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ALTERNATIVE APPROACHES TO THE ORGANIZATION OF PUBLIC PROPRIETARY INTERESTS*

VINCENT OSTROM**

INTRODUCTION

The structure of property rights in natural resource development is undergoing a basic shift to public ownership and the supply of resource services and amenities by intermediate public suppliers. Many of these services, including maintenance of environmental qualities, are not subject to provision as marketable commodities. Nor are they subject to exclusive ownership and control by individuals as private properties. Many environmental qualities and resource services are subject to joint use or consumption by communities of individuals. Where exclusive control is infeasible, the supply of such environmental qualities and resource services is likely to be secured through public instrumentalities. If property rights are viewed as the terms and conditions for asserting claims to anything of value, we are confronted with the task of determining how recourse to public solutions is likely to affect patterns of resource development and utilization.

Reliance upon public sector solutions requires careful assessment of the consequences that are associated with public or nonmarket arrangements. Ironically, the organizational principles applicable to public proprietorships are being seriously disputed at a time when increasing reliance is placed upon public sector solutions. Different schools of thought engage in different diagnostic assessments and formulate different prescriptions for dealing with problems of institutional weakness and failure in the public sector.¹ These issues are the subject of paradigmatic dispute in the study of public administration and political science.

Any consideration of the changing nature of property rights in relation to resources and environmental qualities must give attention to these different approaches to problems of public sector organiza-

*An earlier version of this paper was prepared for presentation to the National Water Commission. A fuller presentation regarding the structure of water rights and the development of public organizational arrangements in California is available in my Institutional Arrangements for Water Resource Development 207-304 (1971).

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1. For a fuller discussion of these issues see my Alabama lectures on The Intellectual Crisis in American Public Administration (1973).

tion. This paper will compare two different approaches to the analysis and design of public organizational arrangements. The traditional approach to public sector organization has been formulated in the principles of public administration and enunciated in various administrative reorganization efforts over the last several decades. This approach has been challenged by a number of political economists who have developed a different mode of analysis for dealing with public organizational arrangements.

The two approaches depart from different premises and rely upon different primary concepts. The conclusions derived from the two approaches are often at sharp variance. The traditional public administration approach uses government as the basic unit of analysis and relies upon the concept of hierarchy as basic to the organization of administration. The approach of political economists uses the individual as the basic unit of analysis, relying upon the concepts of externalities, common properties and public goods to characterize situations involved in the provision of public services. The two view differing organizational arrangements as appropriate to provision of public goods and services. The potential applicability of one or the other approach to problems of public organizational arrangements is important, since different concepts give rise to different design possibilities.

Careful assessment should be made of the consequences that are likely to follow from different types of public organizational arrangements, because unless we know the consequences, the decision to go "public" can exacerbate rather than alleviate problems of resource development and utilization.

THE TRADITIONAL PUBLIC ADMINISTRATION APPROACH

In his essay on *The Study of Administration* Woodrow Wilson layed the foundations for a new science of administration based on a radical distinction between politics and administration. According to Wilson, governments may differ in the political principles underlying their constitutions, but principles of "good" administration will be much the same in *any* system of government. "So far as administrative functions are concerned, all governments have a strong structural likeness; more than that, if they are to be uniformly useful and efficient, they *must* have a strong structural likeness."²

Good administration, according to Wilson, will be hierarchically ordered in a system of graded ranks, subject to political direction by heads of departments at the center of government. The ranks of

2. Woodrow Wilson, *The Study of Public Administration*, 2 Pol. Sci. Q. 218 (1887).

administration will be filled by a corps of technically trained civil servants "prepared by a special schooling and drilled, after appointment, into a perfected organization, with an appropriate hierarchy and characteristic discipline. . . ." ³ Efficiency is attained by perfection in the hierarchical ordering of a technically trained public service. Efficiency is also conceptualized in economic terms: "the utmost possible efficiency and at the least possible cost of either money or of energy." ⁴

Wilson's basic theoretical suppositions can be stated as follows:

1. There is but one rule of good administration for all governments alike.
2. Perfection in hierarchical ordering of a professionally trained public service is the one rule of good administration.
3. Perfection in hierarchical ordering will maximize efficiency as measured by least cost expended in money or effort in realizing policy objectives.

The study of public administration developed within this framework of suppositions proposed by Wilson. When confronted with the task of establishing or reforming public organizational arrangements, practitioners engaged in traditional administrative surveys relied upon certain principles of organization. These principles include: 1) unity of command, 2) span of control, 3) departmentalization by major functions of government, 4) assignment of subordinate authority to single heads of units, and 5) centralization of staff and management functions in the chief executive. ⁵

Over the past several decades, thousands of administrative surveys and reorganization proposals have been made based upon these theoretical presuppositions and principles of organization. The standard format of such surveys begins with a diagnostic assessment of problems and pathologies which are assumed to be associated with proliferation of agencies, fragmentation of authority, overlapping of jurisdictions and duplication of services. Duplication of services and overlapping jurisdictions are presumed to be *prima facie* wasteful and inefficient. Particularistic interests are viewed as special interests, which are necessarily biased, in contrast to the public interest, which takes account of the general interests in a community. Only those who represent the general interest are thought to possess objectivity in development of public policy.

Based upon this diagnosis of social pathologies, reforms are pro-

3. *Id.* at 216.

4. *Id.* at 197.

5. J. Pfiffner, *Public Administration* (1946). See Ch. 5, *The Principles of Administrative Organization* 65 et seq.

posed which would eliminate the proliferation of agencies, fragmentation of authority, overlapping jurisdictions and duplication of functions. Large jurisdictions are preferred to small. General-authority agencies are preferred to limited-authority agencies. Centralized solutions are preferred to authority diffused among diverse decision structures.

The 1966 report by the Committee for Economic Development on Modernizing Local Government illustrates this mode of analysis. The CED report restates many of the standard propositions in its assessment of the pathologies inherent in the fragmentary structure of American local government. It then recommends: 1) the elimination of 80 per cent of the units of local government in the United States; 2) severe curtailment of the number of overlapping layers of local government; 3) severe reduction in the number of locally-elected officials; and 4) reliance upon a "single chief executive . . . with all administrative agencies and personnel fully responsible to him."⁶

Considering how to revise the boundaries of local government, the CED report concludes that "this function is wholly inappropriate to the local units themselves; they lack objectivity."⁷ In a similarly reasoned essay on "Federal Grants and the Reform of State and Local Governments," Terrance Sandalow concludes that:

The question of how state and local governments are to be reformed and reorganized is not, in short, one with respect to which Congress can properly remain indifferent. A judgment that strengthened state and local governments are necessary to enable *the nation* to cope adequately with *its urban problems* must rest ultimately upon some conception of the roles which state and local governments are expected to perform in the years ahead. *Responsibility for defining these roles appropriately belongs with Congress and the President as the most broadly representative of our political institutions.*⁸ (Emphasis added.)

The cumulative thrust of these analyses is to judge citizens and their local elected officials as incompetent to organize their own public instrumentalities. By implication Congress and the President should be vested with authority to make such decisions. Perhaps the ultimate solution in this tradition is to extend the authority of the President under the Administrative Reorganization Act to initiation of reorganization plans for all state and local governments, subject

6. Committee for Economic Development, *Modernizing Local Government* 17 (1966).

7. *Id.*

8. T. Sandalow, *Federal Grants and the Reform of State and Local Governments*, in *Financing the Metropolis* 193, J. Crecine ed. (1970).

only to Congressional veto. Such a possibility is but one step away from the conclusion in one study which suggests:

If the American federal system is to be truly a *system* (their emphasis) of relationships, rather than a jumble, it must be guided by a consistent set of principles. That guidance can come from *a single source of authority—the President* (emphasis added). He must define the principles and apply them in the legislation that he proposes and the way that he directs the execution of the laws.⁹

THE APPROACH OF THE CONTEMPORARY POLITICAL ECONOMISTS

Since World War II the traditional public administration theory of organization has come under increasing attack. Several efforts have been made to reformulate organization theory. The approach that appears to offer the most promise has been developed by a number of political economists who were concerned with public expenditure and public investment decisions and the implications that such decisions have for efficient resource allocation in the American economy. Typically, these political economists 1) use the individual as the basic unit of analysis, 2) use the theory of externalities, common properties and public goods to define the structure of events relevant to public administration, 3) analyze the consequences that different organizational or decision-making arrangements have upon the output of public goods or services, and 4) evaluate these consequences by whether or not the outcome is consistent with the efficiency criterion.

Model of Man

Most political economists base their work on methodological individualism and use the perspective of a representative individual or set of representative individuals in their analyses. Assumptions about the individual normally include reference to 1) self-interest, 2) rationality, 3) information, 4) law and order, and 5) the choice of a maximizing strategy.

The assumption of self-interest implies that each individual has preferences which affect the decisions he makes, and that those preferences may differ from individual to individual. Rationality is defined as the ability to rank all known alternatives available to the individual in a consistent manner.¹⁰ Assumptions about information usually refer to three levels of information, certainty, risk, and uncer-

9. *Organizing U.S. Social and Economic Development* 30, Pub. Ad. Rev. 625, 630 (1970).

10. See A. Downs, *An Economic Theory of Democracy* (1957) for an excellent statement of these assumptions.

tainty.¹¹ Under certainty or risk, an analyst can project a relatively determinant solution to a particular problem. Under conditions of uncertainty, the determinateness of solutions is replaced by conclusions about the range of possible solutions.

Once uncertainty is postulated, it may be further assumed that an individual learns about states of affairs as he develops and tests strategies.¹² He estimates the consequences of strategies. If the predictions prove to be accurate a more reliable image of the world is established. If predicted events fail to occur, he is forced to change his image of the world and modify his strategies.¹³ As the individual learns, the assumption of rationality may also have to be modified to allow for a reordering of preferences to reflect his more accurate assessments of the opportunity costs inherent in different alternatives.

An assumption of uncertainty also implies that one of the essential considerations in the design of organizational arrangements is development and use of information. Planning and deliberation are activities that seek to clarify alternatives and their consequences. Essential characteristics of organizational arrangements are the extent to which they evoke or exclude relevant information and the effect they have upon the error proneness of decisionmakers.

Classical economic theory postulates that economic man will act within the limits of "lawful" conduct. Most analysis by political economists is predicated upon some condition of law and order where basic definitions of rights, duties, privileges and exposures exist. Some basic constitutional settlement is assumed to exist either in the larger political environment or among segments of the domain being considered. In short, some political structure is assumed to provide a context for analysis. In the absence of any law and order assumption, it might be necessary to assume a Hobbesian state of war as the prevailing human condition.

The assumption that individuals will adopt a maximizing strategy implies an individual will consistently choose those alternatives he thinks will provide the greatest net benefit as weighed by his own preferences. This can also be expressed as the choice of the least-cost strategy and is equivalent to the efficiency criterion. Maximization under uncertainty is not possible in a formal mathematical sense. Yet, it is possible to assume that individuals will *attempt* to maximize subject to uncertainty. An individual who pursues a maximiz-

11. F. Knight, *Risk, Uncertainty and Profit* (reissued 1965).

12. Simon, *Theories of Decision Making in Economics and Behavioral Science* 496, *Amer. Econ. Rev.* 253-83 (1959).

13. G. Shackle, *Decision, Order and Time in Human Affairs* (1961).

ing strategy in the absence of knowledge of all alternatives and of the costs of learning about added possibilities would act as if he were "satisficing."¹⁴

Structure of Events

Political economists assume that rational, self-interested individuals who pursue maximizing strategies will face a variety of situations. The structure of events in different situations can be characterized by their relative divisibility or indivisibility. The degree to which events can be subject to control by individual persons through possession, exchange or use is the critical criterion in establishing their divisibility or indivisibility. Those events not subject to such control have the characteristics of involving interdependencies and commonalities in their possession and use.

Events involved in any decisionmaking situation can be arrayed on a continuum ranging from purely private to purely public.¹⁵ "Goods" are events for which people have preferences; "bads" are events for which people have aversions. The potential demand for most goods will exceed the supply and will be scarce; the supply of most bads will exceed demands and thus require efforts to restrict or alter their supply. *Purely private goods* are defined as those which are highly divisible and can be packaged, contained or measured in discrete units. These are distributed under competitive market conditions where potential consumers can be excluded from enjoying the benefit unless they are willing to pay the price. *Purely public goods*, by contrast, are highly indivisible goods and services. Potential consumers cannot be easily excluded from enjoying the benefit once a public good is produced.¹⁶ Once public goods are provided for some, they will be available for others to enjoy without reference to who pays the costs. National defense is a classic example of such a good. Once it is provided for some individuals living within a nation, it is automatically provided for all individuals within the nation whether they pay for it or not.

In addition to the two logical categories of purely private and purely public goods, most political economists would postulate the existence of an intermediate continuum. Within this continuum, the production or consumption of goods or services may involve spill-

14. J. March and H. Simon, *Organizations* (1958). See especially Ch. 6, *Cognitive Limits of Rationality*.

15. Davis and Winston, *On the Distinction between Public and Private Goods*, 57 *Amer. Econ. Rev.* 340-73 (1967). Also note Samuelson, *The Pure Theory of Public Expenditure*, 36 *Rev. Econ. and Statistics* 387-89 (1954).

16. Breton, *A Theory of the Demand for Public Goods*, 32 *Canadian J. Econ. and Pol. Sci.* 455-67 (1966).

over effects or externalities which are not isolated and contained within market transactions.¹⁷ Goods with appreciable externalities are similar to private goods to the extent that some effects can be subject to the exclusion principle, but other of their effects are like those of public goods and impinge upon people not directly involved.¹⁸ Water pollution which results from a prior use of water is an example of a negative externality; the benefits which other members of a community derive from a person acquiring an education would be a positive externality. A reduction in the cost of a negative externality and an increase in the yield of positive externalities are both equivalent to provision of a public good.

Common-property resources have attributes somewhat analogous to public goods.¹⁹ They involve a jointness of supply and a separability of use such that individuals cannot be effectively excluded from access to the supply of a resource, even though each individual makes a separable use of that resource. A ground water basin, for example, affords a common water supply which is accessible to any overlying property owner. Once extracted, the water becomes available for the separable use of each overlying proprietor. Whenever the aggregate demand upon such a resource exceeds the available supply, one person's increased demand will adversely affect the use of others. Beyond certain thresholds of supply, an exclusion principle will operate among users so that one person's use will impair use by others, but the supply of the resource continues to be subject to a high degree of interdependency and indivisibility. Spillover effects occur in relation to conditions of supply and may or may not occur in relation to conditions of use.

Public organizational arrangements are needed when significant externalities, common pool resources or public goods are involved. Purely private goods will not be discussed further since the market organization functions relatively well in solving problems of production and distribution of private goods and services.

Decisionmaking Arrangements

The work of political economists is based upon the assumption that self-interested individuals who pursue maximizing strategies utilize appropriate sets of decision rules or decisionmaking arrangements in dealing with different structures of events. No one form of

17. Ayres and Kneese, *Production, Consumption and Externalities*, 59 *Amer. Econ. Rev.* 282-97 (1969). See also Buchanan and Stubblebine, *Externality*, 29 *Economica* 371-89 (1962).

18. Coase, *The Problem of Social Cost*, 3 *J. Law and Econ.* 1-44 (1960).

19. F. Christy and A. Scott, *The Common Wealth in Ocean Fisheries* (1965). See Ch. 2, *The Characteristics of Common Property Natural Resources*.

organization is presumed to be "good" for all circumstances. Rather, any one organizational arrangement can generate a limited range of preferred effects, and any organizational arrangement will have limitations. Institutional weaknesses and institutional failures will become apparent if those limits are exceeded. Thus, a particular organizational arrangement can be expected to possess certain capabilities and be subject to sources of weakness or failure. The essential problem in the theory of organization is to anticipate or predict the consequences which will follow when self-interested individuals choose maximizing strategies by selecting particular sets of decision rules or organizational arrangements in the context of a particular structure of events. The optimum choice of organizational arrangements would be that which minimizes the costs associated with institutional weakness or institutional failure.

The analysis used by political economists in assessing the consequences that rules have on the choice of strategy in different situations will be applied to four different decisionmaking arrangements. The first application will examine the effect of decision rules which allow for individual choice in the presence of a common property or public good situations. The second application will examine the effect of decision rules characteristic of bureaucratic organization as they apply to the organization of public agencies concerned with supplying public goods. Given the problem of institutional weakness and institutional failure associated with both individualistic choice and large-scale bureaucratic establishments, consideration will then be given to decision rules that would enable a community to reduce costs of such weakness and failure in organizing to develop a common property resource or provide a public good. Finally, consideration will be given to development of multiorganizational arrangements as a means of providing for a heterogeneous mix of public goods.

Individualistic Choice and the Tragedy of the Commons

If each person is free to decide for himself how a common property resource or a public good is to be used, serious problems logically follow. Each individual will maximize his own welfare if he takes advantage of the common property or public good at minimum cost to himself. In the case of a public good, the cost minimizer would have no incentive to pay his share of provision costs. Most public goods would not be provided if paid for on a strictly voluntary basis.

In the case of a common property resource with a renewable yield, such as that of a common water supply, individualistic choice greatly

reduces costs of entrepreneurship as long as supply exceeds demands. However, when the aggregate demand of all individual users exceeds the available supply of a common property resource, an increase in demand will create diminishing supplies and increasing costs for the community of users. Each person will calculate only his own individual costs and ignore the social costs imposed upon others. Many individuals will choose a "dog in the manger" strategy, pursue their own advantage and disregard the consequences for others. Some individuals will conceal information and may remain free to take advantage of opportunities created by the joint actions of others. If voluntary actions were taken to curtail demand, some individuals will pursue a "hold out" strategy. The hold out will be free to capture a lion's share of the benefits derived from the voluntary joint actions of his neighbors. As long as each person is free to decide his own course of action, the probability of someone pursuing a hold out strategy is high. The presence of hold outs will threaten the stability of any joint voluntary solution.

If the competitive dynamic is allowed to run its course, social costs will escalate to a point where operations are sustained with economic losses for the community of users. Individuals in weak economic positions will be forced out. The neighborhood effects generated may include poverty, deprivations, threats, and even violence. This eventuality has been characterized by Garret T. Hardin as "the tragedy of the commons."²⁰ Individual decisionmaking applied to common property resources will inexorably result in tragedy unless decisionmaking arrangements can be modified to enable persons to act jointly in relation to a common property. Unrestricted individual choice in relation to common property resources or public goods can generate destructive competition where the greater the individual effort, the worse off people become.

Because of this competitive dynamic, individuals cannot be expected to form large voluntary associations to pursue matters of common or public interest unless special conditions can be met.²¹ These conditions will exist only 1) when members can derive a separable benefit of a sufficient magnitude to cover the cost of membership, or 2) where they can be coerced through some form of levy or taxation into bearing their share of the costs. Thus, we cannot expect

20. Hardin, *The Tragedy of the Commons*, 162 *Science* 1243-48 (1968). Hardin makes several analytical errors in his essay including a failure to demonstrate that the "tragedy of the commons" applies to decisions affecting human reproduction. Nevertheless, the term "tragedy of the commons" is an apt portrayal of the consequences which flow when demands exceed supply in the use of a common-pool resource under conditions of individualistic choice.

21. M. Olson, *The Logic of Collective Action* (1965).

people voluntarily to organize themselves to secure the development of a common property or the provision of a public good.

When individuals act with the legal independence characteristic of decisionmaking in market structures in a situation dominated by externalities, common property resources or public goods, we can conclude that institutional weakness or institutional failure will occur. The magnitude of the weakness or failure will depend upon the importance of the externality or the degree of indivisibility of the common property or public good.

Bureaucratic Organization

Reliance on hierarchical organization inherent in the traditional theory of public administration is one method for attempting to avoid the tragedy of the commons. Exercise of governmental prerogative by public officials capable of central direction and control implies that effective sanctions can be mobilized to preclude the hold out strategy and that management programs can be undertaken to develop a common property resource or produce a public good.

In any management program recourse to a hierarchical command structure will be economically advantageous whenever production processes require pooling efforts through division of labor and use of common production facilities. This rationale applies to both private firms and public agencies. If a firm can conduct business under the management of an entrepreneur at a lesser cost than if each and every transaction were organized as a market transaction, both the entrepreneur and the employees of the firm can derive a benefit from agreeing to act in accordance with the decisions of the entrepreneur in allocating work assignments among several different employees.²² Bureaucratic organization is a method for enhancing efficiency in operations by minimizing decision costs within the limits or zones of authority provided by the employment contract and the competitive force of the product market.

When bureaucratic organization is applied to provision of public goods and services, a number of sources for potential institutional weakness or institutional failure become apparent. In the absence of an exclusion principle, the competitive force of a product market does not affect many public organizations. As a consequence, entrepreneurs in such organizations will be less sensitive to diseconomics of scale which accrue from increasing management costs as the size of a public organization increases. Furthermore, we can anticipate that any organization will reach a point where the management cost

22. Coase, *The Nature of the Firm*, 4 *Economica* 386-485 (1937).

of supervising more employees will exceed the marginal value added by the productivity of the marginal employee. Beyond that point a growth in organizational size will generate a net economic loss or yield a decreasing social return.

Gordon Tullock in *The Politics of Bureaucracy* analyzes the consequences which follow when rational, self-interested individuals pursue maximizing strategies in very large public bureaucracies.²³ Tullock's "economic man" is an ambitious public employee who seeks promotions within a bureaucracy. Since career advancement depends upon favorable recommendations by his superiors, a career-oriented public servant will act so as to please his superior. Favorable information will be forwarded, unfavorable information will be repressed. This distortion of information will diminish control and generate expectations which diverge from conditions as they are. Large scale bureaucracies will thus become error prone and too cumbersome to adapt to rapidly changing conditions. Efforts to correct the malfunctioning of bureaucracies by tightening control will simply magnify errors. A decline in return to scale can be expected to result. The larger the organization becomes, the smaller the percentage of its activities that will be directly related to output and the larger the proportion of its efforts that will be expended on management.

Tullock suggests that the limits on control in the very large public bureaucracy will engender a "bureaucratic free enterprise" where individuals and groups within an organization proceed to formulate their own missions, increasingly pursuing opportunities for side pay-off, graft and corruption. Goal displacement and risk avoidance motivated by individual self-interest will generate organizational dysfunctions as elaborate justifications are fabricated to cover potential exposures to the scrutiny of superior authorities. The social consequences generated by an organization become increasingly contradictory and unreal when compared to public rhetoric.

Once a public good is provided, the absence of an exclusion principle also implies that each individual using such a service will have little choice but to take advantage of whatever is provided unless he is either able to move to another jurisdiction or is wealthy enough to make separate provision for himself. Under these conditions, the producer of a public good may also be relatively free to induce savings in production costs by shifting some of the burdens or costs of production to users or consumers of the service. Shifts of producer costs to users may result in an aggregate loss of efficiency as savings on the production side are exceeded by added costs on the consumption side.

23. G. Tullock, *Politics of Bureaucracy* (1965).

The inability of users of public goods and services to sustain an arm's length relationship with producers of public goods and services generates further problems when user preferences may change in relation to the available supply of public goods and services. No one can know the preferences or values of other persons apart from giving those persons an opportunity to express them. If public agencies are organized so that different communities of people cannot express their diverse preferences, producers of public goods and services will act without information as to the changing preferences of the persons they serve. Expenditures will be made with little reference to consumer utility. *Producer efficiency in the absence of consumer utility is without economic meaning.*

Other difficulties are engendered when conditions of demand for a public good or service increase in relation to the available supply. When demands begin to exceed supply, the dynamics inherent in the tragedy of the commons may arise all over again. A congested street or highway will, for example, carry less and less traffic as the demand grows. What was once a public good may now become a public bad as congested and noisy traffic precludes a growing number of opportunities for alternative uses.²⁴ In short, public goods may be subject to serious erosion or degradation under conditions of changing demands. In the absence of capability to respond with modified supply schedules and regulations for use, a public good may come to be a public bad and the tragedy of the commons can reach critical or explosive proportions.

Finally, producer performance and user interests are closely tied together when we recognize that the capacity to levy taxes, to make appropriate expenditure decisions and to provide the necessary public facilities is *insufficient* for optimal use of such facilities. One pattern of use may impair the value of a common facility or a public good for another pattern of use. The development of water resource facilities, for example, will be insufficient if it enhances the welfare for members of a community of users without attention to basic rules and regulations controlling the use of such facilities by different sets of users. Use of streams for discharge of waste can become a dominant use which will force out other users.

Optimal use of public facilities, when each use is not fully compatible with each other use, requires development of a system of rules and regulations establishing capabilities and setting limitations on the discretion which persons can exercise in using common facilities. Development of such rules and regulations is relevant both to

24. J. Buchanan, *Public Goods and Public Bads*, in *Financing the Metropolis* (J. Crecine ed., 1970).

scheduling production processes and to ordering use patterns of potential users and consumers. These rules and regulations, like any set of decision rules, are not self-generating, self-modifying nor self-enforcing. Thus, we are confronted with the basic problems of *who* shall enact and enforce rules to govern relations among individuals who use common properties or public facilities. These rules and regulations in effect establish essential property interests among the users of public goods and services.

While bureaucratic organization will contribute significant institutional capabilities to any enterprise or agency concerned with control of externalities, management of a common property or provision of a public good, such a form of organization is also subject to serious institutional weaknesses and failures. An optimal structure for a public enterprise would take account of diversities in user preferences and in production economies, relationship of demand to supply, and relationships in which one pattern of use may impair other patterns of use. The very large bureaucracy will: 1) become increasingly indiscriminating in its response to diverse demands, 2) impose increasingly high social costs upon those who are presumed to be the beneficiaries, 3) fail to proportion supply to demand, 4) allow public goods to erode by failing to take actions to prevent one use from dominating other uses, 5) become increasingly error prone and uncontrollable to the point where public actions deviate radically from public rhetoric, and 6) eventually lead to a circumstance where remedial actions exacerbate rather than ameliorate problems.

The Constitution of Self-Governing Public Enterprises

If individuals are to surmount the problems inherent in the tragedy of the commons and avoid the pathologies of the fully developed bureaucracy, they are confronted with the task of creating alternative arrangements for organization of collective and public enterprises. The structure of events inherent in a common property resource or a public good situation provides a basis for conceptualizing the community of interests which must be taken into account in designing alternative institutional arrangements. An inchoate community is formed by the individuals who use or enjoy a common property resource or a public good. The domain of the common property or the public good defines and bounds the community of interest.

If the object of interest can be identified, courses of action can be examined to determine which alternatives will enhance the welfare of that community of individuals. If some form of joint action is avail-

able which would leave each individual better off provided that all members of the community were required to contribute proportionately, each person will be motivated to devise and agree to a set of decision rules authorizing action on behalf of the community of individuals. Such rules would require some form of coercion to insure that each individual will bear his proportionate share of the burden.

"Bureaucratic free enterprise" need not be the vice that Tullock implied if 1) a bureaucracy is immediately accountable to the relevant community of interest for which it is acting, 2) the costs of providing a joint good are funded by the constituents in proportion to their benefit or in accordance with some comparable rule of equity, and 3) public facilities are subject to use under terms and conditions which are considered by the relevant community to be reasonably designed to advance their common welfare. If these conditions can be met, a self-governing collective enterprise may be designed that is capable of internalizing decisionmaking arrangements appropriate to the community of interests associated with the management of a common property or the provision of a public good. Reliance upon external decision structures would be necessary only under conditions 1) where adequate remedies are not available for resolving local conflicts within the decision structures afforded by the constitution of such an enterprise, or 2) where the operation of a public enterprise is conducted in a manner that causes injuries to others outside its boundaries.

If such conditions are to be met, the structure of public administration cannot be organized apart from processes of political choice, which provide means for 1) expression of social preferences of individuals within the community being served, 2) formulation, enforcement and revision of the decision rules governing both producer performance and conditions of consumer use, and 3) articulation and enforcement of demands made by individual users against producers. In the production and exchange of purely private goods and services, money as a medium of exchange can be used as a measure of value and as an expression of consumer utility. Public goods are not subject to exchange, and market price cannot be used as an appropriate measure of user preference. The constitution of public enterprises must depend instead upon the development of political mechanisms such as voting, representation, legislation and adjudication for people to express their interests.

The development of organizational arrangements which provide opportunities for persons to signal their agreements and disagree-

ments can be conceptualized as a problem of constitutional choice. Constitutional choice is simply a choice of decision rules, assigning decisionmaking capabilities among a community of people. It does not include appropriating funds or acting to alter events except to provide a decisionmaking structure for ordering the choice of future decisionmakers.

The rudiments of a theory of constitutional choice applicable to the organization of a public enterprise has been developed in *The Calculus of Consent*.²⁵ According to the authors, a representative individual wanting to form an organization to provide a public good would need to take two types of costs into account: 1) external costs, which are defined as those costs an individual would expect to bear as a result of decisions which deviate from his preferences and impose deprivations upon him; and 2) decisionmaking costs, which are defined as the expenditure of resources, time, effort and opportunities foregone in decision rules which specify the proportion of individuals required to agree prior to future collective action.

Expected external costs will be at their highest point where any one person can take action on behalf of the entire collectivity. Such costs would decline as the proportion of members participating in collective decisionmaking increases. Expected external costs would reach zero where all were required to agree prior to collective action under a rule of unanimity. However, expected decisionmaking costs would have the opposite trend. These expenditures would be minimal if *one* person could make future collective decisions for the whole group of affected individuals. Such costs would increase to their highest point with a rule of unanimity.

If a constitutional decisionmaker were a cost minimizer, and the two types of costs described above were an accurate representation of the costs he perceives, we would expect him to prefer the constitutional choice of a decision rule where the two cost curves intersect. When the two cost curves are roughly symmetrical, some form of simple majority vote would be a rational choice of a voting rule. If expected external costs were far greater than expected decisionmaking costs, an extraordinary majority would be the rational choice of a voting rule. Such a rule of extraordinary majority would apply where expected decision costs would be of minor magnitude providing that a reasonably optimal set of constitutional rules could be devised which would not impose high deprivations upon any particular element of the community. On the other hand, if the opportunity costs inherent in decisionmaking were expected to be very large in

25. J. Buchanan and G. Tullock, *The Calculus of Consent* (1962).

comparison to external costs, then reliance might be placed on a rule authorizing collective action by the decision of one person in the extreme case requiring rapid response.

If the following conditions can be met, appropriate decision-making arrangements will be available for a community of people to organize themselves as a self-governing public enterprise and take advantage of a common property resource under relatively optimal circumstances: 1) boundary conditions are properly drawn to encompass the domain of the common property; 2) only such developments are undertaken where benefits exceed costs; 3) costs are allocable among members of the community in proportion to benefit; 4) costs can be collected from each potential beneficiary in the form of user charges, yield taxes or other appropriate forms of taxation, and any potential hold outs can be precluded from not assuming his share of the burden; 5) substantial consensus exists regarding the terms and conditions for constituting the collective enterprise; 6) decision rules are divided so that the provision of service will reflect changing user needs, preferences and levels of demand; 7) an efficient production team can be organized to operate the common facilities and provide service to each user that is responsive to his demands; and 8) any one person (or any group of persons) has access to remedies where he can enforce his claims for service and assert his interests in the enterprise.

The Development of Multi-Organizational Arrangements

Assuming that a self-governing public enterprise can be organized under relatively optimal conditions to develop a common property resource or provide a public good, there remain a number of problems which may be sources of institutional weakness or failure. First, a public enterprise may generate externalities that impinge upon others beyond its borders. If the externalities are negative, it may be necessary to limit and control those externalities. If the externalities are positive, supplementary expenditures may be required to sustain an optimal yield of them. Second, common properties may come in many different shapes and forms with significant elements of jointness or interdependency among the various uses that can be made of different common property resources. Water resource systems, for example, present a baffling array of problems associated with persistent interdependencies among many joint uses. Interdependencies among water related uses may also be interconnected with interdependencies involving land uses, energy supply systems, and transport systems. But each use may also involve independencies so that

its provision requires separate consideration on its own merit. The economic interest of each individual is also likely to include a demand for a wide spectrum of uses in appropriate proportions rather than demands for one use to the exclusion of another. Every individual is simultaneously a water user and a water polluter, and both contingencies need to be taken into account. Third, where conflicts arise, institutional facilities need to be available for processing conflict and searching out resolutions that will preclude the tragedy of the commons from working itself out at some new level of interdependency.

Some political economists have suggested that these problems can best be resolved by taking advantage of the overlapping jurisdictions and fragmentation of authority inherent in the American system of government. Mancur Olson, for example, has suggested:

Only if there are several levels of government, and a large number of governments, can immense disparities between the boundaries of jurisdictions and the boundaries of collective goods be avoided. There is a case for every type of institution from the international organization to the smallest local government. It is the merit of the present approach that it can help explain the need for both centralized and decentralized units of government in the same context.²⁶

This solution is the antithesis of that proposed by management analysts in the public administration tradition. Instead of chaos and disorder, these political economists perceive a pattern of ordered relationships among diverse public enterprises which is analogous to the order existing among the many different private enterprises functioning in the context of a private industry. Thus, complex sets of multiorganizational relationships might be characterized as forming public service industries.²⁷

Within a public service industry, key relationships among enterprises involve the terms of trade, contractual relationships, competitive rivalry, and cooperative arrangements for coordinated action. Chief executives and hierarchical structures may or may not be important coordinating mechanisms in this context. Patterns of competitive rivalry and cooperative action sustained through private associations and consortia are far more important in maintaining ordered relationships in the American system of higher education,

26. U.S. Congress, Joint Economic Comm., Subcomm. on Economy in Government, 1 *The Analysis and Evaluation of Public Expenditures: The P. P. B. System*, 91st Cong., 1st Sess. 327 (1969).

27. V. Ostrom and E. Ostrom, *A Behavioral Approach to the Study of Intergovernmental Relations*, 359 *Annals* 137-46 (1965).

for example, than the administrative command structure emanating from the offices of state governors.

Similar analytical perspectives can be used in viewing the American system of water resource development as a public service industry composed of both public and private enterprises. What might be characterized as the California water industry, for example, is composed of approximately 1,200 mutual water companies, 300 to 400 private public utility companies, numerous municipal water departments and agencies, including the Los Angeles and San Francisco municipal systems, several hundred public districts including such large scale operations as the Metropolitan Water District of Southern California and the East Bay Municipal Utility District, and the large scale water production agencies such as the United States Bureau of Reclamation, the United States Corps of Engineers and the California Department of Water Resources.²⁸ The performance of the California water industry would be assessed by examining the economic conduct of different water agencies within the industry in developing and proportioning supply to demand. Emphasis would be placed upon investment decisions, development policies and pricing arrangements rather than perfection of hierarchical organization in an integrated chain of command culminating in control by a single chief executive.

Several potential advantages can be derived from a political system which affords opportunities for overlapping jurisdictions and fragmentation of authority. Some of the potential advantages which might be gained from overlapping jurisdictions include the following:

1. Advantage can be taken of diverse scale economies. Problems in the design and operation of a water distribution system or the management of a ground water basin may involve quite different economies of scale and the proportioning of different interests from the problem of dealing with a large river system extending over several states. Yet, the diverse economies of scale may need to complement each other when a ground water management program operates in conjunction with water transfers associated with large scale water resource development projects which divert water for use on overlying land.

2. Consideration of consumer or user interests can be partially disaggregated from producer interests. The difficulty of sustaining an arm's length relationship between the producer and consumer of public goods and services can be partially resolved if sufficient over-

28. J. Bain, R. Caves and J. Margolis, *Northern California's Water Industry: The Comparative Efficiency of Public Enterprise in Developing a Scarce Natural Resource* (1966).

lap exists among different units of government. Elements of bargaining power are articulated in the California water industry in negotiations between water distribution agencies and water production agencies. Interests of recreational groups are beginning to be articulated. Public sanitation engineers have demonstrated some entrepreneurship in making reclaimed waste water available for public enjoyment as in the case of Golden Gate Park or for sale to ground-water replenishment districts.

3. Fiscal transfers can alter product mix in the provision of public goods and services.²⁹ The expenditure of federal funds to build municipal sewerage plants, for example, may or may not have a significant effect upon the waste load being carried by a water supply system. Federal funds may be a useful source of supplementary funds for investment in sewerage facilities provided that other waste dischargers are not able to function as "free riders" and increase their waste discharges. As Irving Fox has emphasized, large expenditures for secondary treatment of municipal sewage may have a relatively small marginal effect upon the waste load carried by a stream when compared with other sources of waste discharge.³⁰

4. The probability of error is reduced as the opportunity for critical scrutiny by persons occupying positions of independent authority is increased. Where the work of large scale public bureaucracies is not subject to critical scrutiny we can expect pronounced tendencies toward the suppression of conflicting information and analysis and the repression of disagreement. These possibilities can be reduced if promotional agencies are required to stand critical scrutiny in a planning review process, a scrutiny of yield or rate of return on investment, and an evaluation of performance.

5. If two or more types of public services are equally necessary for the public welfare but involve interdependencies having a high level of potential conflict, there will be less likelihood that one use will be subordinated to another use if each service is sustained by a relatively autonomous public enterprise. The opportunity costs associated with many types of water use will involve elements of pollution and the impairment of water for other associated uses. Unless a high degree of autonomy exists among agencies which make provision for the different patterns of use, one type of use is likely to dominate other types of use.

Any system of government which relies upon multiorganizational

29. R. Wagner, *The Fiscal Organization of American Federalism* (1971).

30. Fox, *Institutional Design for Water Quality Management—The Implications of a Systems Approach for Legal and Administrative Arrangements*, in *Natural Resource Systems Models in Decision Making* 212 (G. Toebe ed., 1970).

arrangements to provide a rich mix of potentially competing public services will find it necessary to develop independent informational, consultative and deliberative mechanisms where conflict can be processed in an orderly way to reach mutually satisfactory resolutions. Such institutional facilities are afforded equity proceedings in the courts, representative boards and commissions, inter-agency committees, joint councils, consultative conferences and a variety of different voluntary associations. Such arrangements, when taken together with quasi-market structures, provide the basis for sustaining a vastly different system of public administration that far exceeds the productive potential of the French and Prussian systems of administration which Woodrow Wilson and those who have followed in his footsteps have used as models of administrative perfection.

POLICY IMPLICATIONS

The thesis has been advanced that overlapping jurisdictions and fragmentation of authority are sources of strength rather than weakness in public service industries in the American system of public administration. However, such systems are also subject to serious shortcomings which reflect elements of institutional weakness or failure. I shall indicate some of these shortcomings by reference to the American water industry, then review some of the conditions that have contributed to these shortcomings and suggest some means that may be available for remedying those weaknesses by drawing upon the industry concept.

Shortcomings

The basic shortcoming of the American water industry is overinvestment in water resource facilities, overdevelopment of some water services and a correlative underdevelopment of other water services.³¹ Overinvestment has led to misallocation, which can be expected to aggravate demands for still further investments to alleviate the costs of prior misallocations. The most serious misallocation is associated with distinctly common property or public good uses such as water quality, sustenance of fish and wildlife resources and related public uses of water systems.

Two points of caution should be introduced into this assessment. First, patterns of overinvestment, overdevelopment and misallocation

31. J. Hirschliefer, J. Dellaven and J. Milliman, *Water Supply* (1960). The conclusion is reached that "... major water resource developments are typically undertaken prematurely and on an overly ambitious scale. The dynamics of overdevelopment lead to large-scale projects where small-scale increments in water projects are ignored. *The larger the scale of the agency, the greater its propensity for overdevelopment.*" *Id.* at 358. (Emphasis added.)

will not apply uniformly to all areas or regions of the United States. Second, in many areas of the world, problems of overdevelopment might be viewed as a rather benign affliction. Much of the world cries out because of problems of underdevelopment. This point needs to be emphasized that the American system of public enterprises is immensely productive and it is productive precisely because of the extensive opportunities for public entrepreneurship afforded by a system of overlapping jurisdictions and fragmented authority.

Conditions Contributing to Overdevelopment and Misallocation

With these words of caution, it is important to recognize that conditions giving rise to contemporary political rhetoric about water "crises" and environmental "crises" are largely artifacts, products, or consequences of existing public policies. These conditions are explicit manifestations of the problems generated by overdevelopment and misallocation. I shall attempt to indicate some public policies and public programs which have contributed to the contemporary water "crisis" and environmental "crisis."

1. Public policies associated with the homestead movement and the settlement of the West still permeate national "reclamation" policies and have the effect of sustaining substantial public subsidies for large quantities of water supplied at nominal costs for agricultural purposes in the arid regions of the West.

2. Public policies associated with the stimulation of work relief projects during the Depression of the 1930's continue to have a significant effect in the allocation of costs for flood control projects.

3. The concept of long-term comprehensive planning has not proved to be helpful in taking account of opportunity costs associated with water resource development programs. Rather, the concept implies no limits and serves as a pious platitude covering multitudinous sins of omission. Intelligent planning is of critical importance. Analytical rigor requires specification of the variables used in any planning effort and specification of limits in an explicit acknowledgement of at least some of the variables not being considered. Human fallibility requires careful attention to both time and use limitations. Any pretense of omniscience will simply amplify the probability of error.

The relationship of the above policy conditions to the development of the Central Valley Project in California is an interesting subject for speculation. On the basis of cost sharing formulas in operation during the late 1920's, the Army Corps of Engineers considered Shasta Dam and related works in the CVP to be economically

infeasible. A similar conclusion was reluctantly reached by the State of California. In light of the unemployment problems of the Great Depression the Bureau of Reclamation was, in effect, able to underbid the Corps of Engineers in entrepreneuring the CVP. The cost sharing formulas in the Flood Control Acts of 1936 and 1938 enabled the Corps in turn to underbid the Bureau on projects in Tulare basin. Bureau projects were undertaken and project benefits were made available without prior execution of contractual agreements with potential beneficiaries, further weakening the financial structure of the CVP. The engineering of the CVP gave little attention to the developmental opportunities associated with groundwater supplies, to the problems of sewerage the valley as a necessary consequence of "full" development, and to other opportunity costs. Problems associated with agricultural subsidies and growing demands for urban water use in turn contributed to the entry of the California Department of Water Resources as the third major producer in the Central Valley.

4. Laws at both the state and federal levels tend to identify "interested parties" as public authorities or those who have profitable interests in relation to private proprietorships and to exclude those persons who derive a common benefit from a common or public property. Individual persons are excluded as interested parties in adversary proceedings even though resource development programs may impair their use of some common property. In short, substantial disabilities have been built into the structure of public law which in part explains "the paradox of public goods failing to claim the public interest."³² The basic concepts of limited liability and sovereign immunity as applied to both private and public corporations and governmental agencies need to be reconsidered for their effect upon developmental programs. Limited liability and legal immunity for some decisionmakers necessarily implies legal disabilities for others.

5. Insufficient consideration has been given to an economic calculus that is relevant to public investment in the provision of public goods and services as distinguished from the private investment in the market economy. The Office of Management and Budget has been much more concerned with occupying a suite in the Executive Office of the President than with development of analytical capabilities for minimizing the opportunity costs associated with public expenditure decisions. The use of market criteria in benefit-cost analysis can have

32. Bain, Caves and Margolis, *supra* note 28 at 652; R. Bish and V. Ostrom, *Understanding Urban Government: Metropolitan Reform Reconsidered* (1973).

the consequence of building facilities which are too small to meet demand in the absence of charges or regulations controlling the pattern of use. Money and physical works will be insufficient to sustain optimal use of common properties and public facilities without commensurate capabilities for proportioning patterns of use to conditions of supply.

Some Suggestions for Policy Change

If the assessment that public policies are the principal contributors to the basic shortcoming of overdevelopment and misallocation is correct, what possibilities might be pursued as a means of remedying such shortcomings? I will make a few suggestions, with the warning that relatively moderate adjustments may produce significant changes if they are strategically selected:

1. Terminate all federal non-reimbursable public expenditures and public subsidies for water resource development by some specified cut-off date, e.g., 1980. Alternative modes of funding, including user charges or yield, severance or depletion taxes, would need to be explored for sustaining reimbursability.

2. Consider the possibility of requiring full compensation for the opportunity costs foregone where any public use is impaired or sacrificed as an adjunct of a development program. Constitutional provisions requiring just compensation for the taking of private property should be extended to cover all common properties and public properties. All water rights, including those exercised by federal agencies, might be subject to a yield tax base upon the value of water at its source for alternative uses foregone. Thus, the Bureau of Reclamation might be expected to generate revenues to cover the cost of the salmon fishery sacrificed on the San Joaquin River, and an appropriate fishery agency could use the revenue to generate an alternative in the stock of fishery resources.

3. Develop regional water exchange agreements, including provision for buying and selling short and intermediate term leasehold interests in alternative sources of water supply including reclaimed waste waters.

4. Redefine rights to common property resources so as to recognize individual persons as interested parties entitled to equitable consideration of their beneficial interests in such common properties and to remedies for any impairment of such interests.

5. Extend authorization of inter-agency contractual arrangements for the provision of engineering and planning services and joint operations among public water agencies across local, state and federal jurisdictional boundaries.

These suggestions indicate the thrust of some possibilities that might be considered in modifying the structure of incentives which would alter the priorities of water resource development. Serious considerations of such possibilities would have to be based upon more careful and more extensive analysis than given in this paper.

CONCLUSION

Given the problem of market failure that will occur when many patterns of resource utilization are subject to consumption by a community of users and where exclusion is infeasible, we can anticipate that some form of public organization is necessary to avoid the tragedy of the commons. The appropriate form of public solution is the subject of fundamental disagreement between those who support the traditional public administration and contemporary political economists who rely upon a theory of public goods and the principle of fiscal equivalence. The first approach argues that principles of hierarchical organization provide the requisites for coordinated actions in realizing the common benefits of collective action. The second approach contends that large scale hierarchical organizations are subject to such serious losses of information and control that failures in performance will occur. Which explanation is best supported by empirical evidence can be determined only in light of empirical research.³³ In the meantime, those who advocate public solutions for changing the structure of property rights in resource development and utilization should proceed with caution.

33. E. Ostrom, W. Baugh, R. Guarasci, R. Parks and G. Whitaker, *Community Organization and the Provisions of Police Services* (Sage Professional Papers in Administrative and Policy Studies 03-001, 1973).