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20. There are many more mitoses than meioses in the germ line. I assume that nonsister chromatid exchange occurs only very infrequently in the mitoses, in which homologous chromosomes are not paired. Because the number of chiasmas observed in meioses roughly equals the number of sister chromatid exchanges observed in mitoses, I conclude tentatively that the average number of sister chromatid exchanges per organismal generation occurring in the lineage leading to a given germ line chromosome greatly exceeds the number of nonsister chromatid exchanges.
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28. I did part of this work under postdoctoral supervision of Oliver Smithies, Departments of Genetics and Medical Genetics, University of Wisconsin. I thank Drs. Edward H. Coe and Donald L. Riddle for discussions and Elizabeth Hollis for the figures. This work was supported by National Institutes of Health grants GM20069 to O. Smithies and GM22686 to G.P.S.

Boom Towns May Hinder Energy Resource Development

Isolated rural communities cannot handle sudden industrialization and growth without help.

John S. Gilmore

The energy boom town in western United States is apt to be a bad place to live. It's apt to be a bad place to do business.

This is a problem for more than the people in the boom town. It also affects federal agencies seeking to increase energy resource production in the Rocky Mountain West, as well as the firms building and operating energy resource extraction and conversion facilities. The situation can be frustrating for local and state governments charged with protecting the health, safety, and welfare of their populations. The problems result from the traditional, business-as-usual boom in which unmanaged growth is the cumulative result of many different corporate, governmental, and individual decisions, mostly made in total isolation from each other. "Business-as-usual" is a characterization applicable at all levels of government, as well as to industry.

The results of such unmanaged growth are probably the leading source of upsets and conflicts that can be seen or anticipated in the process of western energy resource development. The boom town is a major source of social tension in an area or a region, provoking both litigation and legislation. It is a major contributor toward the potential confrontation between state and federal governments about who shall make which decisions affecting western energy resource development. Besides fostering conflict, this sort of boom growth almost inevitably generates a situation that causes overruns in both the time and the money required to get projects built and operating.

Pistol Shot, U.S.A.

The best way to explain these effects is to describe the typical business-as-usual boom town. Therefore, let us consider the very real situation in the imaginary town of Pistol Shot in some state in the West. Pistol Shot's problems are typical of those encountered by a small, isolated western community that is being impacted or is about to be impacted by the development of coal, oil shale, uranium, or even geothermal resources.

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Pistol Shot is 100 miles from a town of as many as 10,000 or 15,000 people; it is more than 200 miles from a metropolitan area. Thus it has to depend on its own resources and cannot borrow consumer services from other places. Pistol Shot is a county seat in sparsely settled ranching country, although there was some mining in the past. Its population in 1970 was 1200, down from two or three times that number in the mining days.

Suddenly, this has changed. Coal mining started up again in 1973 and the industry will probably continue to grow. Construction began four months ago on the first 700-megawatt unit of an electric power plant. Plans were announced last year for a $900 million coal gasification plant, but the starting date for construction has already been postponed twice. Confusion about the future as well as about dealing with present growth problems is widespread. It is the same sort of confusion that exists in the Powder River basin, the Four Corners, central Utah, northwest Colorado, western North Dakota, and much of the rest of the West.

Population in Pistol Shot has nearly tripled since 1970 and is accommodated by mobile homes sprawled over the countryside. The rapid influx of people has generated population growth rates of around 25 percent; in most boom towns a 15 percent growth rate leads to institutional breakdowns in the labor market, the housing market, and the system for financing local public facilities. Education, health services, and housing are far behind demand. Oldtimers and newcomers alike are alienated and suspicious, seeking someone in authority to blame. Mental health clinic caseloads have increased radically and indicate that problems are particularly severe for newcomer wives living in mobile homes and not integrated into the community. Construction hiring has tripled the high school dropout rate and has boosted employment turnover in the existing mining industry to the point that productivity, measured in tonnage per man per shift, has already fallen by 20 percent (*1, 2*).

The local elected officials and a good deal of the public have already experienced the four common phases of attitude toward this boom development. The first phase was enthusiasm, with anticipation of economic growth satisfying a classic ambition of a small, declining country town—keeping the young folks at home. The second phase was uncertainty, particularly among the elected officials, as to what the demands for public services to meet the growth might be. The third phase was near panic over the gap between prospective revenues and prospective expenditures,

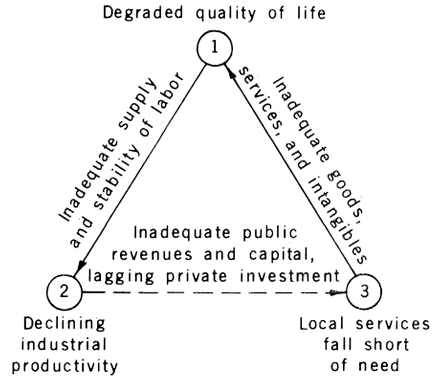

Fig. 1. The problem triangle.

coupled with the realization that Pistol Shot and its school district have nowhere near the bonding capacity to build the facilities needed to accommodate the growth. Finally, there evolves a problem-solving attitude as the officials and the public start trying to understand what the problems are and how to find help for them. The more information that is available on prospective change, the sooner the fourth phase comes.

Upon realizing that they had neither the knowledge nor the resources to deal with the town's problems, decision-makers in Pistol Shot first turned to the state and federal governments for help. The response was unsatisfactory, so money grants from the industry generating the growth were sought. This led to competition and confusion among town, school district, and county, all the different governmental agencies seeking support. This created uncertainty among the firms, which wondered what the priorities should be and who should set them.

The local officials are ambivalent about land use planning and zoning. Their ranching and landowning constituents are strongly opposed to any intervention with their sole control of their property (*3*). State planning legislation is weak (a safe statement to make about any of these undeveloped western states). Many of the local leaders—in government, business, and banking—are wishfully doubtful about the continuity of Pistol Shot's boom.

All are bewildered by the varied new parties-at-interest to community development and decision-making. They include mining companies, land speculators, the *New York Times* correspondent from Denver, consultants and researchers who may not even identify their clients, and numerous state and federal agencies whose existing programs do not quite fit the local needs.

A hundred years ago people flocked to western boom towns and stayed as long as they could. The attraction was the slight chance of striking it rich. Since then, the standard of living has risen and a progressive income tax has been adopted. The only person in Pistol Shot with a reasonable hope for personal riches is a well-financed real estate speculator.

Pistol Shot is an imaginary town, but the situations described in it do exist in many or most of the western energy resource communities facing boom-type growth. The situations are resented by those now involved in them and feared by others who think they may face such things soon.

These are not random problems. Many of them are interrelated, and they tend to be mutually self-sustaining.

The Problem Triangle

A problem triangle is shown in Fig. 1. As population grows at boom rates, existing local services fall short of need. School classrooms, retailing inventories, housing, and the number of physicians in the community do not grow as rapidly as the number of people increases. Many people's recreational requirements are not satisfied by the available opportunities. The quality of life in the community is degraded.

As a result, it is difficult to attract people to this isolated community which has no substantial indigenous labor force to service the economic growth. There is apt to be an inadequate supply of labor, which is unstable and dissatisfied at best. Workers and their families do not want to stay in the community and some of those who do stay are pirated back and forth among employers. Industrial employee turnover rates and absenteeism go up rapidly. It is difficult to attract and retain a satisfactory work force, whether it is a work force for building and operating a power plant or gasification plant, for operating a restaurant, or for maintaining the county's roads and bridges. Industrial productivity and profits drop.

Because of declining productivity, or at least the absence of expected increases in productivity and profits, there is less money coming in to support public sector activities. In addition, social malaise or chaos causes private investors to be skeptical and unwilling to invest in commercial facilities, housing, or the other private sector needs. Insurance companies even stop writing casualty coverage in the boom towns.

Thus the situation is back where it started in the problem triangle, with local services and facilities finding it even harder to keep up with increasing population and demand.

The Model of the Community

The essential problems are illustrated in Fig. 2 (*2*). Before the boom-type growth started, Pistol Shot's economy was roughly in balance. Capital was invested in the basic sector of the economy. The material inputs—land, fencing, grass, water, cattle—were assembled, labor was furnished by ranchers themselves or hired, and the classic factors of production—land, labor, and capital—were brought together. As a result, livestock was exported and purchasing power was imported to support the local economy. This purchasing power largely supported the entire population, including people and families whose income came from providing consumer goods and services in the local services sector.

The local services sector furnishes utilities, schools, public safety, and government and health services in its public subsector. Its private subsector furnishes other utilities, retailing, housing, doctors, and other services. In a stable or slowly growing situation, the basic sector and the public services sector are more or less in balance. Whether or not the local services are adequate is a matter of taste or values, but at least they are what people in the community are willing to pay for.

Some intangible aspects of quality of life are also important to the model. They are primarily those that may be amenable to some managerial effort in the public and private sectors, and not necessarily those that are the most important. They include the responsiveness of government, a sense of community, and an acceptable amount of leisure activity enjoyed by the residents of the community.

In Pistol Shot, all of this has now changed as described above. The basic and local service sectors are out of balance (Fig. 2B).

First, decisions were made, somewhere, to invest money in coal mining; new capital investment was added to that already on the basic side of the model. More capital is being added to build a power plant and still more is contemplated for a gasification plant. This brings in more material inputs; also, more labor must be attracted and hired. The purpose of the new capital investment is to produce new outputs of coal, electricity, or synthetic gas to be exported outside the community.

The population must increase in order to fill the new jobs. For this newly increased population to be adequately served, the local services sector must also be expanded in order to furnish the tangible components of quality of life such as the goods and services needed to accommodate the newcomers.

The intangible aspects of quality of life also must change to accommodate the growth. As the community grows, doubling or tripling its population, one intangible aspect of quality of life takes on special significance. The newcomers feel left out, yet as growth continues, they become a majority of the population. Integrating the newcomers into the community without driving out the old-timers becomes a key problem. It requires serious attention by the part of growth management that is concerned with trying to maintain the quality of life.

Growth Management

Growth management as conceived here does not mean centralized control of economic activity and growth either by government agency or an industrial firm or group. Growth management does involve generating enough cooperation among the groups and persons involved to develop the economic, political and social tools needed to use them to implement solutions to these questions: Where should growth be located? What should the rate of growth be? How should the benefits of growth be shared? How should the costs of growth be paid for, and who should pay for them? How can the parties-at-interest to growth be brought together to manage growth? (*2*)

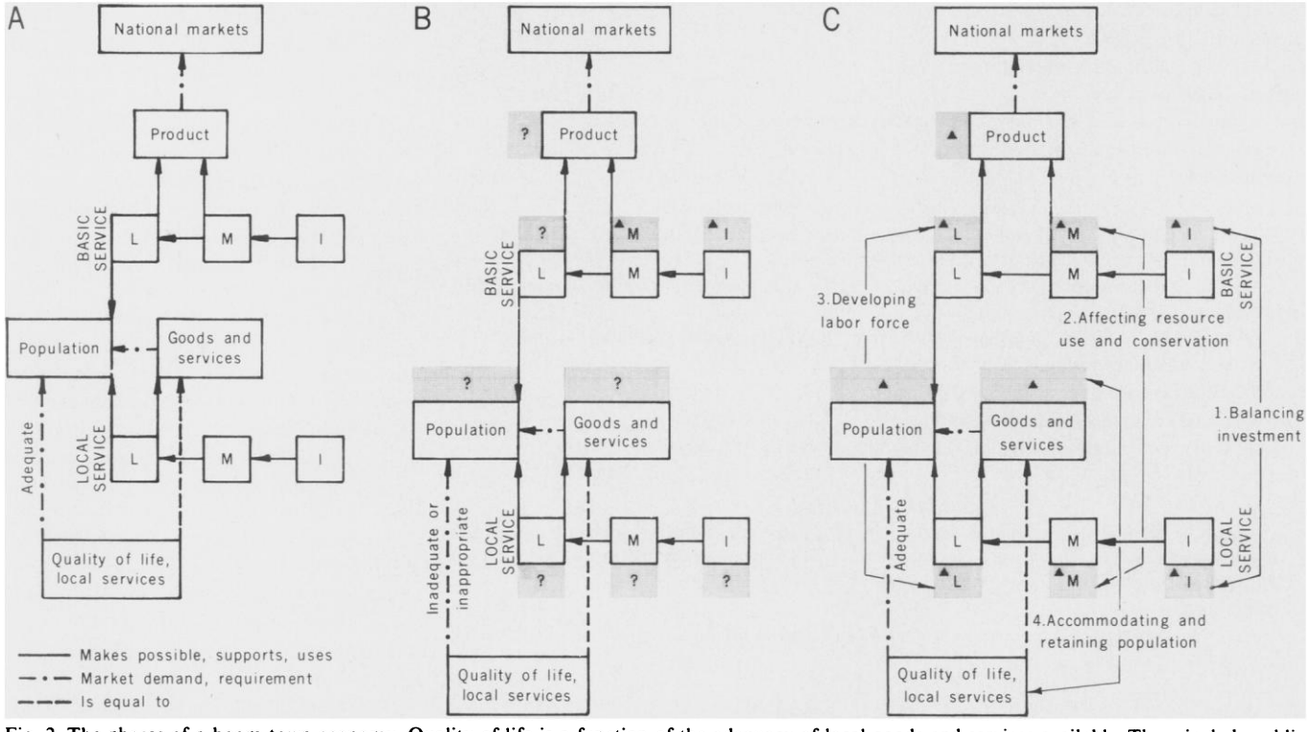

Fig. 2. The phases of a boom town economy. Quality of life is a function of the adequacy of local goods and services available. These include public services such as utilities, schools, safety, health, and government, and private services such as retailing, miscellaneous services, health, and housing. Intangible factors, such as responsiveness of government, sense of community, leisure activities, and, where applicable, integration of newcomers, also contribute to the quality of life. Abbreviations are: I, investment capital; M, land and materials (sometimes converted into plant); and L, labor. Productivity is a function of I, M, and L. (A) The stable situation in a community's economy. (B) Unbalanced growth caused by sudden expansion of the basic sector and inadequate response in local services. (C) The four growth management functions for achieving balanced growth and helping maintain quality of life.

The parties-at-interest to community growth management include at least the following: (i) industry; (ii) state, local, and federal government; (iii) commercial interest; and (iv) the general public (including both the old-timers and the newcomers).

The following are four basic functions of growth management: (i) balancing basic and local service capital investment; (ii) affecting resource use and conservation; (iii) developing labor force; and (iv) accommodating and retaining population. The applicability of these functions to the community growth model is shown in Fig. 2C.

The first function, balancing investment, does not mean dollar for dollar investment in the local services sector to match new basic investment. Instead, balancing these different types of capital investment means finding enough capital to build up the local services sector to accommodate the growth. It is hard to generalize as to how much is needed, but the amount of new capital needed by local services is probably 5 to 20 percent of the new capital invested in the basic sector of the community.

Many tools are available to help carry out this balancing function. Legislation to control plant sites may be used to hold down the basic investment to an amount that can be matched on the local service side. Alternatively, local service investment may be facilitated by such tools as state legislation (for example, the Wyoming Community Development Authority Act), federal mineral lease stipulations requiring off-site effort by lessees to assure provision of the new services needed in the communities they are impacting, or a federal policy of subsidizing communities impacted by energy resource development just as it may subsidize industry in developing energy resources. Regardless of which tools are used, better communication than that conventional under the business-as-usual approach will be essential between industry, state and local government, and the federal government. Proprietary information, fuzzy state policies, and lack of expertise in state and local government are all obstacles to communication.

For the second function, that of affecting resource use and conservation, zoning is the traditional means of using legislative authority to shape community development. Although zoning is occasionally a useful tool, its use is not politically feasible in many western counties or states, at least until after an unmanaged boom has occurred. It may not be feasible even then; opposition is so culturally embedded that zoning may not be implemented until political control has completely shifted away from the old-timers. Zoning concepts that are applied to the use of sparse western water supplies and give local officials control over changes in the use or the point of diversion of appropriated water may possibly be easier to legislate into effective existence than land zoning. The creation of air quality maintenance regions may also affect resource use.

One of the most useful changes that might be made in existing institutions affecting resource use would be reinstatement of the Public Lands Sales Act of 1964. This would permit the use of currently unavailable federal lands for housing in boom communities, and might place some restraint on the inflation of housing prices caused by land speculation and monopolistic pricing. This has been done in Ft. McMurray, Alberta, Canada.

The third function, developing the labor force, may be accomplished in several ways. Affirmative action programs can encourage the hiring and training of residents of the community or the region. Training programs can facilitate this by preparing these residents to handle the jobs and by aiding them and their families to adjust to a culture of industrial employment. Active equal opportunity programs might increase the labor participation rate, thus reducing the number of new households to be accommodated in the community.

Accommodating and retaining the population, the fourth growth management function, depends heavily on the quality of life—both tangible and intangible factors. Good wages furnish a necessary but not sufficient condition for attracting and retaining the new employees and new house-

Table 1. Format for a hierarchy of goals, threats, and opportunities affecting goal achievement, politics, objectives, and implementation programs.

Colorado's goal
The West is not seeking to lock up its energy resources. We want them developed in a thoughtful, careful way. We do not want to be the victims of a hasty, thoughtless program. We do seek to make sure that the West does not pay too large a price to the detriment of our citizens, as the nation moves to balance its energy budget (*6*).
Threats and opportunities in oil shale and coal development
Resource development in Colorado has traditionally depended on local community cost-sharing (in providing facilities and services). This may be very expensive in oil shale and coal development.
Energy resource development may damage the physical environment.
Societal change from development may be very damaging to isolated ranching communities.
Stable, sometimes diversified communities become economically dependent on a single output subject to an uncertain future.
(Item omitted.)
Employment opportunities will increase.
Public revenues may increase.
The quality of urban services in some communities may improve.
The national interest can be served.
(Item omitted.)
Policy responses to threats and opportunities
The beneficiaries of growth from oil shale and coal development should pay the costs of that growth; the present residents should be protected from those costs.
Oil shale and coal development should be deliberately phased to the extent necessary to minimize societal damage (*7*).
Employment of Coloradoans, including unemployed and underemployed, should be maximized.
The physical environment should be protected.
Economic diversity should be maintained or fostered.
Additional state revenues should be fostered.
Federal, state, and industry decision-making uncertainty should be reduced.
(Item omitted.)
Operational objectives
The total local tax and user fee bill to households in oil shale or coal development communities should not increase by more than 5 percent (in real dollars) per year during the first five years of development, or a maximum of 15 percent over the five years.
(Item omitted.)
. . . [Operational objectives should be specific and quantified to the point that success in achieving them can be measured.]
(Item omitted.)
Implementation programs
Cost internalization to assure that the beneficiaries of growth pay its costs—community development authority (similar to Wyoming); state severance tax; authorization for local severance tax (in addition to ad valorem tax) for operations or debt service; severance tax credit for community development expenditures; capital gains tax on real estate appreciation; state or federal lands should be made available for housing to accommodate growth (as in Alberta); . . .
(Three items omitted.)

holds generated by growth. For example, in an extensive survey in September 1974, local wages, job satisfaction, and career opportunities were found to rate very high among newcomers in the Rock Springs–Green River boom community. Nonetheless, 60 percent of the newcomer households said they planned to leave the community within one year unless health services were improved, despite the fact that September 1974 was a recession period and a comparable job might be hard to find. Housing problems were a similar source of dissatisfaction likely to cause departure from job situations perceived as good. The quality of sanitation services, road and street maintenance, schools, and shopping facilities also were deemed low enough that each justified leaving the community in the opinion of a third of the newcomer households queried.

The tools needed to accommodate and retain the new population include the institutions for timely and satisfactory provision of public goods and services. They also include expanded social service programs with extensive outreach programs, recreation programs, improved intracommunity communications, and adult education programs designed to maintain the community.

Solutions

So far, I have described the boom town problems and their origins and have suggested a concept of four functions of growth management. These are merely hopeful generalizations unless some specification can be made as to who should do what. The problem is complicated by the fact that many of the things that need to be done are substantially different from what the parties-at-interest to western energy resource development are used to doing.

Western energy resource development at its current accelerated pace entails a very complex system—which is evidently not yet understood. Nor has anyone described, much less designed, the subsystem needed to keep boom-type societal problems from disrupting both the human environment and the development programs.

However such a system is finally developed, it appears that the states, along with their constituent governmental subdivisions, have a central role since they provide for the health, safety, and welfare of their citizens as well as taxing and regulating industry within their borders. There are examples of western states taking appropriate, if isolated, actions. Wyoming has sought to calculate some future public costs of coal development and to set up taxing and borrowing mechanisms to help pay for these. Both Wyoming and Montana have passed energy facility siting legislation and Montana is also experimenting with revising local government, the various uses of impact statements, and rigorous land classification schemes.

One wonders, though, if the states will not find it necessary to undertake more rigorous analysis and program design if they are to carry out their governmental responsibilities. This would help them to obtain the respect and support needed from the federal government, at the same time making clear to the other parties-at-interest the ground rules for energy resource development within their borders. Any such program design effort must involve all of the state's government and policy-making apparatus.

As a first step toward achieving synthesis between legislative and executive branch efforts, a state leader might propose a goal that is self-evidently desirable. Next, analysis could clarify the threats and obstacles to achievement of that goal as well as the opportunities that lie along the same path. General state policy responses for countering the threats and exploiting the opportunities may then be proposed.

Some of these policy responses may conflict with or reinforce each other or other state and federal policies. Only after the conflicts and reinforcements are identified will it be possible to propose specific operational objectives. These should both define the need for programs to carry out the policies and furnish the means for measuring the success of the programs.

An incomplete example of such a hierarchy of goals, threats and opportunities, objectives, and programs is given in Table 1 (*4*). The objectives and the means (the programs) may require legislation or even changes in state constitutions. Federal support may be needed. In any case, success will probably depend on state executive, legislative, and public consensus—a function of leadership and information.

If a state does in fact take a central role in innovating to handle societal impacts, there obviously must be changes in business-as-usual activities by the other parties-at-interest to development.

The Federal Government

Primarily, of course, specific federal energy policy is needed. This should include as precise a set of schedules on development and conversion of energy resources as is possible. It is desirable that the federal government proclaim a policy of even-handed risk sharing; for example, if it is willing to share financial risks with the corporations undertaking resource development, it should also share financial risks with the communities hosting those developments. This applies not only to such specific government risk-sharing programs as the synthetic fuels commercialization program, but also to implicit federal risk-sharing programs such as the leasing of coal and other fuel deposits now held by the government.

Another federal policy declaration should make it clear that the beneficiaries of growth and development of western energy resources shall pay the public and social costs of that development, thus protecting the bystanders who merely live in the vicinity from increased costs. A federal agency should be designed as having primary responsibility for coordinating federal programs to accomplish this. It should be a primary contact for the western states dealing with the socioeconomic problems of energy resource development.

The guidelines for preparing environmental impact statements should be more comprehensive to make them more useful for growth management purposes. This would include detailing, by community, the public costs of energy resource development and identifying the availability of revenues or capital to meet these costs. Stipulations in the leases of federally held energy resource properties should require lessees to meet the state requirements for both information and funds needed for effective growth management.

Money for institutional innovation and planning by counties and towns should be made available by the Department of Housing and Urban Development, the Economic Development Administration, and the regional commissions. These agencies are now oriented toward support of multicounty regions that may be inherently inappropriate in western rural areas.

Energy research and development programming should reflect concern with conservation as well as with rapid transition from the period of using synthetic fuels to using ultimate energy systems such as solar energy, fusion, and the like. Research should also emphasize the possible effects of the future abandonment now envisioned for coal, oil shale, and synthetic fuel conversion activities.

Thus the federal government has an essential role in financing the public costs of development until the states can establish systems to manage growth and internalize public costs in private transactions. The federal government is initiating change at a faster rate than state systems can be designed and their component institutions created. This implies responsibility for handling the early costs precipitated by federal actions—both on a basis of equity

and on a basis of avoiding the delays and costs inevitable in developing towns such as Pistol Shot.

Local Government

It is necessary for town and county governments in the West to accept the reality of likely change and with it the need to cooperate among themselves.

With the acceptance of change should come a willingness to innovate or adopt and adapt the innovations of others. The Sweetwater County, Wyoming Priorities Board deals with the interface between industrial and local government decision-making and brings both sides together to help deal with growth problems. In Skagit County, Washington, a contract was concluded between the county and a firm building a power plant there. It made the provision by the firm of funds for law enforcement and educational facilities and personnel a condition for the rezoning necessary for power plant construction. In Kitsap County, Washington, local government, assisted by the Department of Defense, set up the Trident Coordination Office to deal with impacts of developing the Trident weapons system. It is financed by the Economic Development Administration, the State Office of Community Development, and some county money (*5*).

The Energy Resource Industry

A major problem seems to be one of consistency. Some firms are leaders in committing themselves to community preservation and development and in otherwise carrying the community development costs precipitated by their energy resource development. The need is for industry-wide acceptance of such standards and willingness to cooperate as the states create new institutions, taxes, and implementation programs for dealing with the problems created by western energy resource development.

The Media

The mass communications media, particularly the local and regional press, could do far more to inform readers, viewers, and listeners of the prospects for and consequences of energy resource development. Interesting feature stories are done on change after it happens. The need is to examine prospective and current change in the energy resource development field, which certainly affects the public as much as action in the courthouse, emergency room, and state capitol. Since Pistol Shot–type development so evidently affects the public interest, I suggest that the press should inquire vigorously and should push its doctrine of fair comment more and more into the industrial activity involved in energy resource development.

The Public

The public needs to seek out information on what is happening and demand more information and innovative responses by its various governments. Otherwise, the only advice one can give to the public is "look out." The business-as-usual approach certainly won't handle western energy boom town problems.

Summary and Conclusions

Accelerated development of energy resources is apt to cause very rapid population increases in isolated rural communities in the Rocky Mountain West. Most of these communities are unable to furnish the services and facilities to accommodate this growth or to maintain the amenities of life. Where that happens and growth is not adequately accommodated, productivity declines, projects overrun time and cost schedules, and operating outputs fall behind.

Such communities need help in managing their growth. The major assistance—often involving institutional change—should come from the states. Until each state can modify its laws, taxes, and (sometimes) its constitution, substantial federal government help will be needed. Current ways of doing things also need to be modified by the energy industry, local governments, and the mass media.

References and Notes

1. The problems are elaborated in Gilmore and Duff (*2*); R. K. Doran, J. S. Gilmore, M. K. Duff, *Socio-Economic Impacts of Proposed Burlington Northern and Chicago and North Western Rail Line in Campbell-Converse Counties, Wyoming* (research report for Burlington Northern, Inc., St. Paul, Minn., 1974); El Dean V. Kohrs, "Social consequences of boom growth in Wyoming," paper presented at the meeting of the AAAS Southwestern and Rocky Mountain Division, Laramie, Wyo., 25 July 1974.
2. J. S. Gilmore and M. K. Duff, *Boom Town Growth Management* (Westview, Boulder, Colo., 1975).
3. "Our findings reveal that a significant feature of the study area is its traditional rural abhorrence of planning. The area's residents consistently and strongly resist the idea of telling people what they can and cannot do with/on their land. Almost 60% state that no one but the owner should have any say about how privately owned resources are used." Community Service Program, University of Montana, *A Study of Social Impact of Coal Development in the Decker-Birney Ashland Area* (Montana Energy Advisory Council, Office of the Lieutenant Governor, Helena, 1975), p. 20.
   I have observed similar sentiment to be predominant in the rural areas of Wyoming, Utah, and much of Colorado. Their planning institutions, often nonexistent, reflect this.
4. This hierarchical format comparing alternative policies and programs by qualitative and quantitative criteria of economic costs, social disruption, political resistance, administrative complexity, environmental impacts, and secondary effects is described and demonstrated in J. S. Gilmore, W. M. Beaney, P. I. Bortz, M. K. Duff, T. D. Nevens [*Environmental Policy Analysis* (University of Denver Research Institute, Denver, Colo., 1971)] and J. S. Gilmore and M. K. Duff [*Policy Analysis for Rural Development and Growth Management in Colorado* (Colorado Rural Development Commission, Denver, Colo., 1973)].
5. These are described in Gilmore and Duff (*2*); D. Myhra, *Planning* **41**, 31 (1975); Kitsap County Trident Coordination Office, "The Kitsap County Trident Coordination Office, A case history," Port Orchard, Wash., mimeographed, undated.
6. Governor Richard D. Lamm, *Rocky Mountain News*, 21 September 1975, Trend section.
7. Societal vulnerability and impacts may be identified among four categories: (i) social structure, including economy, technology, and occupational structure; (ii) polity, including regulation of distribution of power and adjudication of conflicts and claims; (iii) culture; and (iv) institutions. From D. Bell, *The Coming of Post-Industrial Society* (Basic Books, New York, 1973), p. 12; illustrated in University of Denver Research Institute, *Factors Influencing an Area's Ability to Absorb a Large-Scale Commercial Coal Processing Complex* (ERDA—Fossil Energy, Government Printing Office, Washington, D.C., in press).

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