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Economic Development in the El Paso-Juarez Area and Its Impact on Water Supply

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ECONOMIC DEVELOPMENT IN THE EL PASO-JUAREZ AREA AND ITS IMPACT ON WATER SUPPLY*

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OVERVIEW

The United States-Mexico Borderlands has been described in paradoxical terms. On the one hand, the region has as its most salient feature its underdeveloped status, while on the other, it differs markedly from other developing areas around the globe.[1] Within the region contrasting levels of development are coupled with the complexities of multicultural and binational interaction among its peoples. Another obvious feature of the United States-Mexico Borderlands is that of conflict among socioeconomic groups. During the past decade, the region has experienced significant economic growth and is being subjected to increasing levels of conflict over resource allocations.

Within the boundaries of the Borderlands, there is an economic region that has all of the aspects of being unique in an international setting;[2] its two federal jurisdictions are coupled with those of three state governments. A common resource, a principal river basin, has been and continues to be a key element in the economic development of the region. There is a significant measure of interdependency between the two border economies; at the same time, the measures of economic and social well-being on one side of the border are markedly disparate with those on the other. These two characteristics, namely the nonhomogeneity and the interdependence, are what constitute the element of uniqueness.

The twin-community complex of Ciudad Juarez, in the Sate of Chihuahua, and the City of El Paso, in the State of Texas, includes an area described by a radius of 375 km. emanating from the hub of the

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1. E. Orton, *et al.*, Beyond the Bicentennial: Economic Projections for Southern New Mexico (technical report in preparation: New Mexico State University Center for Business Services, Project No. 5700-035).

2. J. Zwerneman, Income and Employment Flows Across Binational Markets (paper presented at Thirteenth General Conf., Int'l A. for Research in Income and Wealth, Balatonfüred, Hungary, Sept., 1973).

two cities. On the northern side of the border, twelve counties of New Mexico and five counties of Texas constitute that part of the region identified by the U.S. Department of Commerce as Bureau of Economic Analysis Economic Area 145.[3] It also is classified as the Rio Grande Water Resources Subarea 13. The southern part of the economic region encompasses the northern part of the State of Chihuahua and includes Ciudad Chihuahua at its southern extremity.

Beginning in 1965 a series of dramatic changes in the patterns of growth and development occurred throughout the Borderlands. These changes can be attributed to a number of factors, but the Mexican border industrialization program has been a principal one. Changes in both the social and economic frameworks on each side of the border have induced considerable interest on the part of investors, producers, government agencies and academicians alike. At the same time, population growth supplemented by in-migration and industrial development (both present and projected) have generated concerns with resource conservation and environmental quality.[4]

The localized growth dilemma besets not only this region but the entire Borderlands region as well. The problem is truly one of global proportions. The dilemma is that unregulated growth cannot be effectively sustained in the future.[5] These regional economies generate growth demands on finite resources that have limitations of support. The increasing costs of material, economic, and technological growth are becoming more obvious. To understand the situation, one needs only to consider the limits projected on: a) fossil fuels and other sources of energy; b) fresh water; c) mineral and nonmineral resources; d) arable land and habitable space; e) the waste-absorbing capacity of the natural environment; and f) the resilience of the region's life-supporting ecosystems.

PROBLEM DESCRIPTION

The importance of water in determining regional growth patterns in arid and semi-arid areas is of no little consequence. In fact, water availability is a necessary if not a sufficient condition for growth and development.[6] The problems of growth are compounded as well in a

3. U.S. WATER RESOURCES COUNCIL, 1972 OBERS PROJECTIONS, REGIONAL ECONOMIC ACTIVITY IN THE U.S. (1972).

4. J. ZWERENEMAN, A NEEDS ANALYSIS OF THE PORT OF ANAPRA DEVELOPMENT PROGRAM (1972).

5. W. HARMAN, AN INCOMPLETE GUIDE TO THE FUTURE (1976).

6. P. McDEVITT, R. CHRIST, *et al.*, INVENTORY OF THE ECONOMIC, SOCIOCULTURAL, AND SOCIOECONOMIC RESOURCES IN THE RIO GRANDE VALLEY FROM ELEPHANT BUTTE RESERVOIR, NEW MEXICO, TO FORT QUITMAN, TEXAS (1976).

Borderlands environment, where there is competition for the vital resource, in this case, water. The transformation of environmental externalities is not easily resolved by actions of international organizations much less the market system of allocating resources.[7]

In recent years, the nature of the water resource problem in the Southwest has evolved from the primary concerns of water rights arrangements to the efficient utilization of existing water resources. In the Borderlands region centering on El Paso-Juarez, water resources management is the issue of greatest contemporary concern.

The problem is being addressed, at least in part, by a consolidated research effort known as the Rio Grande Regional Environmental Project (RGREP). The acronym RGREP refers to a total water management plan for a section of the Rio Grande Valley, the 258-mile stretch of land between Elephant Butte, New Mexico and Ft. Quitman, Texas. RGREP resulted from the growing concern of the local populace regarding the magnitude of the water problem facing the area. A lack of information about the local land and water resource endowment proved an insurmountable barrier to realistic water use planning. Thus, in 1973 the Bureau of Reclamation accepted responsibility for coordinating the water resource planning efforts of a host of federal, state, county, and city agencies, as well as private groups and universities. The completed total water management plan to be available in 1978 will contribute to the sound and orderly development of the regional resource base.

The RGREP project is not limited to the study of the regional water endowment. The study has been broadened to encompass a full economic, social, environmental, and cultural assessment of the RGREP area and its potential. It was, in fact, the purpose of a specific work element to develop a baseline inventory of the socioeconomic, economic, and sociocultural resources of the Rio Grande Valley. Specific project goals included:

1. The compilation of an extensive data base summarizing the socioeconomic and economic resources in the RGREP area; and,
2. the definition, assessment, and evaluation of the regional sociocultural baseline inventory.

The first objective has been satisfied through the compilation and analysis of an extensive regional data bank. These data document the socioeconomic and economic resource endowments of the RGREP area, and they will be used to estimate the impacts of various water management alternatives. Information was collected from a broad

7. d'Arge, *On the Economics of Transnational Environmental Externalities*, in ECONOMIC ANALYSIS OF ENVIRONMENTAL PROBLEMS 397, 434 (E. Mills ed. 1975).

range of public and private as well as primary and secondary sources. The usefulness of this data may be judged by the effectiveness with which it delineates the study area to the uninformed but interested reader. Current research is directed to the use of the data to generate a series of alternative growth scenarios for the region.

The primary growth sectors in the Rio Grande Valley in terms of jobs and incomes generated are manufacturing, agriculture, and government. The majority of the manufacturing and industrial development is concentrated in the El Paso-Juarez metropolitan complex. The economic expansion of the recent past is expected to continue as firms, attracted perhaps by the cheapness of the regional labor force, continue to relocate into the area.

Agriculture is practiced widely throughout the RGREP area. Until relatively recently, the region was primarily dependent upon agriculture for income and employment. The most notable feature of agriculture in the Rio Grande Valley is that it is based entirely upon irrigation. There are presently 159,650 acres of water right farmland, for which the major source of water is the Rio Grande.

The contributions of the public sector are both sizeable and diverse. Federal monies utilized in the construction of facilities at White Sands Missile Range and the NASA Apollo site have contributed significantly to the economic base of the region. The growth of New Mexico State University and the University of Texas at El Paso have also benefited the region. In addition, Elephant Butte and Caballo Dams have generated income and employment through recreation and agriculture. Investments in local transportation have created a network conducive to effective marketing of locally produced goods and have indirectly helped accelerate the increasing importance of El Paso-Juarez as a foreign trade outlet.

The second objective of this research calls for the development of a sociocultural baseline inventory of the RGREP area. Such an inventory is defined here as a composite of attitudes of residents toward contemporary lifestyles in the Rio Grande Valley and toward the role of water in influencing those lifestyles. The purpose of this baseline inventory was to characterize the configurations of local feelings toward the environment as it is today and as it is likely to be in the future.

The sociocultural baseline inventory is based upon a set of two distinct instruments which were developed and administered over a period of three months. Such a multi-faceted research approach proved productive for several reasons. First, the research techniques themselves were complementary in their diversity; for example, the characteristic weaknesses of purely objective and purely subjective

survey techniques were offset in part by combining both approaches, while the advantages of each were retained. Second, the implementation of three distinct instruments permitted the targeting and sampling of two separate subgroups of the population. This minimized the probability that the results would be unduly influenced by an unknown characteristic of a single sample. Finally, the information derived from an integrated set of well-designed survey instruments formed an overlapping, complementary data base that was more useful in composite than was the sum of the individual findings.

The results portray a population that, on the one hand, is remarkably consistent in terms of its likes and dislikes and that, on the other hand, is potentially at odds with itself. RGREP residents value those facets of life that have contributed to the recent growth of the Southwestern United States. These include a delightful climate, clean air, wide open spaces, and a generally unfettered, non-hectic lifestyle. Such attributes might generally be considered ecological or qualitative in nature. The prime shortcomings of local lifestyles seem to be mainly economic. These include such constraints as limited employment opportunities and relatively low incomes. Thus, the advantages and disadvantages of the local environment seem to be obvious and well ordered, at least to local residents.

Attitudes toward water, while somewhat more complex, are similarly congruent. Residents are extemporaneously noncommittal about water issues but tend to acknowledge the regional importance of water when the issue is raised explicitly. Furthermore, under conditions of regional water shortages, residents are in accordance that scarce water supplies should be heavily allocated in favor of household and agricultural uses, with industrial and recreational needs relegated to relatively low priority rankings. In terms, therefore, of future developmental alternatives, the local population favors a primarily rural agrarian setting similar to that which exists in the RGREP area today, and it is willing to allocate the regional water endowment to promote such an environment.

In an economic sense, there may be an inconsistency in such a regional preference function. It would be feasible, for example, to maintain an agricultural economic base in the Rio Grande Valley, but there is some doubt that this economic growth path could generate socially acceptable levels of employment and income. The residents of the RGREP area would consequently be confronted with a familiar dilemma: within existing water constraints, a growth plan could be chosen that would maintain an ecologically acceptable environment with considerable unemployment and depressed incomes, or a growth path might be chosen that generates more acceptable levels of

employment and income at considerable cost to the local environment. The comprehensive water management plan that will eventually be adopted should almost certainly be a compromise scenario. In the final analysis, the entire RGREP planning effort may well be evaluated in terms of its ability to effectively compromise between such competing options.

RESULTS OF RECENT AND ON-GOING RESEARCH

The allocation-management plan for a relatively fixed supply of water currently being addressed by RGREP has led to a number of research efforts initiated by faculty and staff at New Mexico State University. There are three projects that are closely related,[8] and a major present effort is underway to develop a series of short- and long-range projections of social and economic activity with the corresponding estimates of water demands by user-sectors. The narrative below draws heavily upon the results already reported and in progress.

The Basic Water Allocation Problem

The RGREP study consists of four counties—two in Texas and two in New Mexico. Initial estimates of water diversions within the region equal 1.2 million acre-feet. Of this total, about 83 percent is for agriculture. Sierra and Doña Ana Counties in New Mexico account for about 42 percent, and El Paso and Hudspeth Counties in Texas account for the larger share, 58 percent. Depletions are less than one-half the 1.2 million acre-feet total, and agriculture is accountable for more than 88 percent.

At present rates of growth in the region, at about 2 percent per annum in New Mexico and higher rates in the El Paso-Juarez region, the real crunch can be expected to occur sometime following the turn of the century. The basically stable supply will be matched by demands that, in turn, will be a direct function of population growth, in-migration, industrial development, and the growth of corollary services. The role of agriculture is to be a function of whatever management structure is derived.

One alternative is a no-management plan and to let the "market" take its course. The sets of possible impacts transposed from other study areas[9] could lead to policy decisions designed to alter the path

8. *Supra* note 6; P. McDevitt & R. Christ, The Identification and Analysis of Attitudes toward Comprehensive Regional Water Planning, (manuscript submitted to GROWTH & CHANGE, 1976); *supra* note 1.

9. R. PARKER, *et al.*, EVALUATION OF IMPACTS OF A "NO-MANAGEMENT" PLAN ON THE SAN ANTONIO-GUADALUPE RIVER BASIN (1975).

of growth and development. Part of the RGREP research has been structured to assist in evaluating alternative courses of action.

The Inventory

The purpose of this research was to develop a sociocultural, socioeconomic baseline inventory for the Rio Grande Regional Environmental Project (RGREP). Such an inventory is a complete audit of the salient economic, social, and cultural relationships that are indigenous to the area. In order to reduce this formidable task to manageable proportions, only that information has been collected that was deemed instrumental to effective regional resource planning.[10]

The Project Area is a narrow strip of land bordering the Rio Grande for 258 miles through Texas and New Mexico. It includes two counties in Texas (El Paso and Hudspeth) and two counties in New Mexico (Doña Ana and Sierra). From a sociological viewpoint, this region is indeed unique. It possesses a rich historical legacy, having experienced four cultural infusions (Spanish, Mexican, Indian, and Anglo) and incorporating two nationalities (Mexican and American). The river itself is an international border, a fact enforcing its already symbolic importance. In short, the area is rich in the social and cultural diversity of its customs, institutions, and people.

The RGREP area is dominated by the El Paso-Juarez metropolitan complex. While Juarez is not strictly speaking a part of the RGREP area, Juarez and El Paso are, in fact, "twin cities," separated only by the Rio Grande; from an analytical point of view, the two cities should be considered as one. El Paso is a major trade center in the southwestern United States, and with Juarez, it is the major international port between the U.S. and the Republic of Mexico. The population of El Paso is large (377,000 in 1975) and growing; it is composed mainly (60 percent) of Mexican Americans, with a population that tends to be slightly skewed toward the elderly. For its part, Juarez is experiencing a virtual population explosion; the mid-1975 population exceeded the 1974 count by five percent. This population gain is attributable to both high birth rates and a vast in-migration from the interior of Mexico.

In the last quarter century, the economic base of El Paso (and to a much lesser extent, Juarez) has broadened dramatically. The once primarily agricultural area now relies heavily upon private industry and the public sector for employment and income. For example, between 1967 and 1974, manufacturing payrolls increased 138

10. *Supra* note 6.

percent. Attracted, perhaps by an abundant pool of relatively cheap labor, new industries have tended to be of the relatively labor intensive variety, providing needed employment. Similarly, public sector expenditures, particularly military expenditures, have risen both in real and in nominal terms since 1962.

While agriculture does not occupy the position of unquestioned supremacy that it once did, farm production is an important component of the El Paso County economic base. During the period 1970-1974, the value of all farm products sold rose by 40 percent. The major cash crops include cotton and cottonseed, milk, fed beef, vegetables, pecans, and eggs. As is true to a greater or lesser extent for all farm products in the Rio Grande Valley Area, these are heavily dependent upon an extensive irrigation system which draws water from the Rio Grande. It is a truism that should farmers be deprived of this vital water source, the agricultural sector would figuratively and literally "dry up."

The growth of the service and trade sectors in the "twin-cities" complex has been steady if not spectacular. A breakdown of the service sector reveals that most services fall into the "personal" category. The most notable feature of the trade sector is the increasing impetus of international trade between Juarez and El Paso. Export transactions have grown relatively quickly on the United States side, so that in 1972-1974 El Paso's net trade balance with Mexico showed a surplus for the first time since 1965. Whether this trade surplus will continue depends upon relative price differentials and, among other things, international geopolitics.

In stark contrast to the growing El Paso-Juarez metropolitan area, the remainder of the RGREP area has remained primarily rural and agrarian. With the exception of Las Cruces and perhaps Truth or Consequences, New Mexico, the river valley is dotted with small communities that are best described as agricultural trade centers. Incomes in these towns tend to be relatively low, and employment possibilities are limited.

Such generalizations, however, are inappropriate for the rural agricultural base. In El Paso County, farm production is becoming an increasingly important component of the economic base, in both absolute and percentage terms. To the north, Dona Ana is the leading county in New Mexico in terms of agricultural output. Major cash crops there include cotton and cottonseed, pecans, lettuce, chile, small grains, alfalfa, and onions. A noticeable increase in wheat output has also occurred in recent years, spurred by the strengthening of international wheat markets.

As a general rule, growth prospects appear moderate in the Rio

Grande Valley outside of El Paso. This is attributable partially to the spatial predominance of agriculture and partially to the economic base of the relatively small urban areas. For example, Las Cruces, New Mexico (population, 42,000), depends heavily upon public sector employment, which has shown at best a moderate growth. Truth or Consequences, New Mexico (population, 5,700) relies upon retiree incomes. Therefore, barring major changes in water-based recreation activities at Elephant Butte, the present concentration of population and economic activity in the Rio Grande Valley is unlikely to vary in the years to come.

The socioeconomic profile of the RGREP area presented above poses a very real problem to regional water planners. Although the El Paso-Juarez area is small in terms of the land mass of the RGREP region (2.8 percent), it does represent the major population concentration (88 percent); and if water needs are perceived as a function of population, water needs are greatest and growing fastest there. On the other hand, the great majority of land area in RGREP is functionally agricultural—and that sector is notably land and water intensive. The dilemma is clear: a socially acceptable water management plan must provide an acceptable scheme for allocating scarce water between numerically dominant household water uses in El Paso and spatially dominant agricultural uses in the rest of the valley.

To more clearly illuminate the water-related attitudes of the local populace, a set of key social attitudes and variables were selected to be studied. When identified and interrelated, these were deemed to present a composite of water-related attitudes useful to water planners. These data were obtained operationally from a pair of complementary research approaches which utilized different analytical techniques and which addressed different samples. The result was a well integrated, internally consistent regional sociocultural profile providing an abundance of information for planners.

Such a profile should offer the following. First, it should completely document the working relationship between the area residents and their environment. Harmonious and conflicting relationships should be identified in both present and future contexts. In short, the nature of the status quo, which may or may not be impacted by resource planning, must be characterized. Second, specific attitudinal postures toward water and its importance in the area must be posited. Together these should provide a verbal photograph of the RGREP area in a water relevant sense.

In general, the profile derived from the present effort suggests that residents of the RGREP area are quite pleased with their surroundings. The most favorable characteristics of contemporary lifestyle are

those generally associated with life in the Southwest, e.g., the climate, the people, the lifestyle. It is precisely such features that have contributed to the recent growth of the State of Arizona, for example. And it is also interesting to note that this growth eventually will destroy those very characteristics which initially generated the growth.

The advantages of living in the RGREP area are primarily attributable to the nature of the regional socioeconomic base. Relatively underdeveloped, agrarian regions typically do offer the clean air, open spaces, and generally unfettered lifestyles that are so highly valued. At the same time, such a region will generally possess shortcomings of the type frequently mentioned by RGREP residents: lack of job opportunities and low incomes. Thus, the major regional advantages might be described as ecological, while major shortcomings are economic. It has not been determined whether residents understand that it is the local socioeconomic base which generates those most desirable and least desirable environmental attributes.

The ultimate test of satisfaction with the status quo is whether it is considered desirable in the future. In this regard, residents seem to have well-ordered preferences. In choosing among a set of future growth scenarios, they strongly opt for a future environment which resembles the present and the past. Specifically, a predominant agricultural base and open space and clean air are consistently favored over a relatively more industrialized and densely populated environment.

Several attitudes that are extremely importnat to this baseline inventory have not yet been mentioned explicitly. Feelings about the role of government in the RGREP area are critically important for ascertaining the regional receptivity to public planning, and feelings about present and future water uses constitute the parameters of the water problem itself. Each of these issues has been addressed both directly and indirectly, and the two were found to be interrelated.[11]

One of the characteristics of the local environment about which feelings are strongest is the role of the public sector. The people in the RGREP area are very conservative toward government "interference" or what is perceived to be interference. Opposition was expressed against government "in general" and against government activity for specific needs such as resource planning. Opposition to the federal government was particularly strong. Neither the present nor the future of the RGREP area, as envisioned by its residents, includes extensive public sector involvement.

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11. P. McDevitt & R. Christ, *supra* note 8.

Attitudes toward water proved much more complex. When the issue of water was raised explicitly, most people readily acknowledged its importance. It was consistently ranked as the most important of a number of regional resources. Until water is mentioned explicitly, however, it is conspicuous by its absence in a discussion of regionally significant issues. This lack of extemporaneous concern for water in the Rio Grande Valley is surprising but understandable, for the major explanation seems to be unawareness.

There are two principal reasons for the lack of open concern with water-related issues. The first of these is a lack of historical experience with water problems. Very few persons in the valley, with the exception of farmers, have ever had difficulty obtaining water of sufficient quantity and quality at reasonable cost. For this reason, few persons anticipate water problems in the future. The attitudes of RGREP residents are strikingly similar to those of most Americans prior to the Arab oil embargo of 1974: as long as cheap and abundant petroleum products were available, the public saw no reason to be concerned with increasingly inadequate domestic oil reserves. One hopes that history will not repeat itself in microcosm.

Ignorance of water affairs is also due to the complex framework within which water is allocated and distributed in the RGREP area. The system is based upon numerous international, interstate, and intrastate regulations which are administered by a host of public and private bodies. The effort to understand and evaluate such a system is formidable, indeed. It is a fact that even many large agricultural water users, whose welfare is directly based upon water, do not understand (or will not admit that they understand) the local water system.

While historical precedence and the complexity of the water regulatory systems are probably the most important reasons for the apparent ignorance or the lack of opinion concerning water, there are certainly many others. This rather uniform lack of concern and knowledge regarding water suggests an interesting hypothesis. Prognostications on the basis of only a preliminary investigation are notoriously unreliable, but an inference is at least warranted. Much of the opposition to government planning in the Rio Grande Valley might dissipate if the public were aware of the basic water situation. It is, after all, the basic purpose of comprehensive resource planning to optimize the regional development within relevant resource constraints, and the public has demonstrated its appreciation of water in regional development efforts. Therefore, to promote concerted planning efforts, the impending shortage of water must be communicated. This awareness is an acute necessity in the RGREP area, where

institutionally determined prices fail to accurately reflect resource scarcity.

The effectiveness of this inventory is considered to rest heavily upon the capacity to identify future water use attitudes in a water scarce environment. Since this is the most likely scenario in the Rio Grande Valley, a knowledge of these attitudes is useful for several reasons. First, they more effectively elucidate contemporary feelings toward water and water uses in a semi-arid region, and second, such a social profile clarifies the extent to which future expectations coincide with realistic possibilities. Accordingly, a considerable effort was directed at determining desirable growth paths given known water constraints.

In a variety of water stress situations, desirable growth prospects are consistently well-ordered extrapolations of the present environment. Residents are relatively unanimous in their rankings of priority water uses under a range of cost and availability situations: they consistently allocate water first for farm and household uses, and next for industrial and recreational needs.

If, in fact, a severe water shortage occurred, three-fourths of the residents consulted would ration water in the following order: agricultural, household, industrial, and recreational needs. In this ordering, inhabitants are strongly in concordance. A regionally scarce resource endowment should be used to support a future lifestyle that is primarily agricultural and residential.

The population that has been characterized above is most notable perhaps for the unanimity of sentiment toward contemporary lifestyles and toward the role of water in the environment. There are divergencies of opinion, of course, depending upon the occupation, place of residence, and ethnicity of the respondents. The importance of such differences in attitudes should not be minimized, and these are dealt with in considerable detail in the appropriate chapters. The lasting impressions, nevertheless, are of a population that is satisfied with present living conditions in spite of acknowledged shortcomings, a population that hopes and expects that the future will not depart dramatically from the present and that will ration a meager but vital resource to assure continuity; and a population that, perhaps because of its insensibility to local water problems, does not foresee the need for public sector assistance in regional resource planning.

3. *Policy Conclusions*

As a point of departure, several issues that are worthy of further analysis should be mentioned. The first deals with the nature and ramifications of the regional growth process. At a conceptual level,

growth might be considered a process of allocating societal resources among a constellation of socially desirable ends. As in the Rio Grande Valley, resource utilization might be most desirable for sustaining a rural, agricultural environment rather than a heavily industrialized one. Such a dilemma is well understood, and the ramifications are clear. A non-industrialized development pattern offers an ecologically pleasing environment with all the benefits that RGREP residents enjoy, but these advantages exist at the cost of limited income and growth possibilities. The implications of such a choice in an area with a growing population are clear: in the long run, an economy that fails to generate sufficient employment for its own population will suffer sizeable unemployment and depressed incomes. Thus, the benefits and costs of alternative growth patterns, which will result from alternative water allocations, should be clearly specified. There are various techniques for formulating such information. The most popular of these is regional input-output analysis.

A second issue concerns the allocation of water between agricultural and household users. In spite of the fact that these were designated the top priority uses, a conflict between the two needs is inevitable. The sheer magnitude of water requirements for both makes a trade-off imminent. The best water need projections for El Paso alone indicate growing water needs in the future. If continued pressure upon relatively fixed water supplies continues, the apparent coalition of household and agricultural water users should be expected to deteriorate. The value of comprehensive regional resource management may well be judged by the effectiveness with which it encompasses such an eventuality.

4. *Developmental Scenarios*

A series of growth scenarios[12] are being developed by using alternative sets of growth projections. These projections are designed to utilize water coefficients for estimating alternative demand configurations. The results will be analyzed in terms of output, employment, income, and capital requirement factors. Models developed by others[13] will be utilized as well as techniques of divergence mapping

12. For a scenario prepared subsequent to this paper, *see* New Mexico State University for Business Services, Long Run Impacts of Regional Water Management Policies in the Rio Grande Valley from Elephant Butte Reservoir, New Mexico to Fort Quitman, Texas (report to Bureau of Reclamation 1977). The principal investigators were Richard Christ and Paul K. McDevitt.

13. D. RIELD, J. BARRON & B. LONG, eds., WATER AND COMMUNITY DEVELOPMENT–SOCIAL AND ECONOMIC PERSPECTIVES (1974); H. FULLERTON & J. PRESCOTT, AN ECONOMIC SIMULATION MODEL FOR REGIONAL DEVELOPMENT PLANNING 76-81 (1975); N. GEORGESCU-ROEGEN, THE ENTROPY LAW AND THE ECONOMIC PROCESS (1971); R. Haveman, *Efficiency and Equity in National Resource and*

for the region. The general format consistent with future research is being utilized.

AN AGENDA FOR FUTURE RESEARCH ON THE REGION

The advent of the establishment of the Southwest Border Economic Development Region by the U.S. Department of Commerce will, no doubt, set the tone for future research efforts for the entire Borderlands. A primary item on the priority list of action programs will be to initiate a set of compatible income and product accounts. This has been addressed earlier as a necessary step in measuring regional progress.[14] More recently, Taylor[15] has provided an agenda for research that is designed to cover three topical sets: 1) economic structure and growth (including some of the projections currently underway plus a comprehensive resource management scheme); 2) human resource analysis; and 3) topics related to production and managerial economics.

Each of these areas can be approached with what Taylor calls the economies of intimacy and scale. The former are the concern and mandate of those who are a part of the region and are concenred with the changing environment. The latter is a more comprehensive view and is concerned with the national and transnational interests. To those of us who are a part of the Borderlands, our mission is to maintain a constant awareness of the changes as they occur and to try to improve our reflection of what is to be. The blend of economy, polity, and society is the umbrella under which we must strive for the common good.

RESUMEN

Un elemento crítico en determinar el futuro crecimiento y desarrollo de la economía regional de El Paso-Juárez es la eficacia de agua. Este trabajo examina varios factores importantes que tienen impacto en la posibilidad de crecimiento en la región relacionada con

Environmental Policy, in BENEFIT-COST AND POLICY ANALYSIS 1974 227-237 (R. Zickhauser, *et al.*, eds. 1975); Herfindahl & Kneese, *Measuring Social and Economic Change: Benefits and Costs of Environmental Pollution*, in THE MEASUREMENT OF ECONOMIC AND SOCIAL PERFORMANCE 441-508 (M. Moss, ed. 1973); J. PRESCOTT & W. LEWIS, URBAN-REGIONAL ECONOMIC GROWTH AND POLICY (1975); J. ROTHENBERG & J. HEGGIE, THE MANAGEMENT OF WATER QUALITY AND THE ENVIRONMENT (1974); N. SPULBER & I. HOROWITZ, QUANTITATIVE ECONOMIC POLICY AND PLANNING –THEORY AND MODELS OF ECONOMIC CONTROL (1976).

14. *Supra* note 2.

15. Taylor, *The Status of Borderland Studies: Economics*, 12 SOC. SCI. J., no. 3 (Oct. 1975) and 13 SOC. SCI. J., no. 1 (Jan. 1976) (double issue), at 69-76; J. TAYLOR, TWIN PLANTS AND THE BORDER INDUSTRIALIZATION PROGRAM (1972).

la eficacia de agua. Al centro del asunto hay los actitudes de las poblaciones mezcladas y multi-culturales que viven en el área. Los resultos de estudios actuales y continuos reflejan algo de estos actitudes y sentidos sobre alternativas a crecimiento. Se determinaban estos resultos durante unos trabajos conducidos por el Rio Grande Regional Environment Project (RGREP), fomentado en parte por el Bureau of Reclamation.

El propósito de un aspecto del proyecto fué el desarrollo de un inventario de los existentes recursos socio-económicos, económicos, y socio-culturales del valle del Río Bravo desde la presa Elephant Butte, New Mexico, a Fort Quitman, Texas. Fines específicos del proyecto incluían 1) la compilación de un gran base de datos que pueden servir como un sumario de los recursos económicos y socio-económicos en el área de RGREP, y 2) definir, determinar, y evaluar el inventorio regional socio-cultural. El inventario ahora se utiliza a desarrollar una serie de proyecciones de extensiones, cortos tanto como largos, sobre actividad social y económica con estimatos correspondiente a demandas para agua en áreas que usan estas aguas.

En el estudio incluye descripciones del problema básico de distribución de agua, el inventario, consideraciones en policias, y el formato para el desarrollo de planes alternativos. En conclusión se presenta un agenda para estudios futuros que son necesarios para hacer planes regionales.