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A CONCEPTUAL FRAMEWORK FOR RESOURCE MANAGEMENT PLANNING

By

Douglas H. Ford

B.S.F., University of Montana, 1970

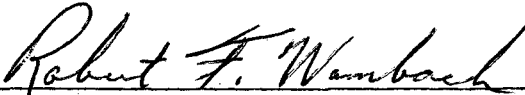
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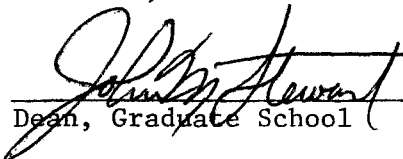
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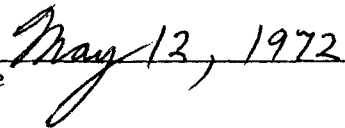
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Douglas H. Ford

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INTRODUCTION

Natural resource managers are finding themselves in the midst of a social revolution characterized by rapidly changing priorities and expanding professional responsibility. This revolution has shattered the quiet complacency of many resource managers. The public no longer exhibits an unquestioned faith in the proper stewardship of the natural resources. Americans have become greatly concerned with the quality of their environment. They now demand that those who manage this environment do so in accord with their concerns (5). Satisfying this demand for a high quality environment has created some problems in defining and justifying many resource management programs. Natural resource managers can no longer solve problems of this nature in a haphazard manner, improvising as the situation warrants. These managers must now seek to determine the future through rational analysis, and deliberately allocate resources on the basis of this analysis (14). This analytical viewpoint presupposes planning, and the necessity of planning is apparent to us all.

Well-planned management provides for the best use, or combination of uses, of the natural resources in order to meet all foreseeable human needs (9). A short time ago these needs were categorized as biological, or human existence needs, and economic, or social subsistence needs. Today, with limited natural resources and an expanding population, there

is a third category of need which encompasses variety and quality in natural resource management. This category accounts for the almost infinite array of resource uses which society desires, and the environmental quality demands of that society (13). In this light, our natural resource kingdom must be considered to be the domain of nothing less than the whole of society. The rational management of this kingdom involves a comprehensive analysis of both the requirements and the interests of that society (3).

An awareness of, and concern for, the interests of an entire society expands the scope of management beyond the immediate concern for product output, and beyond the boundaries of a specific management area. This broadening of the functional and areal distribution of professional responsibility reduces the likelihood of developing a rational management program. To meet the test of public acceptance of a management program, professional judgment has been supplanted by analytical procedures for the delineation of resource management activities (5). The most important aspect of these programs is the efficient integration of resource uses and human needs (6). In other words, these programs try to balance the various resource uses with their respective human demands. In order to achieve the desired efficiency, many resource management firms have turned to comprehensive methods of land-use planning. The last few years have seen a proliferation of methodologies in this field of planning. Unfortunately, very few of these firms have been able to grasp the conceptual framework which differentiates possible resource management plans from successful management programs.

FORMING A BASIC UNDERSTANDING

The principles of natural resource management, or any other form of management, can be reduced to one basic function. This function is one of decision-making (12). Furthermore, this decision-making function can be subdivided into three different stages, or processes, each of which occurs during the resource management sequence (2). The first of these stages is the democratic process in which goals and objectives are decided upon (2). This process is democratic in the sense that decisions are made on the basis of a consensus of opinion among top level managers. These decisions are usually value judgments concerning how a firm can best serve its own interests while providing for some human need (2). These judgments are based on information which concerns the present state of human welfare, and any evaluation of this data is a purely subjective evaluation (6). The output at this stage of the management process becomes the set of general policies which will provide direction for the ensuing management programs.

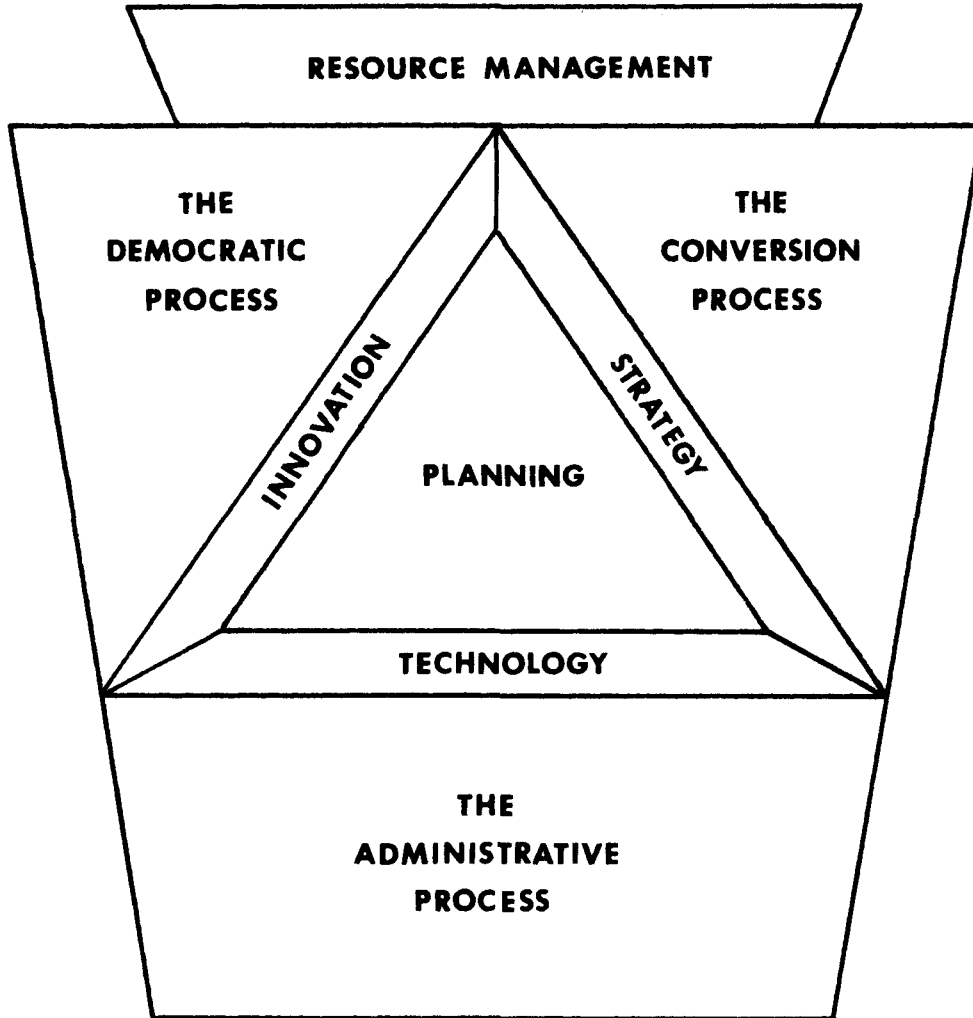
The second stage of the decision function involves a conversion process (2). It is at this stage of management that subjective inputs, or policies, are transformed into objective outputs, or action programs. During this process the management group of a resource based firm will investigate alternative means of goal achievement (8). The feasible alternatives will be identified on the basis of an objective analysis, and a preferred alternative will then be chosen (8). This decision subfunction produces a written document, or plan, which specifies how this preferred program will be carried out.

The third stage of the decision function is known as the administrative process (2). At this point in the management sequence the preferred action program is implemented. Control of this program is then maintained through the application of physical criterion which specify how the stated goals of the firm are to be achieved (2). The decisions made during this stage of management are usually concerned with the regulation of the sequence and pace of events occurring in the preferred action program (6). This stage of management is also responsible for the establishment of an information feedback and program evaluation mechanism which will monitor the level of goal achievement (6).

Planning is the mechanism which integrates the three decision-making stages of management into a single, continuous process. Planning can be thought of as an information handling device which is subordinate to each of the decision processes (2). This conceptual approach visualizes planning as a central figure in a resource management keystone (refer to figure 1). In this keystone the interface between planning and the democratic process represents the innovative role of planning. This is the role which is responsible for injecting new ideas into the democratic process through the provision of information detailing human needs (2). The boundary between planning and the conversion process contains a second role of planning which is known as the strategic role. This role involves gathering information, identifying value relationships, and enumerating alternative courses of action (2). The third side of the planning triangle symbolizes the technical role which planning must play in the administrative process.

FIGURE 1

THE KEystone OF RESOURCE MANAGEMENT¹



^{1/} The elements of resource management found in this diagram have been adapted from Driver (2), but the style of presentation is the sole responsibility of the author.

This role involves planning's responsibility for stipulating the exact actions which are necessary in the preferred action program in order to reach a desired goal (2).

In this context, comprehensive resource management planning is not considered to be a decision-making process. Planning should, however, be considered in the light of its relationship to the decision-making processes (2). The act of planning is a necessary part of each of the subdivisions of the basic management function. It is not, however, equivalent to any one of them, nor can it act as a substitute for decision-making in general (2). Planning must be defined as "an activity concerned with the systematic collection, analysis, organization, and processing of technical information to facilitate decision-making (2)." Planning has been defined as an activity, not as a process, because it is only a small part of the overall management process. Activities other than planning take place during the various stages of this process, and people other than planners perform some of the crucial steps (2).

A GENERAL MANAGEMENT SCHEME

There are probably as many different concepts of the management process as there are individuals and organizations engaged in management. It would appear obvious that some of these approaches are going to be more comprehensive and sophisticated than others (2). However, all of these approaches are usually founded on the same basic premise. This premise states that "only rarely will the natural resources provide their maximum contribution to society in their unmodified natural

state (6)." This premise may not be acceptable to some individuals, notably the wilderness enthusiasts, but it does form a basis for human intrusion into the natural production cycle. The act of manipulating this cycle, by applying human inputs to increase the capacity of the resources to satisfy human needs, can be referred to as natural resource management (6). The procedural steps of this manipulative action are emphasized in the following presentation, and are, or at least should be, ubiquitous to all resource management sequences.

Most resource management activity will find its beginnings in an unsatisfied human need for some good or service which can be derived from the natural resources. Recognizing this need (want or desire) involves forming an image of the current state of affairs in the field of resource management (8). This general overview may identify areas in which the output capacity of the resources can be increased to provide for some human need through a revision in, or addition to, management programs (6). These areas will delineate a perimeter of management concern, limit the choice of rational management policy, and suggest a possible direction for management action to follow (8). The next step in the management process involves identifying specific program direction by studying the dynamics of the resource production situation which the firm may wish to alter (6).

A study of dynamics involves identifying the relationship between the resources and the observed human need in order to establish a program which will provide for this need (6). The identification of this relationship entails the collection, correlation, and subjective evaluation of information concerning the existing physical, cultural, and

social conditions surrounding the area of management concern (6). This procedure will determine the basic opportunities and constraints which influence the choice of management action. Included here is the specification of some reasonable level of attainment in the satiation of the observed human need (8). Once these things have been defined, the management intentions of a firm can be specified by establishing some definite targets, or goals, for management action (8).

The next step in the management process converts the targets to a set of management expectations, or objectives. These expectations will include such things as a rate of return on investment, the needed and desired levels of output, and the type of effect that the firm would like to have on the resources (i.e. enhancement of value provided) (13). Once these expectations have been established, the investigation of alternatives can begin. This investigation will involve the definition of feasible alternatives, and the modulation² of these alternatives (6). The definitional portion of this step includes identifying the alternatives, estimating their probable performance, and an objective analysis of this performance in light of the firm's expectations. The modulation procedure considers the probable physical effects of each alternative, and the externalities associated with these effects. It then generates incremental variations in each alternative so that its effects will approximate the firm's desired outcome (6). This is a repetitive procedure which may, or may not, prove successful for each alternative.

²The term "modulation" has been taken directly from Hills (6), and simply means the modification of an alternative so that it more nearly expresses management's interpretation of the relevant goals.

One aspect of the modulation process is, in the author's opinion, very important, and yet it is often neglected by private resource management interests. This aspect involves the introduction and evaluation of the externalities associated with each alternative. In other words, the costs and benefits which may accrue to others, and which are associated with each alternative, should be accounted for in the firm's evaluation of each alternative (13). Government agencies consider externalities in a process which they refer to as public involvement. In private resource management situations, the consideration of externalities should probably be internalized as an attitude of public awareness on the part of the decision-makers. Regardless of whether or not this consideration is made in the form of a process, or an attitude, the final decision concerning the importance of externalities rests solely with the firm. In the final analysis, the consideration of external costs and benefits could make the difference between program success or failure, especially in terms of public acceptance of the program.

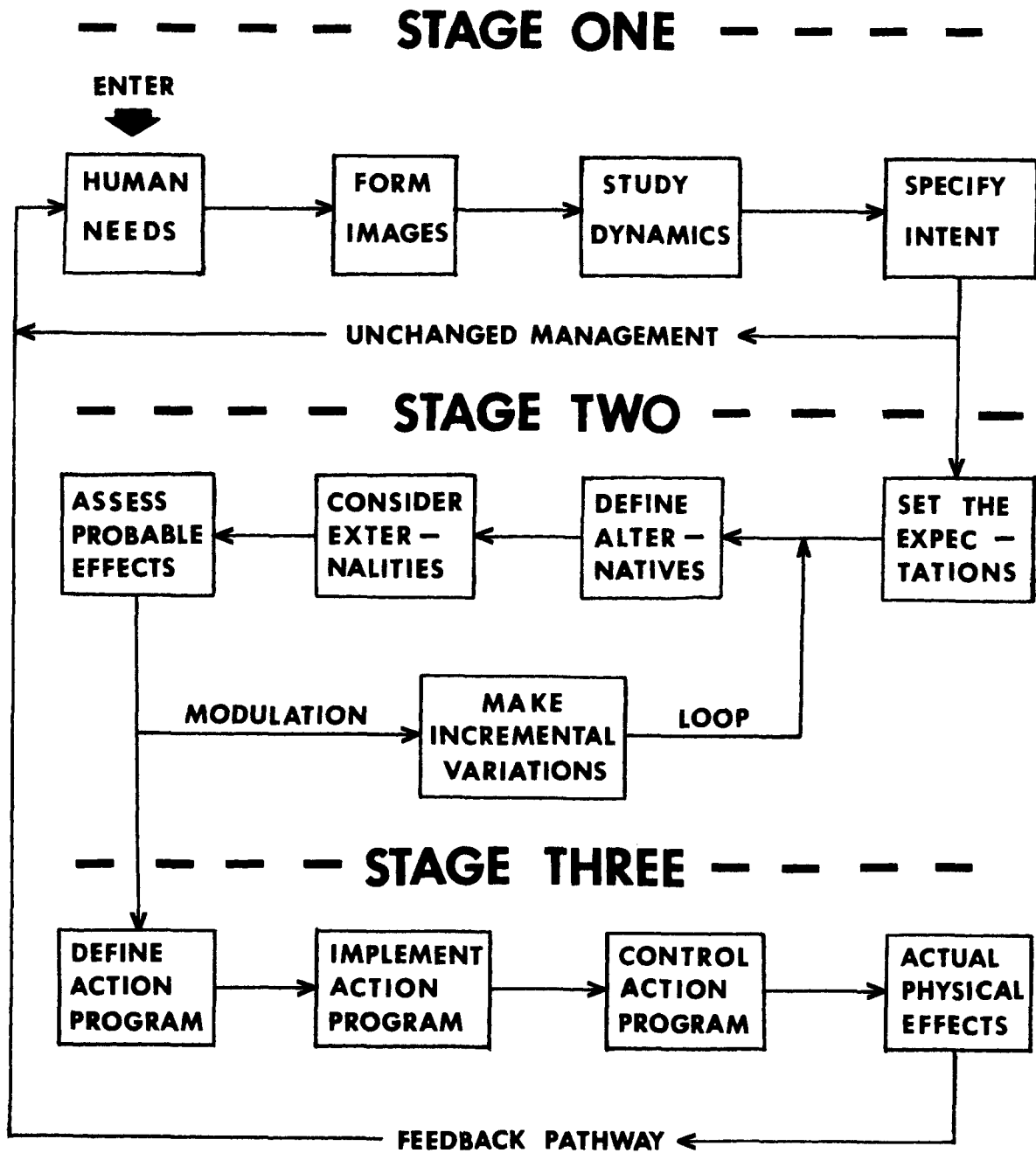
After the modulation procedure has been completed, the feasible alternatives are ranked according to their desirability, and a preferred alternative is selected on the basis of this ranking (6). After the selection has been made, the technical role of planning will stipulate the exact actions to be included in the preferred management program (6). This planned action program will then be implemented and controlled. Once the program has been set in motion and actual results begin to appear, it becomes vitally important to monitor and evaluate these results. Included here is the need for keeping track of the results as they occur (8). This need leads to the incorporation of an information

feedback pathway in the management process. This information feedback mechanism is desirable because it facilitates outcome followup, control, and revision (6). It also allows for the formation of new management images based on the success or failure of the present action program, thus making the management process a cyclic process.

A simplified schematic model of the management process has been included in this presentation (see figure 2) to aid the reader in his understanding of the author's conceptualization of this process. In the model there are designated stages which separate the various steps into their respective decision processes and planning roles. For example, stage one refers to the democratic process and the innovative role of planning. The reader will note that there is no exit point indicated in this model. It has been assumed that if a possible management direction can not be identified, exit will be made through the unchanged management loop. The exit point is the same as the entrance point in this case, hence leaving at the point of an unsatisfied human need. If, on the other hand, a possible course of action is identified and followed to an unsatisfactory conclusion, the exit will again be at the point of unsatisfied human need. In the case of an unsuccessful program the firm might elect to remain in the management cycle, hoping to find a more successful program through modulation, thus satisfying a human need. When a program is followed to a successful conclusion the firm will probably remain in the management cycle by following a course of unchanged action, or by striving for improvement through further incremental variation in the original program.

FIGURE 2

A SCHEMATIC MODEL OF THE MANAGEMENT PROCESS³



^{3/} Adapted from "Steps in the Planning Process" (8), and Forest Landscape Management, Volume One (13).

THE INFORMATION REQUIREMENT

One of planning's major contributions to decision-making is in comparing the performance of alternative management programs. In this light, a fundamental requirement of any plan is that it must represent a usable document to the decision-maker (7). This usability is determined by the information which a plan contains, and the manner in which this information is presented. A rational decision requires the best information, which it is practical to obtain, concerning the consequences of alternative courses of management action (14). The exact type of information to be provided will be determined by the purpose of the management program, and by the ability of the decision-makers and planners to recognize this relevant material. The quantity of information to be provided will be limited by the time and budget constraints involved in preparing a plan. Above all, the provision of information will be limited by the state of knowledge surrounding the subject in question, and by the ability of the decision-makers to assimilate and utilize this information (2).

The quantity and quality of information available for decision-making will, to an extent, define the type of management alternative that will be selected as the preferred action program. In the unlikely event that a decision will be made under conditions of complete information, or certainty, the preferred alternative will be the one which maximizes the net benefits to be derived through the manipulation of the resources (2). When a lesser quantity of reliable information is available, there is some degree of risk involved in making management

decisions. The alternative that is selected under conditions of risk must be the one which will maximize the expected utility⁴ of resource manipulation (2). When little or no reliable information is available for decision-making, a condition of uncertainty exists. This condition dictates that the preferred alternative should be a minimum cost alternative (2). This minimum cost should be calculated in terms of both dollar cost to the firm, and human welfare cost to the public. In any case, the information provided to the decision-maker should be of a quality that is commensurate to the importance of the decisions being made.

The reliability and validity of any management program depends on the quality of the data utilized in the analysis of the management situation (14). This data must be presented in a straightforward manner in which the pertinent facts concerning each alternative are readily apparent and comparable. Determining what information to present, and presenting it in a usable manner, is a difficult task. This task is complicated by the necessity of having to provide both technical information and qualitative information in the same presentation (14). Both types of data are needed in order to coordinate goals and action programs so that the analysis of alternatives is truly complete (14). Included in this analysis is the consideration of pertinent physical, economic, and social factors from beyond the immediate perimeter of management concern (9). The inclusion of this information concerning

⁴Expected utility is determined on the basis of probability functions concerning an alternative's payoffs and costs, and is usually founded on past experiences, or prior knowledge (2).

factors which are exogenous to the management situation will aid in the selection of a successful action program by helping to clarify some of the constraints which limit management activity.

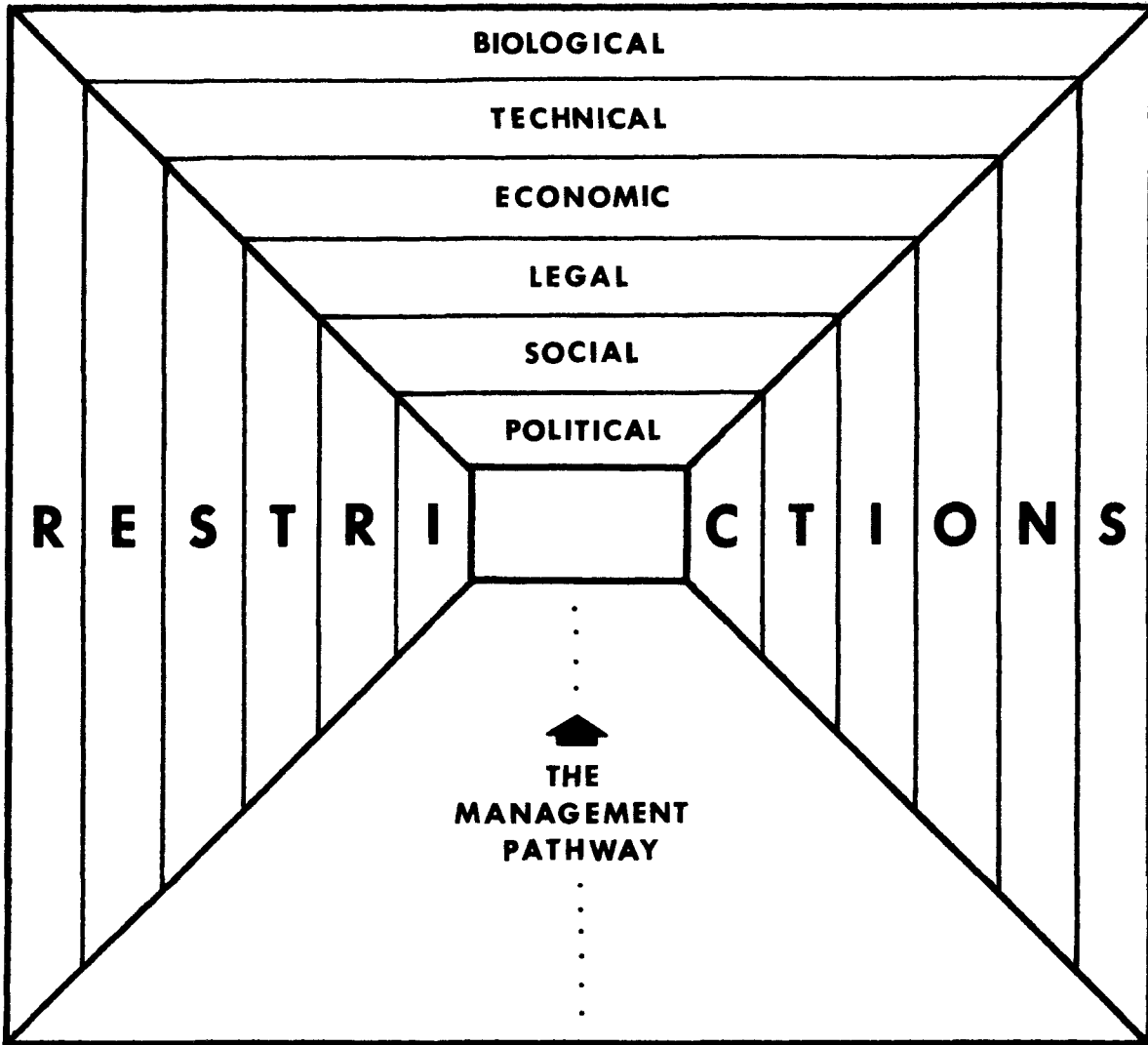
IDENTIFYING THE CONSTRAINTS

Logical resource management will strive for a high degree of integration of human needs and resource values on the local, regional, and national levels. In order to achieve this integration, private firms will have to make decisions among resource management alternatives on the basis of some system of rational choice (6). Planning is an activity which will enhance the rationality of choice by providing a sufficient quantity of reliable, high quality information to the decision-maker. Rationality, in this context, includes the presentation of alternatives whose consequences can be evaluated on the basis of a systematic appraisal of their worth (2). This systematic appraisal must include a consideration of the complex network of constraints which influence natural resource management. The influence of these constraints on a firm's choice of management programs may be either direct or indirect, but they will limit the choice of rational management activity. The limiting character of these constraints can be thought of as forming a tunnel on the road to successful resource management (see figure 3), down which the firm is directed along a constricted pathway of possible action.

The first four segments of the constraint tunnel consist of factors which have a direct influence on management choice. Private resource management firms have considered these four units as the set

FIGURE 3

THE MANAGEMENT CONSTRAINT TUNNEL⁵



^{5/} The various constraints (restrictions) shown here are found in Hills (6). The tunnel concept was developed for this paper.

of constraints which had to be negotiated in order to develop a successful management program (6). The first step in negotiating this portion of the constraint tunnel was to identify those management actions which were compatible with nature, or which were biologically possible. Once this identification was made, the second step along the tunnel called for the elimination of those actions which were not technically feasible. The third step down the tunnel of constraints involved the elimination of those biologically and technologically possible actions which would prove to be uneconomical in practice. The fourth segment in this first portion of the tunnel required the firm to establish an order of legal availability⁶ among the remaining management options. This step involved the elimination of those alternatives which would have proved to be illegal if practiced (6).

In this initial conceptualization of the constraint tunnel the only factors introduced to account for human welfare were those of economic demand and legally defined patterns of acceptable behavior. The continuing social revolution has promulgated acceptable patterns of behavior which far exceed those presently defined by law. These new behavioral patterns, along with a declining importance of purely economic factors in the market place, have created some additional management considerations. These additional considerations have expanded the private firm's initial constraint tunnel by including two new steps involving indirect management influences. Unlike the direct

⁶An order of legal availability "consists of a clear and exact assignment of each resource and action to some specific person or persons, and of an exact match between the acts one person expects and the acts other persons are required to perform (6)."

influences which have been mentioned above, these new influences are much more subtle in their effects on management choice. They will involve the firm in a consideration of externalities of production, and in an estimation of how society will greet a new or additional program of resource manipulation.

In the expanded version of the constraint tunnel the fifth step will involve the firm in a consideration of social constraints. These are the constraints which may limit management activity to those actions which will not interrupt the mutual interdependence of the individuals who comprise the human ecosystem (6). In other words, a firm should try to minimize those management activities which disrupt the delicate balance between the desirability of having an economic livelihood through resource utilization, and the right to an untrammelled environment. This is where externalities come into play through the consideration of such things as the possible pollution which may result from choosing an inept course of management action. The sixth step in the expanded version of the constraint tunnel deals with political constraints. The consideration of political constraints involves the formation of a compromise between conflicting resource utilization interests so that the public will not greet a new program with negative comment. In other words, various desirable resource uses, or manipulative actions, must be adjusted and/or combined in arriving at an orderly, reasonable, and acceptable management program (15).

In this conceptualization, social and political rationality have been placed in positions of greater importance than the more traditional and direct management constraints. In the final analysis, well

planned management should be directed toward humanistic, as well as materialistic goals. Decisions concerning these dual purpose goals are made in the context of human welfare, and ultimately become value judgments (6). As important as technical and economic considerations are, a cultural rationale is just as important to the definition of a successful management program. By considering social, political, and physical aspects of possible management programs, an astute manager can provide the greatest good to his own firm, and to society in general (6).

COMPLETING AN ECONOMIC ANALYSIS

Many individuals will maintain that the development of our natural resources is an essential component of economic growth. Furthermore, some of these individuals will maintain that continued extensive development of the natural resources is in the best interests of the nation as a whole (9). This viewpoint assumes that one of our primary national goals is perpetual economic growth. Society is vigorously examining the relationship between this growth and the quality of life. It may well be that economic growth, with all its consequences, should no longer be expanded upon in an indiscriminate manner (3). If you consider pollution, including audio and visual pollution, as a diseconomy of growth, then the treadmill of growth is responsible for some of the problems facing resource managers today (3). It would appear that at least some of these problems could be alleviated by substituting management programs that are designed to optimize net human welfare for those which employ extensive resource development.

A major objective of comprehensive resource management planning is the design of programs that will optimize net human welfare (4). Unfortunately, most resource management programs in the private sector have been designed on the basis of some accounting system which tends to substitute purely economic considerations for those of total human welfare (5). A comprehensive planning approach to program design is based on an economic analysis of society's requirements for goods and services provided through resource utilization. However, this analysis does not stop with an evaluation of the market place, for it also goes on to consider the more esoteric quality needs of society (9). Comprehensive management programs serve a variety of preferences, and include the quality aspects along with the productivity aspects of resource manipulation (4).

The consideration of quality in resource management must not be divorced from the normal resource planning considerations. These quality aspects of resource management are necessary components of truly comprehensive management programs (13). To a private firm the most efficient use of a resource is the use which produces the required goods and services at the least possible cost (6). Quality considerations appear to be adding costs which reduce the efficiency of private resource management programs. However, quality resource management involves utilizing those lands and resources which can absorb human inputs without noticable ecological effects (6). This utilization should be based on the highest and best use of each resource. The highest and best use will employ the inherent capacity of the resources to produce goods and services that are desirable to man (6). In this light, the

consideration of quality does not add to the costs or reduce efficiency of management, rather it aids in the development of capital intensive management programs. Private firms must base their activities on capital intensive management programs in order to achieve efficient resource utilization. In the final analysis, the assessment of resource capability and suitability, along with market demand and supply, will determine land allocation and resource utilization (6). This four-way assessment is necessary for a complete economic analysis in resource management planning.

THE ECOLOGICAL CONTRIBUTION

A comprehensive resource management plan includes an inventory of resource characteristics. This inventory, along with a knowledge of ecosystems, provides some of the necessary background for resource management. These ecosystems form the basic building blocks of nature, and are the primary production units in any resource management program (6). They are dynamic and complex systems whose end products are greater than the sum of their individual parts. They are usually characterized by a central core or dominating feature, but they operate in a pattern of circular causality and resultance (6). Ecosystems are in a delicate natural balance which makes their management by man an extremely difficult task. Man, through his manipulative actions, may be able to destroy an ecosystem, while only nature can create one.

Sound resource management programs are developed on the basis of an analysis and synthesis of ecological principles. These principles deal with the nature of the ecosystems in the management area, and the

relationships which exist within and between these systems (6). The selection and implementation of a preferred action program is guided by an ecological perspective. This perspective can be gained only by coupling a knowledge of ecosystems with an awareness of their sensitivity (6). Combining ecological principles with an ecological perspective will aid in the organization and management of a resource property. A private firm should subdivide its properties into ecologically homogeneous communities which are capable of uniform response to a given treatment (6). These treatments, however, may not be mutually exclusive in their effects (11). There may be, and usually are, some effects of resource manipulation which will extend beyond their intended limits, and which are undesirable to both the managing firm and its neighbors. Hence, it is important for the firm, and the individual manager, to understand the specific ecological effects of various alternative resource management activities. In order for a firm to achieve optimal returns and highest resource use, that firm must consider the set of community interrelationships which may influence, or be influenced by, its management activities (6).

The management implications of community interrelationships and non-exclusive treatments are very important, especially when one considers a single resource property such as an industrial forest. These ecological factors do not permit a firm to assume that the effects of its timber management activities are exclusive to its industrial forest property. Instead, these factors lead the ecologically aware firm to conclude that any management activity it undertakes will also effect adjacent land ownerships, and even the national park which may be one

hundred miles downstream. It would appear that management activities which are carried out in a specific resource area⁷ are not isolated from actions in other related and concerned resource areas (1). An ecological perspective implies that resource management, even when directed toward a single end, is multiple use management because more than one resource use can be affected (11). The ability to assess interrelated and external biological effects of resource manipulation is the major contribution of ecology to comprehensive resource management planning.

AN UNDERLYING PROBLEM

The development of a successful management program depends on the existence of three prerequisites. These prerequisites are: clearly established goals; alternative means of pursuing these goals; and a basis for choosing among the alternatives (12). Where free choice of management action exists, alternative means of pursuing goals are usually quite abundant. Several authors, notably Messrs. Thompson and Richards (12), are convinced that the greatest problem in developing a successful management program arises in choosing among the alternatives. These same authors identify this problem as being one of deciding which alternative performs best according to the criteria set forth in the firm's expectations (12). When it is applied, the strategic role of comprehensive planning becomes the means by which this problem can be overcome. Unfortunately, a second and more insidious

⁷The term "specific resource area" is used to denote both geographical areas such as an industrial forest, and areas of management endeavor such as the field of timber management.

problem may exist in the development of a successful management program. This second problem pertains to the difficulty which may be encountered in establishing meaningful goals.

A firm's goals should be specific enough to provide management direction, without being so rigid as to deny flexibility in management action (12). The act of defining meaningful goals is really nothing more than policy planning, and is undertaken in much the same manner as planning an action program (15). This last statement implies that a rational decision-making system can be employed to establish goals. Pressman (10) cites many authors who are of the opinion that rational decision-making and meaningful goals are extremely rare in the real world. These authors insist that incremental response, satisficing schemes, and heuristic processes are more realistic means of decision-making and goal formation. In defense of their theories, these authors claim that rational decision-making is dependent upon a coherent statement of the "public interest," and this statement is non-existent (10). Furthermore, due to the dynamic nature of society, all goals will be in a constant state of flux, and therefore are probably undefinable. This type of reasoning is nothing more than an ideological reinforcement of the pro-inertia and anti-innovation forces which are prevalent in most management organizations today (10).

One can appreciate the idea that the nature of a firm's goals will determine the nature of the processes and actions which follow. A comprehensive land-use management plan is a reasoned strategy for pursuing a set of resource management goals (15). Without meaningful goals the decision-maker has no reason for preferring one alternative

to another in developing a planned action program (10). This line of thought implies that goals must be clearly defined, and that decision-making does proceed on the basis of rational choice. We now have both sides of a controversy which centers on the problem of goal setting, and which hinges on the question of what a goal really consists of? Webster's New Collegiate Dictionary defines a "goal" as "the end to which a design trends." Young (15) points out that this definition says "trends" and not reaches, or achieves. His point is well taken because there are no goals which are final ends unto themselves (15). A goal simply provides a reason for management to travel in a certain direction, and is not a destination which must be reached. Young (15) goes on to state that in many cases a goal is an ideal which is expressed in abstract terms, imbued with intrinsic value, and often makes competing demands on the same limited resources. These latter characteristics appear to be the cause of the problems which are encountered in defining meaningful goals.

Before a meaningful goal can be selected, there must be a will to choose a goal in a particular area of resource manipulation. This choice must then be made on the basis of a firm decision if the job is to be done intelligently (15). If one believes in the value of rational decision-making then the prescription for clear, meaningful goals and good company policy is an easy one to follow. This prescription calls for a decision-making system which is sufficiently centralized so as to allow one decision-making unit to evaluate goals on the basis of some widely endorsed priorities (10). This decision-making unit is the one which is involved in the democratic process, and these widely

endorsed priorities are supplied by the innovative role of planning. The abstract terms, intrinsic values, and competing demands which appear in these priorities can be handled by providing the decision-making unit with reliable background information which clarifies these factors (10). The dynamics of our continuing social revolution can also be handled in a rational manner. By setting a policy planning horizon at infinity, goals can be evaluated on a sustained basis, rather than at a given point in time (11). The sustained evaluation of a firm's goals can help to insure that our society's changing priorities will be accounted for in the overall management process.

The belief that most management problems are caused by an inability to define meaningful goals is, in this author's opinion, unrealistic. Students of policy formation who advocate incremental or satisficing schemes for goal selection resemble doctors who treat symptoms without diagnosing the disease. The tools needed for defining meaningful goals are already available. The problem is not the inability to define meaningful goals, rather, for many managers, it is an unwillingness to commit themselves to a specific goal. This is a problem which is usually thought to be more prevalent in public resource management, but it can be just as prevalent in the private sector. Insofar as can be determined, this problem can be overcome by a management atmosphere which encourages innovation and responsible action. If the atmosphere is one which stifles these qualities, managers will become nothing more than automatons, unable to challenge the status quo. If this occurs, meaningful goals do become a very scarce commodity!

COMPLETING THE FRAMEWORK

A successful resource management program for private enterprise will be one which serves the best interests of the firm, while providing for total human welfare (6). In all probability, this program will be one which maximizes profits, tries to remain unencumbered by governmental controls, and appears as an organized corporate effort for the socio-economic betterment of the general public. In seeking a program of this nature, decision-makers should begin by asking themselves some very basic questions. These questions⁸ are:

- Is the resource property being utilized as fully as is economically feasible and socially desirable?
- If not, what changes and/or adjustments should be made in the management program?
- What basic factors must be considered in order to define and justify a new management direction?
- What is the context within which the answers to these questions will be sought?

The reader can foresee the difficulties which will be encountered in answering these questions. Even when these questions are answered in an intelligent manner, a successful management program can not be guaranteed. To err is to be human, and resource managers are human.

G. Angus Hills (6) has developed a fairly involved, scientific method of program design which strives to answer these basic questions. Although originally intended for use by public agencies, this system

⁸Adapted from: R. K. Belknap, J. G. Furtado, R. R. Forster, and H. D. Blossom. 1967. Three Approaches to Environmental Resource Analysis. The Conservation Foundation, Washington, D. C. pp. 7-8.

also lends itself to the design of private land management programs. The method is basically a three step ecological approach to total resource management. The first step calls for a physiographic division of the resource property into the smallest possible landscape units having any ecological homogeneity. These subdivisions are referred to as physiographic site units (6). These units are then related to a predetermined set of general land-use categories. This relationship is firmly established in the second step of Hills' method. In this step an estimation is made of the highest intensity and type of use that can be economically maintained, without any site deterioration. The final step of Hills' system involves grouping the individual sites into larger management units which lend themselves to the firm's management policies. Once this grouping has been accomplished, decision-makers can go on to make general recommendations for preferred action programs (6).

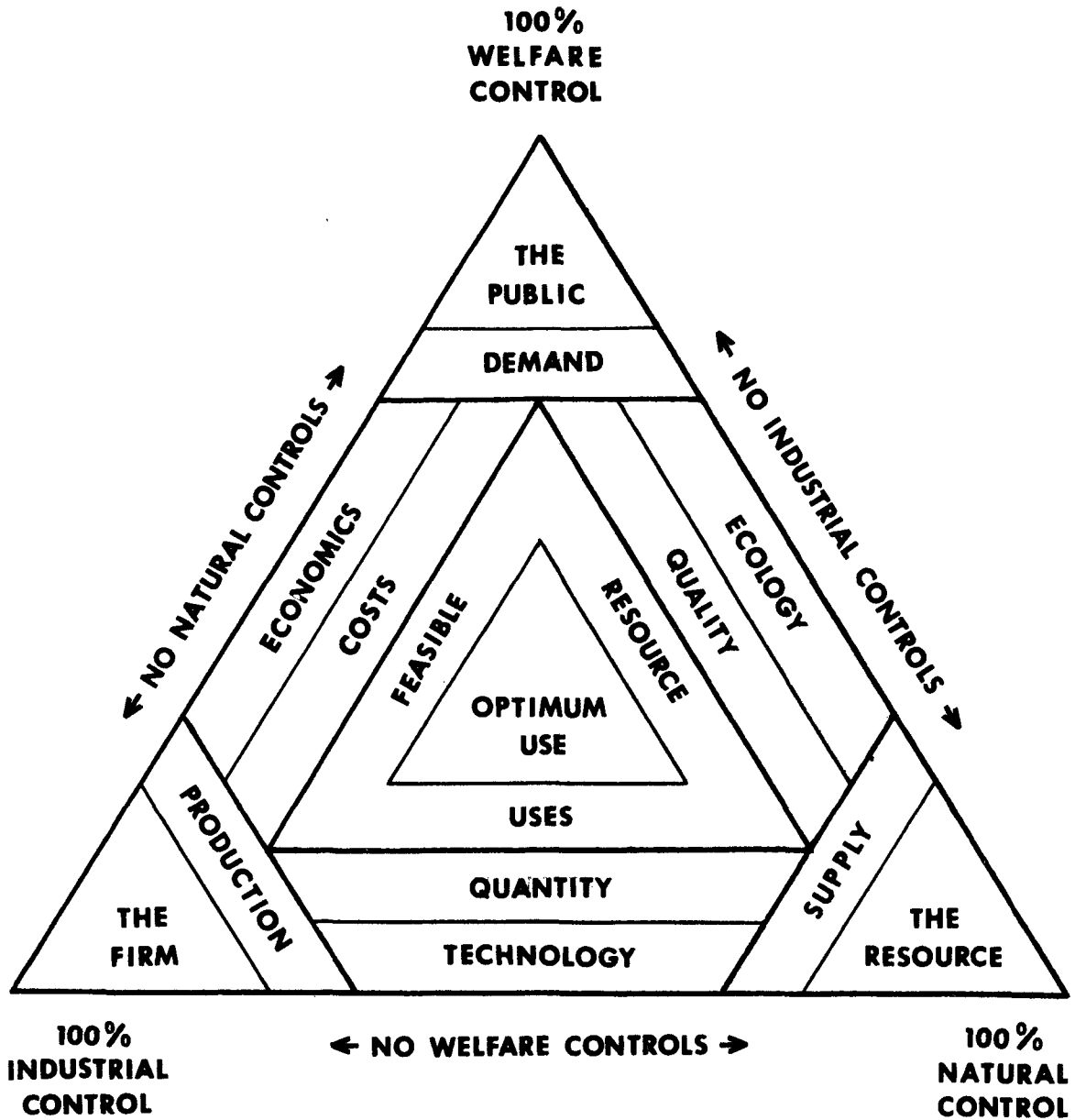
In reality, Hills' system is a simple extension of the basic site evaluation procedure which every forester is familiar with. Hills' new evaluation involves the usual biological growth analysis, plus indepth soil and climate analyses, and an analysis of the geomorphology of each site. The unique aspect of Hills' system lies in the determination of the potential productivity of each site. Hills not only evaluates each site's use capability, he also evaluates the use suitability and feasibility of each site. Hills considers use capability to mean the potential production of goods and services from an area when it is under specified types and levels of economic and technical control. Use suitability is defined as "the relative ability of a specific area in

its present condition to produce specified goods and services (6)." To Hills' way of thinking, use feasibility refers to the relative advantage of managing an area under the existing and forecast socio-economic conditions. If a firm has extensive land holdings, a complete evaluation of all property would become quite costly and time consuming. The solution to this problem lies in selecting areas which exhibit extreme physiographic conditions, and then collecting data in "local reference areas surrounding these bench mark sites (6)." Once this procedure has been completed, the remaining land area can be classified and evaluated by extrapolation, and spot checks can be made to determine the accuracy of this extrapolation procedure.

Underlying the theme of Hills' method of program design is an implicit recognition of three elements which will ultimately control resource management. These basic elements are: the public; the firm; and the resource base. Taken together, these elements form a set of control points which restrict resource utilization (6). The triangular framework of resource management (see figure 4) considers these biological, industrial, and human welfare controls which form the basis of Hills' program design system. It is within the context of this triangular framework that resource managers must carry out their responsibilities. If any one of the control points is removed from the framework, or ignored, realistic management of the natural resources becomes non-existent (6). Once the resource manager accepts the idea that he must work within this conceptual framework, his job of planning successful resource management programs is fairly well defined. Within the framework, the key to intelligent resource management is found in

FIGURE 4

THE TRIANGULAR FRAMEWORK OF RESOURCE MANAGEMENT⁹



^{9/} Adapted from: G. Angus Hills, Developing a Better Environment (6).

the word "balance." A conscientious resource manager will seek to balance supply, demand, and production. This balance must be sought by combining the fields of economics, ecology, and technology; and requires the manager to make quality, quantity, and cost considerations (6). A well planned, balanced, resource management program will fall in the realm of feasible resource use, and will hopefully achieve the perfection found in the area of optimum resource use.

CONCLUSIONS

The demand for quality in resource management is one of the most pervasive aspects of our continuing social revolution. As a panacea for this demand, natural resource managers have developed methods of comprehensive land-use planning and interdisciplinary approaches to resource management. Government agencies have even exposed their resource management programs to public review at all stages, from images to outcomes, in an attempt to discover how to satisfy this demand (8). Yet, with all of the devices for attaining rational, comprehensive management programs, resource managers have lost sight of their primary objective. They have become immersed in technology, ecology, economics, and politics, and have forgotten the greater value of the concept of total human welfare. Most resource managers are guilty of this crime. They have failed to recognize that their field is made up from a combination of science, technology, and philosophy. The combination is conceived in the context of human welfare, where decisions are ultimately made as value judgments (6). It is in this light that a framework for resource management planning must be developed.

If private enterprise is going to remain in a position of having broad responsibility for the nation's resources, then its stewardship is going to have to extend beyond the market place and political arena. The resource management programs of private enterprise will have to provide the goods, services, and experiences which society is now seeking. In providing these items, resource managers are going to have to engage in some creative thought in order to make a long-run contribution to society (3). This creative thought is going to move private enterprise away from the conventional interpretation of industrial development, and call more attention to the problem of total human welfare (7). The resource manager, along with other decision-makers, will have to challenge the herd psychology in order to confront this problem (1). Challenging the herd psychology means that resource managers must place more emphasis on the "whys" of program design, rather than continuing to focus on the "hows" of resource manipulation (15).

The ideal management program which has been alluded to in this paper is described as well planned, justifiable, and successful. A combination of ecological land-use planning, rational decision-making, and comprehensive constraint analysis has been offered as a possible means of designing programs to fit this description. The object of this paper has been to propose a theoretical framework for program design. The suggested framework is involved with the interrelationships of three factions which lie at the heart of all resource management programs. These factions are: the firm; the public; and the resource base (6). These factions form the control points around which a triangular management framework has been built. The resource manager

must seek to balance the demands of each of the factions in developing a successful management program within this framework. Hopefully, this balancing will provide programs which are successful in terms of being ecologically sound, publically acceptable, and financially rewarding.

The theory of seeking balance within a triangular framework has been suggested by the idea that all resource management programs can be based on general equilibrium analysis. This idea is implicit in public resource management programs, but needs to be made explicit in the private management realm. Time has taught managers to beware of programs which yield optimal results for each division of a firm, especially when these programs are designed on a division by division basis. The danger lies in the fact that programs designed on this basis do not account for each division's effects on the rest of the firm. In many cases, this situation produces results which are far from optimal when the company is taken as a whole. Substituting the three factions of resource management for the divisions of the firm leads to the conclusion that a balance of demands between these factions will provide for optimum resource utilization. What we are really suggesting is that a firm's management programs can not be determined in isolation from public desires and/or nature's principles. Instead, these programs must be designed by comparison with other programs which compete for, or dominate, the limited production capacity of the natural resources.

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