interest groups. While this type of input and the aforementioned methods of individual citizen input do cover the range of public opinion, they convey little of its quantitative nature. Only some type of public opinion survey or vote is quantitatively indicative of public opinion. Both of these quantitative systems could be used to ascertain opinion on substantive issues. Voting is primarily used for electing representatives though it is also used for such substantive issues as tax changes and bond issues. The public opinion survey method could also be used by a planning agency for quantitative analysis of substantive issues. The Cognitive Strawman system is a proposal to use the survey method to determine public opinion weights associated with societal goals. For a discussion of this method see "A Public Weighting of Four Societal Goals in Arizona and Oregon," (Kimball, et al., 1973).

The attempt is to retrieve public weights concerning the general goals of society and not opinions on specific technical matters. It is based on the theory that all people are capable of expressing an opinion concerning the general directions of society. Thus, the public and the planning elite are on an equal basis when they express their fundamental beliefs.

THE COGNITIVE STRAWMAN CONCEPT

In order to evaluate this proposal of publicly obtained weights concerning societal goals, a sub-set of the original Strawman's nine goals was selected. Based on the dual criteria of (1) relevance to water resource projects and (2) potential of retrieving public perception, three prime goals and one sub-goal were chosen. They are Recreation Opportunity, Aesthetic Opportunity, Economic Opportunity, and the Health Security sub-goal of Collective Security.

The prime goals, Collective Security and Environmental Security, were rejected on the basis that they are primarily technical and thus not conducive to public reaction. The remaining goals, Individual Security, Cultural and Community Opportunity, Individual Freedom and Variety, and Educational Opportunity are within the scope of public perception but have proportionately less relation to water resource proposals. The proposed public opinion survey, a mail questionnaire, had definite length limitations and therefore represented an additional constraint on the selection of the above mentioned goals.

In order to insure that these selected goals were logically enumerated and described, the following set of rules was adopted:

1. The structure of goals, sub-goals, and social indicators will be dendritic and non-overlapping in nature and will proceed from general, perceived goals to specific, technical indicators.
   (Public preferences can thus be obtained by asking trade-offs across the perceived, upper level of the structure while such goals and sub-goals can be physically measured by quantifiable indices at the bottom of the structure.)

2. Sub-goals and sub-sets of sub-goals may appear in more than one place in the overall structure.
   (While the "non-overlapping" constraint of Rule 1 applies within the disaggregation of any one goal, the appearance of similar sub-goals in different goal disaggregations is allowed.)

3. All sub-goals in any one category should be independent within the category.
   (Independence between sub-goals in any one category is seemingly inherent in the assumption that social goals can be disaggregated into specific components or sub-goals, and also the presence of such an

independence constraint facilitates public preference attainment in any given category. For example, if a category in Recreation Opportunity was defined to contain two components, crowding and quality of recreation sites, respondents might well experience difficulty in making viable preference judgments between the two if they considered crowding to be an integral part of the quality of recreation sites.)

4. The attempt is made to make the sub-goals in any category exhaustive.
   (The disaggregation of a goal or sub-goal to a higher level of resolution (i.e., down the structure) should contain all components which are thought to comprise the goal or sub-goal. Admittedly, any sub-goal disaggregation presented herein is by no means exhaustive for all foreseeable Strawman applications, but the attempt is and should be made to provide the best possible weighted preference system.)

5. The maximum number of sub-goals in any one category must be 6 or 7 to facilitate the attainment of public preference.
   (Psychologists estimate that 6 or 7 items is a functional limit for individuals to simultaneously judge independent variables. As the number is increased objects are generally grouped and then compared. (Schimpeler, 1967, p. 146))

Given the above rules for disaggregation, the research procedure to redefine the Strawman in terms of people's perceptions was based upon a lexicographic analysis, or content analysis, of the components of Recreation Opportunity, Aesthetic Opportunity, Economic Opportunity, and Health Security and analysis of the interviews by the researchers.

The specific methodology was to ask open-ended questions of the type, "Visualize air pollution and describe the components of your mental image" and "List five areas of economic concern which affect you personally and explain why." From such lists of goal descriptors and the relative frequencies which which our respondents mentioned each, our team selected a representative list and aggregated these publicly-obtained terms in such a way that they would be acceptable to planners and meaningful to the public. In accordance with the preceding rules for disaggregation, the goal descriptors were fitted into the structure. As a result, people's perceptions, balanced by planners' needs, are reflected in the resulting Cognitive Strawman.

A revised taxonomy of the Health Security sub-goal of Collective Security, the goals Economic Opportunity, Aesthetic Opportunity, and Recreation Opportunity follow as Figures III through VI.

Figure III Aesthetic Opportunity Goal Disaggregation

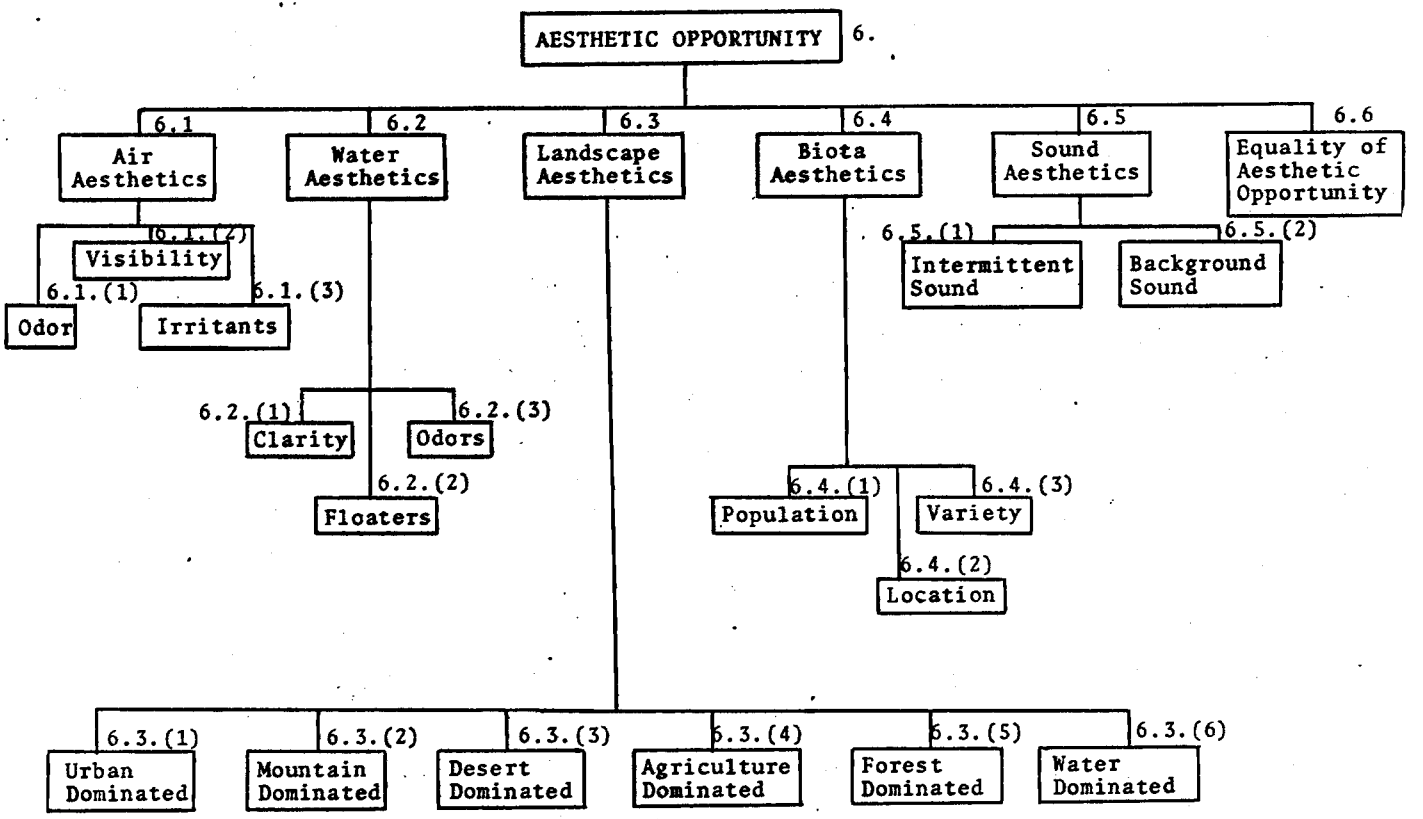


Figure IV Economic Opportunity Goal Disaggregation

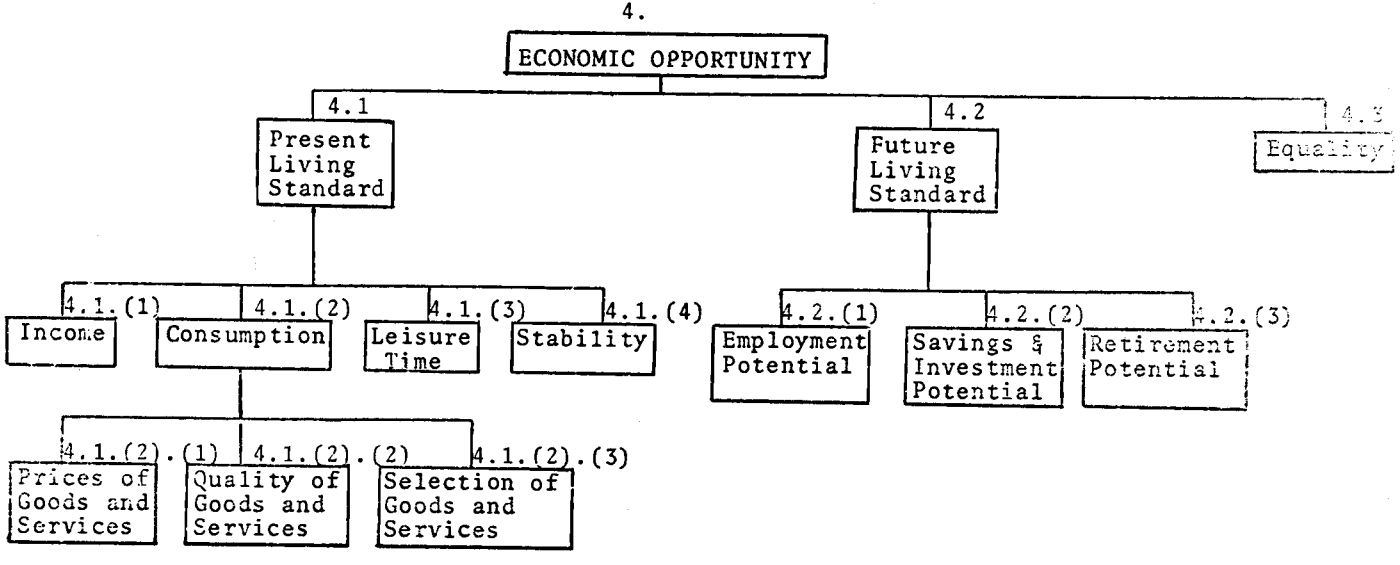
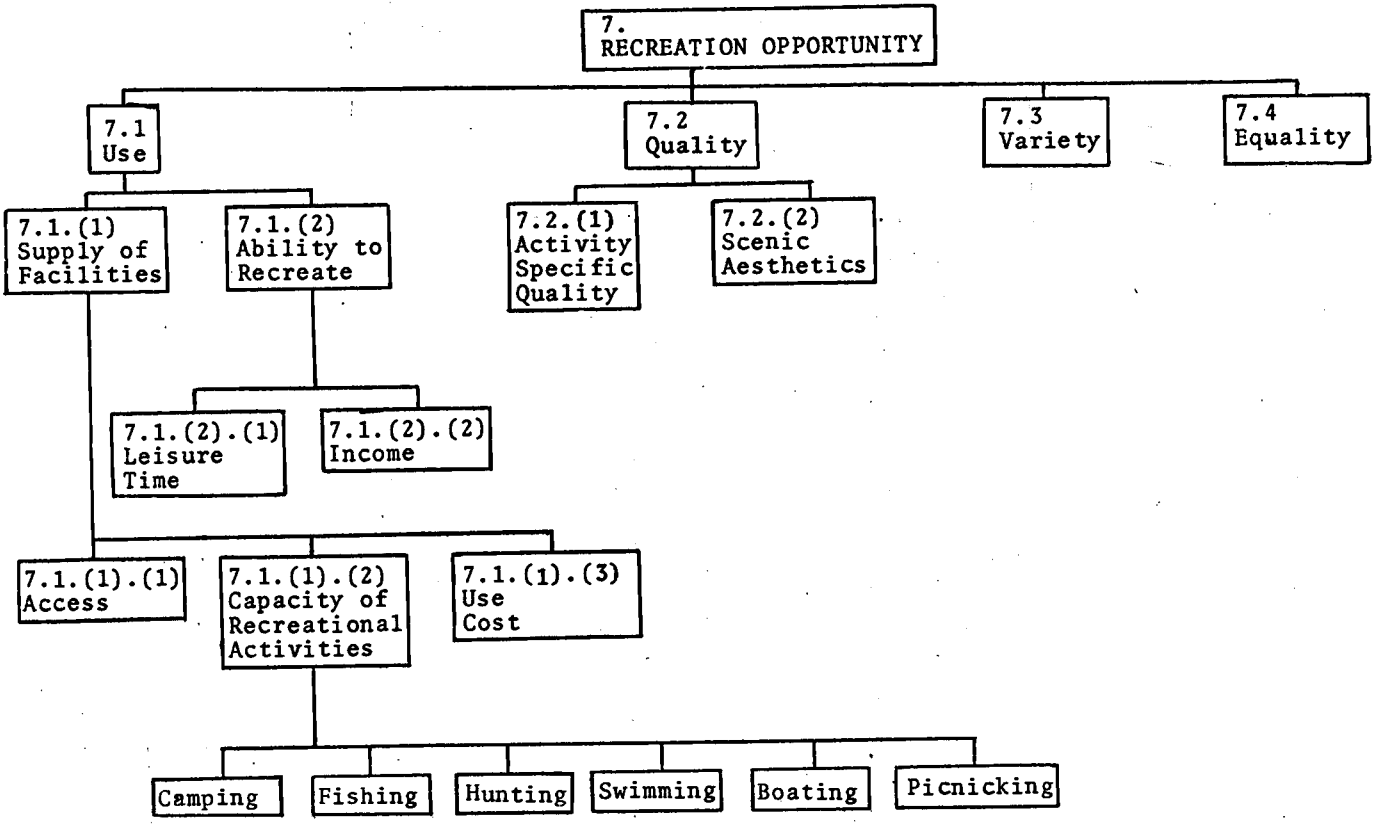


Figure V: Recreation Opportunity Goal Disaggregation



CONCLUSION

A simple model of the planning process should include the following steps:

1. Definition of the Problem
2. Information Collection
3. Development of Evaluative Criteria
4. Development of Alternative Plans
5. Selection of "Best" Plans, or less presumptuously a Set of "Good" Plans

The procedure discussed in this paper provides a fundamental framework for developing evaluative criteria, Step #3, emphasizing public input. It is hoped it will be a useful tool in evaluating societal goals by utilizing non-economic criteria. In addition, its use should aid in fulfilling the increasing demands of the populace for responsive open-channels to their planning specialists. In essence, it is an effort to supply an unfulfilled demand by the consumer of government services for planners to respond to his needs. In addition, however, it is believed the system is also compatible with the planning elite and will, if utilized, provide him with needed information to make informed decisions.

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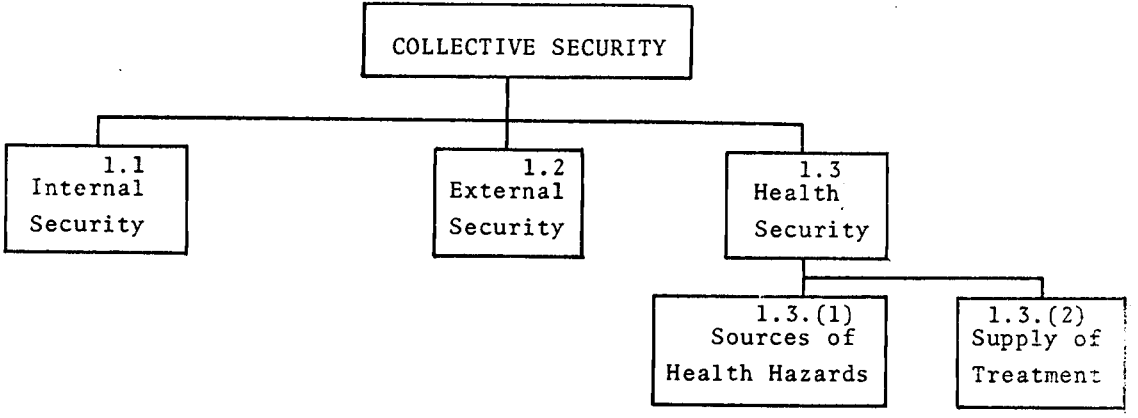
Figure VI Health Security Goal Disaggregation



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