

## ECONOMICS AND THE SOUTHEAST ALASKA REGION

George W. Rogers

Forest Practices Training Project, Interagency Session  
Alaska Department of Natural Resources, Klawock, Alaska  
April 27, 1982

Economics and Renewable Natural Resources Management

Increasingly since the 1960's, the term "socio-economic" has appeared in Federal natural resources legislation and management programs and has had its echo in similar state legislation and programs. This trend reached a peak in the mid-1970's (1976 to be precise) in a series of acts of Congress re-defining the objectives of resource management under federal jurisdiction. The latest revision of the forest and range lands laws resulted in a major undertaking by the Forest Service setting up new management plans for the Tongass and Chugach National forests in Alaska which, among other things, attempted to measure and predict the impact of changes in management policy and resource disposal upon regional and local economic (primarily employment impacts) and communities. About the same time the 1976 fisheries management and conservation act created the North Pacific Fisheries Management Council headquartered at Anchorage and charged with the management of all offshore fisheries of the North Pacific Ocean and Bering Sea within a 200

mile conservation zone. The keystone of this responsibility was the annual preparation of management plan with the objective of achieving the "optimum yield" for each fishery. "Optimum yield" was defined as maximum sustainable yield (a biological concept) of the fishery as modified by "any relevant economic, social, or ecological factor." The 1976 Bureau of Land Management organic act formally recognized that the bureau sometime ago had evolved from being a land disposal to a land management agency and set forth the objectives of management. Again, a key element was social and economic impacts (benefits and costs) to the nation, the regions and local communities. Economic considerations had always influenced the biological management of renewable resources via the political system, but now they were made legitimate and visible and, it was hoped, subject to rational regulation.

Most of the agency staff charged with these responsibilities, like the participants in this training project, had backgrounds in disciplines other than economics and social sciences. They were variations of biological and physical scientists and engineers, and the re-definition of forestry, fisheries and land management objectives initially created an economic boom for private consulting firms. Since then there has been the introduction of some in-house social sciences analytical capabilities, but there still remains the need to educate the dominant management staff or at least elevate their awareness of the nature of social and economic objectives. The scheduling of three lectures on aspects of forestry economics in this training project is a recognition of these needs, albeit only the very barest of beginnings.

The Meaning of Economics for Non-Economists

I'm sure that my two colleagues in this economics section share my thanks that instead of having one lecture on something called "forestry economics," the organizers of the project have included three separate and independent presentations of "economics" from three different points of view. Economics is a very broad and complex discipline and an overview of the literature or the course offerings in a university catalogue gives an impression of diverse and seemingly unrelated and, at times, contradictory, subjects. Practicing economists come in a host of species speaking in a babel of voices not always mutually understandable or accepted.

The founding fathers of modern economics, Adam Smith and the French Physiocrat for openers, were highly practical men and conceived their new discipline in the mode of political economy -- an aid to the formulation of "right" policy. Very early on, however, a wrong turn was taken in the evolution of main-stream economics. "Political" was dropped as a modifier and the core of economics moved from applied science to religion, or economics for its own sake, abstracted from everything else by means of ceteris paribus. Although the high priests (there now are also priestesses) may be the academic or "pure" economists (they're the type who ask if you are a real economist), of necessity at the working level and in order to deal with the real world a number of hybrids and some heretics emerged, each tainted or enriched (depending on your point of view) by their working associations. Schools of business and public administration, products of the cross-fertilization of economics and

management, are commonplace. Political economics is enjoying a revival in company with the survival of economic geography or regional economics (depending upon which side of the Atlantic you are living), natural resources or land economics (offsprings of agricultural economics), and other products of a long list of marriages of convenience.

There is an order of sorts, however, in this seeming chaos. Economics is really a constellation of specializations orbiting on a shared common core. We are all concerned with optimization of behavior relative to the satisfaction of the material needs and desires of humanity. This is carried out in a context of scarcity in that human desires can always be assumed to outstrip the means of their satisfactions (hence the need to "economize"). Anything concerned with these objectives and terms can be taken to be economics, pure or profane.

The meanings and forms of optimization vary according to the definition of the boundaries of the subject unit of analysis. This can range all the way from society as a whole or in its other natural and regional entities, industries, firms, households and individuals. Accordingly, what is to be maximized or optimized is a spectrum including net benefit (excess of benefits over costs) to society, industrial efficiency, income distribution (appropriate allocation of rents, wage, profits, to the corresponding factors of products), firm profits (or minimization of loss), individual satisfactions, etc. What is central and essential in one case may be external to another and excluded from analysis (i.e. an "externality" assumed to remain constant). Space or time does not permit any review of all of this, but you should get

sampling of the variety of existing vocabularies from the three papers that follow.

Because most of my career as a practicing economist has been devoted to working with politicians and resource managers (generally biologists), in the interest of communication I generally depart from the jargon of my discipline, although remaining true to its essence "in my fashion." Also, I differ from many of my colleagues by avoiding embracing or attempting to swallow other disciplines to which it is necessary to relate. This is usually done through hyphenation (e.g. socio-economics or bio-economic modeling). The application of economics to natural resource management rather should be as one element in a form of multi-objective analysis each element of which has its own accounting rules. This approach recognizes that in the real world the manager is dealing with a complex of different systems -- biological, ecological, economic, social -- each with definable boundaries and purposes, but all interacting with and on each other. The politically determined objectives with which he must work can be identified with one or more of these systems, but the manner of dealing with each has to be in terms appropriate to the individual system.

Once more time constraints do not permit even an overview of this basic and little understood aspect of resource management -- the relativity of specific management objectives to basic systems and processes. <sup>1</sup>The balance of this lecture will be devoted to an introduction to a way of looking at the Southeast Alaska regional economy

and a means of analyzing the impacts of management upon jobs in the region.

### The Southeast Alaska Regional Economy

As with other lectures on this program, I will be treating my assigned topic of "Economics, a Regional Overview" as a case study using the Southeast Alaska economy. There are a number of ways in which this economy could be described and analyzed. If the primary concern of the overview is national and international interests, the most appropriate form of an overview would be in terms of the regional economy as a system for converting available raw materials (natural resources) into consumer goods (e.g. minerals, forest products, fisheries products). The analytical tools would be such accounting devices as gross regional product (the regional equivalent of GNP or Gross National Product), balance of trade, etc. Or the regional economy could be considered as a means of producing and distributing income, which not only gives a useful picture of its internal structure and functioning, but the allocation of benefits of the process between resident and non-resident participation. Currently the most politically relevant view is in terms of the creation and maintenance of employment. At the regional and local levels economic survival is often measured in terms of jobs and most resource managers are all too aware that the battle between environmentalists and

---

1. For a full discussion see George Rogers, The Economic Importance of Commercial Fishing in the Southeastern Alaska Region, Vol. I, ISER, February 1982, pp 83-102.

commercial developers is drawn up in terms of protection of wilderness values vs. creation of jobs. This will be illustrated in the final section of this lecture through an economic-base model of the region using employment data. First, however, a historical overview of the evolution of the present regional economy will be presented with a gloss on the historical uses of the region's forests.

At the time of the first continuous Western contacts (circa 1790) a population variously estimated at between 15,00 and 20,000 was supported by the region's abundant marine resources (primarily salmon) supplemented by wildlife and berries. The forests provided materials for shelter, transportation (dugouts), utensils, and ritualistic monuments and decorations, but their basic importance to the people was in providing the critical habitat for the spawning of salmon and survival of wildlife resource. The Russians were singlemindedly concerned with the fur trade and used timber as a support of this pursuit in building their forts, houses and ships. During this period the total population seriously declined due to exotic diseases, such as small pox, brought in by the new immigrants or sweeping up from the Mexican and American settlements far to the south. The first attempts at census taking in the 1830's indicated a decline to about 9,000 persons which continued downward to about 8,000 by the 1880 U.S. census. The American occupation up until the 1950's was almost as specialized as the Russian, the basic economy being the extraction of gold and the harvesting and canning of salmon. Following the establishment of the first gold camp and salmon canneries in 1878 population rose rapidly for a brief period and then stabilized at between 20,000 and 25,000 until 1950.

The 1950's were a time of dramatic transition in the region's economy. Gold mining never did recover from the wartime shut down of mining operations in 1944 and the salmon resource crashed, the average annual catch of a quarter of a billion pounds of fish in the 1930's dropping to about eight million pounds in the 1950's. But a counter-trend was set in motion by the first serious commercial use of the forests with the establishment of pulp mills at Ketchikan and Sitka in 1954 and 1959 and expansion of timber facilities at Wrangell and elsewhere in the region. Prior to this the commercial forest harvest had been restricted to some local use and specialized export of Sitka spruce and cedar. In the period between the founding of the first pulp mill and the second timber harvest increased three-fold over the average annual harvest of the preceding five year period and by the mid-1970's had increased about ten-fold over the pre-pulp period. Due to poor market conditions in Japan and the lower United States, there has been a serious decline in forest products industry output and under the provisions of the Alaska National Interest Lands Act of 1980 the possibility of future expansion has been restricted.

The 1960's and 1970's not only saw the establishment and expansion of timber production as a main element of the region's basic economy but also a significant recovery in the yield of salmon resources and, fueled by petroleum revenues, an explosive expansion of employment in government, from 4,590 in 1970 to 11,010 in 1979. Total regional population increased from 28,203 in 1950 to 35,403 in 1960 and 53,854 in 1980. An analysis of the structure of the economy in terms of employment demonstrates that the three major forces of change in the economy are



State government (because of the location of the State capital at Juneau), timber and fisheries in that order. The future recovery of mineral production as a significant factor in the regional economy appears to hinge on U.S. Borax being able to develop one of the largest known deposits of molybdenum near Ketchikan and a multi-mineral project proposed on Admiralty Island. Both projects are under vigorous attack by environmentalists.

Because of the importance of the maintenance of employment to the region's communities, resource managers must have some means of assessing the probable <sup>employment</sup> impacts of their decisions. Such tools and most of the data required for their use are readily available and understandable. My remaining time will be devoted to a description of one of the most practical and useful.

#### AN ECONOMIC-BASE MODEL OF THE SOUTHEAST ALASKA REGION

The simplest and most useful tool for regional economic analysis is the economic base model. In this type of model, the various segments of the economy are classified as belonging either to the basic sector, which is created and sustained by forces located outside the local region, or the support sector which is determined by forces within the region (the need of local residents and the base sector industries) and which responds to changes in the base sector in some determinable manner. This type of model has been around for a long time under slightly different names and with different labels for the sectors, but whatever the

nomenclature used, all economic base models have a common form of functioning.

All regional or local growth or decline is driven by change in the "basic" sector which responds to exogenous forces. When employment expands in a basic industry, it is assumed that this will induce increased employment in the support industries of the economy. In other words, change in the total regional or local economy is determined through the familiar multiplier process from the basic change. The total direct impact of change, therefore, is determined not only by the magnitude of the initial change, but by the inter-industry relations within the economy as well. Through a further extension of this process, change in total employment is assumed to change total population by some other multiple. Because of the importance of government in Southeast Alaska's economy a third sector, "Local Government", has been added to this model. Local Government (State government less employment related to the functioning of the Capital at Juneau plus city and borough governments) is assumed to be a function of population change.

The model used here for the Southeast Alaska region is described by five equations. Taking the equations in order, total employment in the regional economy is divided into three categories: basic, support sector, and local government (federal government employment is implicitly assumed to be part of the basic sector). Employment in the basic sector is exogenously determined. Support sector employment is proportionately related to total employment. These five equations in five variables (employment levels in the four sectors plus population) can be solved to

show that total employment is strictly a function of employment in the base sector. The "multiplier" relating total employment to base employment is determined by the parameters of the equations.

$$(1) E = B + S + GL$$

$$(2) B = B_0$$

$$(3) S = c_1 E$$

$$(4) GL = c_2 P$$

$$(5) P = c_3 E$$

Then,

$$E = B_0 + c_1 E + c_2 (c_3 E)$$

or

$$E = \frac{1}{1 - c_1 - c_2 c_3} B_0$$

Where

E = Total Employment

B = Employment in Basic Industries

S = Support Sector Employment

GL = State and Local Government Employment

P = Population

The first step in applying this model is the determination of what constitutes a basic industry and what constitutes a support industry; the operation of the model is extremely sensitive to how this is done. On a case-by-case basis a determination can be made by referring to the definitions. For example, the establishment of new timber harvesting and

processing activities in the region would introduce new jobs and income into the local economy directly in these activities and eventually would cause further expansion in employment and income through additional support sector activities (retail and wholesale trade, services, transportation, schools, etc.). The reduction of such basic activities would have a similar multiplier but negative effect. On the other hand, in the absence of any change in the basic sector, a new grocery store would merely fight for a share of the existing market.

In the attached table the employment of the southeast region for calendar year 1965 and annually for the period 1969 through 1979 has been organized in accordance with the model sectors. This is the twelve month average for each year and is below the highest month of employment (in most years the month of August) in accordance with the relative seasonality of each industry or activity. For example, commercial fishing <sup>employment</sup> for 1979 was 6,277 for the month of August as compared with the twelve-month average of only 2,440, while for timber, pulp and lumber the month of August was 3,172 as compared with the twelve-month average of 2,615 and support sector employment went from a peak of 10,840 to an annual average of 9,840.

The most obvious group of industries belonging to the basic sector are the commodity-producing industries. Virtually all of the output of fish harvesting and processing and logging and forest projects is for markets outside the region and is determined by their requirements and demands. The amount consumed within the region, of course, should be estimated and the related employment allocated to the support sector, but

such a calculation is difficult in the absence of hard data and in any case would be relatively minor. "Other manufacturing" is a catch-all miscellaneous of commodity-producing activities and includes both basic and support (e.g. bakeries, newspapers, etc.). No attempt was made in this exercise to break this into two sectors because in total it is of minor importance.

Construction is also difficult to accurately allocate from the data sources available. For example, home building, expansion of school facilities, utilities expansion, etc. are support in nature, but in this model all or most might also be considered to be part of the local government sector as much of the grants and subsidies are from this sector and such construction activity is a function of population just as is the local government sector. "Road and street construction" includes many basic sector activities (e.g. logging roads). Public works would appear to be induced or part of the support sector, but greatly increased state revenues from oil and gas developments resulted in a boom of all types of public works construction from 1972 onwards, quite beyond normal needs response. These included new state office and court buildings throughout the region, airports (an international airport at Ketchikan and jet airfields at Wrangell and Petersburg), a four-lane expressway at Juneau, major building and other additions to the state capitol complex at Juneau (one of the region's major basic industries being capital-related government), and community facilities at the local level financed by unusually generous state grants-in-aid or outright appropriations. All of these construction activities were considered to be basic in nature as they would not have been undertaken in the absence

of state revenues and because they introduced new money and employment from sources outside the region.

In view of all these considerations and in the absence of a basis for allocating construction employment among the three sectors, all was lumped in basic employment. "Mining" was so minor that in some years segregation would have involved disclosure. This was combined with "construction."

Federal government was allocated totally to the basic sector. The major employers -- the U.S. Forest Service, Department of Transportation (including the Coast Guard), and National Marine Fisheries Service -- perform activities which are in the national as well as the region's interest, or are strongly identified with the private enterprises engaged in basic sector activities. Because of the location of the state capital within the region, state government in the Northern Division was divided into basic and support on the basis of an annual classification made of jobs at Juneau into their statewide, regional, and local orientations. Most of the "military" employment in the region is the uniformed personnel of the Coast Guard.

No attempt has been made to identify tourism-related employment for inclusion in the basic sector, because no means were found to segregate from Department of Labor employment records those businesses in transportation, services, and trade which rely in whole or part upon tourists. The inclusion of these basic activities in the support sector

are probably offset in whole or major part by inclusion of some construction support activities in the basic sector.

The model parameters were calculated for each year in the period 1969-79 from the data in the attached table. The first ( $c_1$ ) was calculated by dividing support sector employment (S) by total employment (E), the second ( $c_2$ ) by dividing local government employment (GL) by total population (P), and the third ( $c_3$ ) by dividing population (P) by total employment (E). In reviewing the resulting constants for each, it was discovered that the first three years, 1969-71, differed significantly from the remainder of the series. This difference probably occurred because the interindustry relationships and linkages were still in a stage of dynamic change continuing from the preceding period, and state government spending had increased dramatically after 1971. These three years were eliminated, and averages for the eight years 1972-79 calculated as follows:

$$c_1 = 0.32936$$

$$c_2 = 0.08729$$

$$c_3 = 2.06235$$

From these three parameters a total employment multiplier was calculated as 2.0384. This means that if the basic sector employment were to increase by 1,000, total employment would increase by 2,038. From the other equations population would increase by 4,203. The other sectors' increases would be 367 for local government and 671 for support sector employment.

The application of this model to forest and other natural resource management can be traced through the expected impact of regulation or policy changes upon the availability of the resource for harvest. From an analysis of the structure and functioning of the related resource harvesting, processing and marketing industry, it is possible to translate this quantity of raw material into an increase or decrease in employment in the basic industries sector of the economy. The model then provides a means of estimating the probable further indirect impacts upon total employment and population.



SOUTHEAST ALASKA - TOTAL POPULATION AND 12-MONTH AVERAGE EMPLOYMENT, BY SECTOR AND INDUSTRY  
1965 - 1979,  
(12-MONTH AVERAGE, NUMBER OF EMPLOYEES)

	<u>1965</u>	<u>1969</u>	<u>1970</u>	<u>1971</u>	<u>1972</u>	<u>1973</u>	<u>1974</u>	<u>1975</u>	<u>1976</u>	<u>1977</u>	<u>1978</u>	<u>1979</u>
Total Population	41,300	41,900	42,900	45,000	45,200	46,600	47,800	50,300	54,400	54,200	53,800	57,300
Total Employment	15,900	17,782	19,161	19,381	21,415	22,579	24,084	24,449	24,931	25,819	27,218	28,113
Basic Industries Employment												
Commercial fishing	1,371	1,445	1,781	1,592	1,722	1,907	2,088	1,769	1,931	1,986	2,454	2,440
Fish Processing	600	731	769	602	825	816	713	718	846	864	999	957
Timber, pulp, lumber	2,334	2,434	2,622	2,579	2,675	3,037	3,337	2,875	2,732	2,898	2,455	2,615
Other manufacturing	100	155	161	142	143	146	187	201	186	171	202	231
Mining and construction	<u>743</u>	<u>617</u>	<u>711</u>	<u>749</u>	<u>1,199</u>	<u>1,341</u>	<u>1,196</u>	<u>996</u>	<u>1,024</u>	<u>1,024</u>	<u>1,071</u>	<u>1,020</u>
Subtotal	5,148	5,382	6,044	5,664	6,564	7,247	7,521	6,559	6,719	6,943	7,181	7,263
Federal-Military	666	670	672	613	589	611	648	676	663	731	717	685
Federal-Civilian	2,095	1,992	2,092	2,037	1,833	1,853	1,892	2,019	2,062	2,110	2,374	2,384
State-Capital	<u>1,003</u>	<u>1,198</u>	<u>1,454</u>	<u>1,625</u>	<u>2,026</u>	<u>1,911</u>	<u>2,124</u>	<u>2,444</u>	<u>2,639</u>	<u>2,772</u>	<u>2,827</u>	<u>2,852</u>
Total Basic	8,912	9,304	10,262	9,939	11,012	11,622	12,185	11,698	12,083	12,556	13,099	13,184
Local Government Employment												
State	955	1432	1490	1583	1683	1674	1785	1850	1862	1614	1721	1798
Local	<u>1,210</u>	<u>1,675</u>	<u>1,787</u>	<u>2,028</u>	<u>2,109</u>	<u>2,297</u>	<u>2,435</u>	<u>2,748</u>	<u>2,725</u>	<u>2,908</u>	<u>3,255</u>	<u>3,291</u>
Total Government	2,165	3,107	3,277	3,611	3,792	3,971	4,220	4,598	4,587	4,522	4,976	5,089
Support Sector Employment*	4,823	5,371	5,622	6,031	6,611	6,986	7,679	8,153	8,261	8,741	9,143	9,840

\*Transportation, communications, utilities, wholesale trade, retail trade, finance, insurance, real estate, services, miscellaneous unclassified.