Forest Service Handbook (FSH) 1909.17

Index of Documents: *Some chapters, because of their length, are organized into several documents. Additionally, interim directives (IDs) and some tables of contents and exhibits are separate documents.*

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Service-wide Issuances

- wo_1909.17_10_Evaluating Economic Efficiency.doc
- wo_1909.17_10_contents.doc
- wo_1909.17_20_Economic Impact Analysis.doc
- wo_1909.17_20_contents.doc
- wo_1909.17_30_Social Analysis.doc
- wo_1909.17_30_contents.doc
- wo_1909.17_zero_code.doc
- wo_1909.17_zero_code_contents.doc

FSH 1909.17 ECONOMIC AND SOCIAL ANALYSIS HANDBOOK

CHAPTER 10 - EVALUATING ECONOMIC EFFICIENCY

Evaluations of efficiency are one of the basic types of economic and social analysis and are an integral part of the planning process at the national, regional, and National Forest levels. Economic efficiency evaluations are required for project selection, functional planning, integrated planning, and budget preparation (FSM 1970.3).

Economic efficiency evaluations are essential for management guidelines and analyses of new or improved management technology.

With a range of applications and levels of detail, it is necessary to present concise instructions for making economic efficiency evaluations. This chapter includes instructions and illustrations for the major evaluation techniques.

Economic efficiency evaluations can be presented in two different modes: 1) as part of, or a supplement to, a planning document with objectives, production processes, and perhaps costs and prices, in other parts of the document; and 2) as a separate document with complete information supplied in one place.

11 - MEASURES. Measures of economic efficiency present problems in terminology and in measurement with which the analyst should be familiar.

11.1 - Use of Terms Economic Efficiency, Cost Efficiency, and Cost Effectiveness. Economic efficiency is a term used to describe how well inputs are used to achieve outputs when all inputs (activities) and all outputs (including market and non-market) are identified and valued. All costs and all benefits to society are included; amounts of each output are not preestablished but are produced in amounts that maximize net public benefits.

Because some outputs and effects cannot be adequately valued in many planning situations and must be handled using constraints in developing planning alternatives, true measures of economic efficiency often cannot be obtained. To call attention to such circumstances, use the term "cost efficiency" to describe an analysis in which some outputs are produced according to their value and others are produced to meet specific levels of public demand and are achieved in the least cost manner.

Cost effectiveness measures how well inputs (activities) in a production process are used to produce a fixed set of outputs. Cost effectiveness analysis is an appropriate form of efficiency analysis under certain conditions. These are:

1. The decision to do the project has been made or is determined to be appropriate in a separate analysis.

2. The benefit stream from all options considered does not vary significantly.

CHAPTER 10 - EVALUATING ECONOMIC EFFICIENCY

A cost effective analysis approach requires the amount of all relevant outputs and effects to be pre-established. Analysis computes the costs of each alternative set of activities and determines the least cost method.

The kind of analysis that is appropriate depends on the information needed for decisionmaking. Use cost-effectiveness analysis if analysis of benefits is not necessary. This may occur if the analysis of specific activities or projects can be tiered to an earlier plan or programmatic analysis. Further cost improvement of individual projects processes may be accomplished utilizing the technique of value engineering (or value analysis).

Programmatic analyses consider only general locations and average site conditions and individual project information may deviate from these data substantially. If project yield or other benefits deviate markedly or fall outside the range of conditions included in the programmatic analysis, a full cost-efficiency analysis of the project may be required.

11.2 - Measures to Rank Alternatives. The preferred measure to rank alternatives is present net value (sec. 15.1). The following principles and guidelines apply to the use of present net value:

1. In general, when comparing alternatives for managing the same resources in long-term analysis periods, present net values are more appropriate measures of economic efficiency than benefit-cost ratios or internal rate-of-return. Because many analysis in other agencies and the private sector are more familiar with the benefit cost ratio and internal rate-of-return criteria it may also be useful to display these criteria. Many computer programs calculate all three criteria to facilitate such displays.

2. In allocating limited budget funds in short-term analysis periods to implement long-term plans, present net values may not provide unambiguous ranking because programs or projects may differ greatly in scale. In such comparisons, benefit-cost ratios or internal rates-of-return may be more useful (sec. 15.2).

Benefit-cost ratios or internal rate-of-return can also be used in comparing alternative non-resource projects for their cost efficiency. They indicate the economic efficiency in terms of the growth of capital used in investment and operating funds.

Total costs and unit costs are appropriate evaluation criteria in cost effectiveness analysis. Unit costs are the preferred measure when difference exists in the quantity of output flows between alternatives analyzed.

Evaluations of economic efficiency must recognize that it is not possible to express all aspects as quantified measures. Some outputs and inputs cannot be valued. In particular, it may be appropriate to include the possibility of uncertain future developments (FSM 1970.6). In some cases, it may be useful to employ a separate measure that would rank alternatives subjectively according to the probability of event occurrence or according to the flexibility of response to unforeseen occurrences.

CHAPTER 10 - EVALUATING ECONOMIC EFFICIENCY

12 - IDENTIFYING INPUTS, OUTPUTS, AND PRODUCTION PROCESSES. Economic analyses must identify inputs, outputs, and production processes. Inputs are factors of production (land, trees, other raw materials, management, labor); outputs result from production (timber harvested, sediment created, wildlife habitat developed or destroyed). Production processes describe how inputs are transformed into outputs (for example, acre X, when logged, produces 50 MBF net, 400 tons of slash, 3 tons of sediment, and so on).

12.1 - Objectives and Measures for Attainment. Either within a planning document or in a separate efficiency evaluation document, include the objectives of the project and a description of how they are to be attained. The objective statement should include indications of extent, measures of attainment standard, and a time frame (if other than that for the proposed plan or project).

12.2 - Uncertainty in Production Processes. Analysts express inputs and outputs in the production process as estimated average quantities. Uncertainty exists about these quantities due to such factors as the occurrence of fires, insect and disease outbreaks, and unfavorable weather over a production cycle. This is also true for prices and costs due to various economic conditions, changes in technology, and inflation and deflation. Analysts and decisionmakers cannot be certain of what conditions will prevail in the future.

The correct approach in dealing with this uncertainty is to conduct the economic efficiency analysis using best estimates of all inputs, outputs, prices, and costs. These average values or expected outcomes should be the best currently available for analysis, even though they will not be the ones that actually occur in the future.

The basic recommendation for handling uncertainty is to avoid direct adjustments of values, but instead present some quantitative indication of the range of expected variation in values. Understating benefits, inflating costs, or using an adjusted discount rate are not appropriate because these adjustments conceal the problem of uncertainty (sec. 15.51).

If a great deal of uncertainty exists about the estimates, the analysis can be repeated using other values, a type of sensitivity analysis (sec. 16.1). Simulation techniques have been useful in this regard. An alternative procedure is to calculate a breakeven value (sec. 16.5) for those values for which a great deal of uncertainty exists.

These procedures provide decisionmakers with a best estimate based upon economic efficiency analysis. A statement of how the results would vary as assumptions change should strengthen the basis for choices.

12.3 - Standards for Time Periods. Evaluations should present quantitative schedules of input and output flows expected over time or refer to such schedules in associated documents. The following applies:

CHAPTER 10 - EVALUATING ECONOMIC EFFICIENCY

1. Time Horizon and Periods. Schedules of inputs (costs) and outputs (beneficial or adverse) should include the significant input and output flows to a common time horizon. The number and length of time periods from the present to the horizon should encompass significant changes in flows of costs and benefits. FSM 1910, 1920, and 1930 specify time periods for various types of Forest Service planning.

Where the length of production processes are unequal, adjust the time stream of costs and benefits to assure comparability, or include estimates of residual values. For example:

a. Use multiples of each prescription. If prescription A has a timeframe of 20 years and prescription B has a timeframe of 30 years, compare a multiple of 3 A's with a multiple of 2 B's, or a 60 year horizon.

OR

b. Assume all alternatives are repeated to infinity by discounting computation.

OR

c. Include a residual value for the land and other resources at the end of a common planning period. Planning systems that use linear programming, such as FORPLAN, often have this feature.

OR

d. Express all present net values as annual equivalent values.

2. Production Process Cycles. Production process cycles span the entire life cycle of the investment. They encompass the set of activities required to establish the vegetation or facilities; maintain the resources, including periodic replacement of major components as needed; recover periodic outputs; and perform cleanup and salvage; and prepare the site or land for another cycle at the end of the process. Activities to remove vegetation, debris, or facilities prior to the start of a cycle are costs of the previous cycle or of developing the land and other resources for production. Specific analyses may encompass all or part of a production cycle. The decision being considered will determine the portion of the production cycle included in the analysis.

12.4 - Standards for Inputs.

1. Measure or estimate inputs at the level of detail significant to the type of planning or evaluation conducted. The detail for inputs included will also vary according to the evaluation objective.

2. For analyses of the most cost-efficient activities or their combinations, inputs often need to be specified as quantities of labor, equipment use, and supplies to determine the best combinations. At this level of detail, trends in costs of activities can be projected through trends in the real costs of inputs.

3. In schedules of inputs and outputs for long-range production processes, factor inputs (labor, materials, etc.) need not be specified individually. Combine them into activities or management practices with their collective costs. For project analyses, specify and analyze inputs to a higher level of detail, since site-specific detail is available. Include them as specific activity types, if costs are available, or as specific factors of production such as materials, equipment and labor.

4. Activities or management practices should be specific enough to permit estimation of costs by decision units (such as classes of land), if the cost or production differences significantly affect economic efficiency among decision units.

5. Include activities legally required to protect the environment or maintain land productivity and costs.

12.5 - Standards for Outputs.

1. Identify and measure, or estimate, the primary outputs contributing to policy, program, plan or project objectives.

2. Identify and measure, or estimate, outputs jointly provided by the production process, but not controlled for, within the policy, program, plan or project objectives. These may be either positive or negative quantities and either desirable or undesirable products.

3. Measure changes in resource productivity as changes in the future flow of outputs.

4. If outputs are significantly different than the average in terms of quality such that higher or lower values should be assigned, identify and evaluate the magnitude of the difference.

13 - ANALYZING COSTS. Cost information has two general uses: planning, including long-term strategic plans, project evaluations, and annual budgets; and control, including fiscal control and performance evaluation. Give consideration to all the uses of cost information when deciding the level of effort to expend in cost development and analyses.

13.1 - Costs of Forest Service Activities.

13.11 - Costs to be Considered. In preparing an economic efficiency analysis, include all costs up through that stage of processing at which the benefits are valued or environmental effects are achieved. Consider expenditure costs (costs or inputs for which funds are paid) and it may be appropriate to consider costs of resources or inputs already owned and diverted from other uses.

1. Costs of activities required by Forest Service policy, in addition to the costs of activities necessary to produce controlled outputs. These activities include:

   a. Maintaining land productivity, protecting the environment, and assuring public safety.

b. Protecting and efficiently maintaining resources, roads and other facilities. Specific standards for the most efficient level of road maintenance and fire protection are in FSM 7732.11 and FSM 3100, and FSM 5100 and FSH 5109.19 respectively.

2. Non-Forest Service costs of public agencies, private firms, and individuals, whether co-operators or users of outputs. Examples of these costs are:

a. When costs are incurred under cooperative arrangements to increase output, include costs up through the processing stage when outputs are valued, such as ranchers' costs installing and maintaining cooperative range improvement treatments, or cooperative funds for brush disposal following timber harvest.

b. When evaluating differences in logging, transport, and other access costs of forest users, all user costs do not need to be included unless differences in costs are incorporated into output values. Only the cost differences between the proposed and base alternatives, such as the cost savings to loggers and recreation users that result from building a road that reduces distance and traveling time are necessary.

13.12 - Standards for Costs. In valuing inputs:

1. Include all transaction costs, such as required shipping and installation fees.

2. Express costs as real dollar values. Using the appropriate base year, support real cost changes by studies of long-term cost trends (sec. 13.33).

3. Provide a similar degree of detail for resource and production process information. One criteria for recognizing resource classes (such as analysis areas) is identifying differences in treatment or access costs. If resource classes are distinguished in the analyses and differences in treatment and access costs exist among them, develop such differences even if methods are used informally. Analysts should consider if the usefulness of more detailed costs, such as by types of activities or by classes of resources, merits the time and expense of developing more detailed cost data.

13.2 - Fixed and Variable Costs. In analyzing costs, place emphasis on variable costs, which will differ among the alternatives being considered, and thus affect the decision process. Determining which costs are variable differs with short-term or long-term analyses.

13.21 - Distinguishing Variable Costs. Because the continued use, maintenance, replacement, and acquisition of capital assets are decisions of long-term planning, the maintenance of existing assets is a variable cost in long-term analyses. For project planning and analysis, the capital assets to be retained and maintained have been decided by the long-term plan. Thus, the same maintenance of existing assets that was a variable cost in long-term planning is a fixed management cost in project-level analyses.

13.22 - Use of Variable Costs in Analysis. Though both fixed and variable costs are real expenditures, generally only variable costs are needed for a decision to select from a lot of similar alternatives. However, it may be appropriate to document costs that are constant for each alternative in the analysis.

The costs that differ between alternatives in short-term analyses, such as in the selection of treatment methods or in prioritizing projects within a planning cycle, are the variable costs within the relevant range anticipated by the long-term plan.

13.3 - Development of Cost Information. In evaluating the production or management processes included in a project evaluation, the analyst must assign costs to each treatment or activity. These include costs of all specific inputs, such as labor, supplies, equipment, fuel, and other expenditures.

13.31 - Conducting Informal Cost Surveys. Even under favorable circumstances, use of average accounting data will not permit development of detailed cost data by method, resource class, size of tract, or other cost influencing factors. The most common means of estimating such data, either average unit costs or relative cost factors, is in the form of informal surveys.

13.32 - Using Engineering Cost Estimates. The estimation of treatment costs can be made by estimating the necessary physical units of inputs and then multiplying this by the unit prices, developing the total cost for a treatment. This is a useful technique when heavy equipment is a predominant input. Often the machine productivity rates can be developed from records of equipment scheduling, and the machine costs can be developed from acquisition, fuel, maintenance, and downtime records. (This is the predominant method used in costing engineering projects).

13.33 - Analyzing Cost Trends. Because real values of outputs change over time, economic analyses should also determine whether or not costs have been changing, with all other factors remaining the same. If a trend has persisted, it should be quantified and used to estimate the real change over time.

Often the costs of treatments have increased in proportion to cost components, such as general labor rates of personal income, or to trends in equipment costs. Projections of these rates are available.

Analysts should be familiar with a number of real cost general indexes. Among them are average personal income estimates found in the RPA Assessment, and the index for the cost of government services found in the annual Economic Report of the President.

Statistical analyses of cost trends are complicated by frequent shifts in treatment methods used or average sites treated. A solution would be to average the trend in costs over one or more business cycles, beginning and ending at the same phase in the cycle.

13.4 - Costs in Partial Analysis. Generally, multiple-use planning methods consider all outputs simultaneously in evaluating alternatives. Partial analyses of producing individual outputs--such as timber, recreation, or range--are not necessary in normal planning procedures, but, in some circumstances, it may be necessary to separate the contribution of one or several outputs from the combined flows of costs and benefits of a multiple-use alternative. Legally required analyses, or special analyses to meet issues raised by outside interests, or administrative, or legislative review may be among these circumstances.

13.5 - Adjustments for Constant Dollar Values for a Base Year. Use real dollar values for a specific base year for costs and benefits in analyses. Real dollar values, unlike current values, are adjusted for inflation by stating values for each year evaluated in terms of one base year. To adjust past costs and prices, generally use the GNP implicit price deflator as given in the most recent annual Economic Report of the President and published in the Department of Commerce's Survey of Current Business. These documents are available to the Regional Economist.

For specific cost and budget studies, use price indices for individual cost components, if available.

For regional plans and analyses and for National Forest Plans, use the base year in the most recent RPA assessment or as designated by the Chief.

Analyses should reflect that real price changes in some costs and benefits may occur because their price trends deviate from those of the general economy. Analysts should project expected real price changes, if significant, by output or cost category and by region of the U.S.

The following examples show how the GNP implicit price deflator is used to calculate real dollar values of data from various time periods. For adjusting values to a base year real dollar value, the general formula is:

$$\text{Real Dollar Value} = \frac{\text{Base Year Index Value}}{\text{Index Value for Year Converted}} \times \text{Dollar Value}$$

Example 1 - Adjust a $100 cost occurring in 1976 to real dollar value in 1980 dollars.
Index value for Base Year (1980) = 85.7
Index value for Year Converted (1976) = 63.1
Dollar value = $100
Real dollar value = $\frac{85.7}{63.1} \times \$100 = \$135.82$

The value of a $100 cost occurring in 1976 is $135.82 in 1980 dollars.

Example 2 - Convert a $100 cost occurring in first quarter 1985 to 1980 dollars.

Index value for Base Year (1980) = 85.7
Index value for Year Converted (1985 first quarter) = 110.2
Real dollar value = $\frac{85.7}{110.2} \times \$100 = \$77.77$

The value of a $100 cost that occurred in the first quarter of 1985 is $77.77 in 1980 dollars.

14 - ASSESSING MARKETS AND DEVELOPING OUTPUT VALUES. Regional price determination studies (FSM 1970.42) should be made to determine output market clearing prices for market areas or subareas. In National Forest planning, market or submarket area prices should be used in analyzing projects or programs. National Forests may need to make additional analyses in preparation for National Forest Plans.

14.04 - Responsibility. Regional offices should coordinate use of output value information at National Forest levels, whether the values are regional or local values developed by special studies.

14.1 - Outputs to be Valued. Determine values only for outputs that are sold or potentially could be sold if the law or Forest Service policy permitted. There are four general situations applicable to estimating values of current and future Forest Service outputs:

1. Local active markets exist for the output as it is produced by the Forest Service.

2. Local active markets for the output do not exist but it is possible to estimate values from market values for the output at a further stage of production or transportation.

3. Local active markets do not exist for the output the Forest Service produces, but markets, even though perhaps weak, exist for similar outputs. This permits estimation of values through comparison appraisals that recognize differences in quality and access.

4. No relevant markets for either similar or further process outputs exist, but it is possible to input values by analytical techniques that rely on user preferential or actions.

5. No relevant markets for either similar or further processed outputs exist and it is impossible to impute values by analytical techniques that rely on user preferences or actions. This case includes outputs such as visual resources and threatened or endangered species.

Outputs may be valued if the first four situations (items 1, 2, 3, or 4) occur in Forest Service planning actions. Do not value outputs for market situation number 5.

Indicate in planning reports and documents that all unit values, especially future values, are only approximations of the worth of the outputs and their use is to assist in placing relative priorities on plan or project alternatives, along with numerous other criteria.

14.11 - Specific Outputs to be Valued. In determining which outputs to value, it is necessary to identify - at what level of detail outputs can or should be measured.

At the national level, defining "sawtimber" as an output may be adequate and appropriate. However, this resource could be redefined to provide more detail by subdivision into "softwood sawtimber" and "hardwood sawtimber", if market values of "softwood sawtimber" and "hardwood sawtimber" are quite different, or costs of production differ significantly. Further

differentiation could include breaking out individual species within these categories. Whatever level of detail is chosen, it follows that everything covered by that definition is a homogeneous economic output.

In deciding on the outputs to be valued, consider the following factors:

1. The degree to which differences in value are accounted for. Is a value placed upon an output like "dispersed recreation" or "softwood sawtimber" adequate or is more detail needed for the analysis?

2. The data bases available and the costs of developing additional data. Are the definitions of outputs and values of outputs comparable? Is it worthwhile to develop more detailed output data or more detailed value data to more effectively use existing information on either outputs or values?

3. Reporting requirements to other organizational levels. Can data be aggregated/disaggregated or translated to meet other possible needs?

4. The degree of precision in cost/price estimates judged to be appropriate by decisionmakers.

Developing values and outputs appropriate to the level of analysis requires coordination and communication between analysts and other resource specialists.

14.2 - Components of a Market Assessment. (FSM 1971.51) A market assessment can be useful in verifying the economic opportunities that may exist with alternative plans, projects, or other proposals. It will usually be conducted as a part of an overall economic base study or economic overview at the Regional and Forest level. It is useful in setting objectives, identifying constraints, and as an aid in determining appropriate values and costs for outputs and inputs.

There are a number of elements that may be considered in a market assessment, depending upon the scope and level of detail appropriate for the overall analysis and type of decision. Some of the elements that might be considered are:

1. Population - composition and change through time.

2. Income - historical levels, relationship to other areas, and trends in expenditures.

3. Past Consumption - historical relationship of various outputs to population and income.

4. Past and Current Production Capacity - relationship of capacity to consumption (e.g. sawmill capacity, base ranch capacity, ski area capacity, etc.).

5. Past and Current Production Technology - relationship of factor inputs to product output over time (e.g. jobs per mbf timber processed, acres per AUM, etc.).

6. Substitution Effects - opportunities for factor input and product output substitutions and their potential effects.

7. Complementary Effects - opportunities for factor inputs and product outputs to be complementary to some other input or output whose demand or supply is changing.

8. Institutional Factors - laws, political jurisdictions, government programs, tariffs, taxes, etc.

9. Transportation Networks - costs of access, shipping, etc.

Compiling and evaluating this type of information can aid the analyst in understanding the markets for outputs and in establishing values for these outputs.

14.3 - Demand Schedules for National Forest Outputs. The Forest Service uses five different approaches for assuming or estimating empirical demand schedules. They are:

1. Fixed value/demand limits.

2. Constructed demand curves.

3. Statistically developed curves including travel cost methodology.

4. Derived demand computation.

Each approach has its limitations and is appropriate to only certain circumstances.

14.31 - Fixed Value/Demand Limit. The fixed value/demand limit approach is the easiest to apply and is widely used and accepted when supported by data on values and likely consumption limits. However, this approach is also subject to the greatest criticism. It is a simple procedure recommended in the absence of better methods.

This approach assumes fixed prices -- that is, for all quantities of output ranging from zero to some upper limit, the estimated price or value level does not vary.

In this approach, the analyst must estimate and project the unit benefit or value for the output over the planning period in real terms. Estimating the quantity to which the benefit per unit applies is crucial in most applications. The objective is to estimate the range beyond which outputs can be considered to have little value through use or consumption. Factors that help determine this range:

1. The estimated "market share" the producing unit now provides and/or expects to continue providing up to unit's production capacity during the planning period.

2. The projected consumption of the output plus an allowance for error.

Obviously, estimation of the quantity interval requires different procedures for different outputs.

14.32 - Constructed Demand Curves. This approach assumes the demand schedule for a forest is not perfectly elastic and the observed price-quantity relationship and zero price-quantity relationship define a linear demand schedule.

The zero price-quantity level is difficult to estimate. For timber, the point has been based on the full capacity of mills in the market area. For recreation, it might be based on total leisure time of local residents.

Problems can exist in the use of the current price-quantity equilibrium point. Use of a low output year would give a different demand curve than a high output year. Therefore, use a long-term average.

The fixed price/demand limit and the constructed demand approaches are tenuous. Neither provides the response of price to quantity changes by the forest. Neither provides satisfying information on the values or benefits associated with varying quantities of output. In addition, the procedures are not suited to projection through time. Do not use either the fixed value/demand limit or constructed demand approach to estimate a price-quantity demand relationship if there are other alternatives.

14.33 - Statistical Demand Equations. Numerous studies of forest output demands, especially for timber, have been made attempting to find the function of quantity demanded (and consumed) with price and other identifying variables.

These models have used annual data, thus the demand relationships are primarily short term.

The econometric techniques used for these studies are technical and should be attempted only by those with the necessary training. Even then, it is generally recommended that such econometric analyses not be made for areas smaller than market areas or for individual classes of owners, such as by National Forests.

14.34 - Computation of Derived Demands. If the demand curve at a further stage of production is known, an analyst can compute the derived demand curve (or elasticity) for a factor of production by several techniques. If the production function requires a constant per-unit input (meaning, the conversion ratio is constant) and the other factors are labor, energy, or supplies freely available (with perfect elasticity) in the local economy, the computation is straight forward.

14.35 - Travel Cost Method. This approach is a standard method used to compute demand schedules for recreation type activities.

The analyst must be aware of potential problems caused by assumptions of this method when designing a travel cost project or using the work of other analysts. These assumptions are:

1. The value given up by the user includes travel cost and the value of time spent in travel. (Time was not included in many older studies.)

2. All users obtain the same total benefit, equal to the travel cost (including value of time) of the marginal user.

3. At the same cost, people in all distance groups having the same demand function would participate at the same rate.

With use of this method, a number of complicating factors have been discovered that may require adjustments to the values:

1. Longer recreation trips may be vacations with a number of intervening stops. This has been partially overcome by excluding a portion of the costs for these stops in computations.

2. Incomes and amounts of leisure time influence the amount of recreation in which families participate.

3. The value of travel time may be as influential as out-of-pocket travel costs. Recent studies show that the value of travel time is approximately one third to one half of the hourly wage rate.

4. Residents of each zone differ in behavior, and preferences. Zone averages may mask such variation.

5. It is best to adapt methods to family and group demand, whereas recreation use is by recreation visitor days--or individuals. Counting children the same as adults overstates the values.

6. Length of stay may affect value. People may be willing to pay more per day if they stay one day instead of twenty days.

Despite these difficulties, the travel cost and related survey based methods such as hedonic pricing and contingent valuation are regarded as suitable for approximating recreation-type demands.

14.4 - Projection of Demand. In program planning, land-use planning, and in most project evaluations, estimations of future demand and values are necessary since most benefits will occur in the future. For each output for which markets are assessed, and prices estimated, demand information must be projected over the planning period. But the methods used to project price-quantity demand relationships and the values themselves must be compatible with the current demand analysis.

CHAPTER 10 - EVALUATING ECONOMIC EFFICIENCY

14.5 - Selection and Adjustment of Output Values. The under lying assumption in the development of program benefits is that the Forest Service will claim the incremental total value of output attributed to management. The increment to total value may arise from changes in units of output or from changes in per unit values. Each output type is assigned values according to its market conditions.

14.51 - Selection of Type of Value. The following accounting stances define the types of values that may be considered dependly upon the perspective of value.

1. Existing - fee accounting stance. These are the values of receipts from purchasers or users. These are not considered the output values, but are used primarily in determining the funds returned to the U.S. Treasury from Forest Service operations. In RPA and other analyses, total anticipated returns to the Treasury are computed for each alternative and displayed in the planning documents. Payments-in-kind, such as the value of conservation practices performed by leases of National Grasslands, are part of the existing fee.

2. Market - clearing price accounting stance. This value uses the market or simulated market price as the value of the output. The only major market where values are represented by prices is timber. In other "markets," such as those for recreation, wildlife, wilderness, and range, the demand curve may be known or approximated but not the prices which because fees are either not charged or are a portion of estimated marginal willingness to pay. To approximate a value in exchange, use one of the following methods:

Approximate the value by determining the maximum supplier gain as if it were possible to sell the output. The value would be the largest revenue--price multiplied by quantity for any combination of price and quantity. This could be determined by trial and error computation or mathematically if a formula for the demand curve is known.

3. Willingness-to-pay accounting stance. The willingness to pay value of incremental units of a public agency's output is considered the net gain from the sum of the following:

a. Market Clearing Price.

b. Consumer surplus.

14.6 - Standards for Values. Values used or generated in the Forest Service must be comparable, because program analyses add the benefits of several resource outputs. The following standards apply to values assigned in Forest Service analyses:

1. For outputs used off-site, base benefits on output values when they leave the land or production site. For outputs used on-site, value benefits when in use. However, it may be easier to derive some values from those measured after the output leaves the production site. In such cases, to determine final values deduct costs incurred and profits earned after the output

leaves from the values achieved at later production or transport stages. Derived or adjusted values of the incremental output are often called "appraised prices" if determined by cost adjustment or called "shadow prices" if computed by mathematical programming.

2. Express benefits in real dollars. The base year is established through the Resources Program and Assessment planning process. For outputs with different quality grades, use the same relative prices over time, unless a separate analysis of value trends by grade have been made.

3. If output quality significantly affects value, estimate unit price differentials in market assessments.

14.7 - Use of Demand and Value Information. The following standards apply in assigning values to the schedule of outputs:

1. For Forest and other local Forest Service plans, use output values and rates of growth in demand established by regional market assessments, unless special studies show these values and rates do not apply in local areas. In the absence of regionally determined values and rates or special studies, use RPA values and rates.

2. Use long-term price-quantity relationships, if established according to approved procedures. Regardless of the price-quantity relationships assumed, long-term planning should not include investments that would expand outputs beyond amounts likely to be consumed. Beyond such levels, additional outputs have diminishing value.

15 - COMPUTING MEASURES OF ECONOMIC EFFICIENCY. This section addresses measures of economic efficiency, recommended computational techniques, and preferred terminology. What follows is a version of investment or economic efficiency particularly suited to forestry and land management. Its use in decisionmaking will assure comparable and readily understandable results.

The question of the "best" measure of economic efficiency is controversial. The Forest Service position is that the most appropriate measure depends on which input is most scarce or most limiting for the program or project evaluated. In long-term planning, the scarce resources are either (1) forest and rangeland resource management opportunities being considered, or (2) the investment and operating funds (capital) required to put and keep lands in production.

15.1 - Discounted Measures: Scarce Resource Opportunities. The measures to apply when lands or productive opportunities are limiting assume that other inputs such as capital are potentially available at a cost, even if constrained in certain periods. These measures are:

1. Present net value. Present net value (PNV) is the present benefit value (PVB) of the stream of benefits less the present cost value (PVC) of the schedule of costs. It can be expressed in the following equation:

$$PNV = PVB - PVC$$

2. Equivalent annual income. Equivalent annual income (EAI), also called "average net annual benefit", is similar to PNV, except the value is expressed as an annual flow of income that the PNV would produce if invested at an interest rate equal to the discount rate. It is computed by amortizing the PNV over the life of the project.

If the time horizon is perpetual, the equation is:

$$EAI = PNV * i$$

If the time horizon is N years, the equation for determining equivalent annual income is:

$$EAI = PNV * \frac{i * (1 + i)^N}{(1 + i)^N - 1}$$

3. Soil Expectation Value. Soil Expectation Value (SEV) is the present net value of an infinitely long series of expected net periodic incomes from timber. SEV represents the present value of non-forested land for growing timber, "bare land value", and is the captilized value of an infinite series of timber rotations. Also referred to as the land expectation value or "Faustmann formula" it is calculated as follows:

$SEV=FNV[1/((1+i)^N-1)]$ where...
FNV=Future Net Value or net value at the end of the first rotation
N=Rotation Length
i=Interest Rate

Note that all intermediate costs and benefits must be expressed in terms of the value at the end of the rotation. The explicit assumption is that all future rotations will be identical to the first rotation. The rotation age (N) yielding the maximum SEV is the economically optimum rotation age.

15.2 - Discounted Measures: Scarce Investment Funds. If capital is the scarce resource, and resource opportunities are not limiting, use these other measures to gauge how much the capital earns in proportional terms, or the rate at which the capital 'grows' while invested in the program or project.

1. Benefit/cost ratio. The benefit/cost(B/C) ratio is the present value of benefits (PVB) divided by the present value of costs (PVC). It can simple gauge of the relative efficiency of amounts of investment and operating funds to produce benefits. It is calculated as: B/C = PVB / PVC

2. Internal rate-of-return. The internal rate-of-return (IRR) is the discount rate that makes the present value of benefits (PVB) equal the present value of costs (PVC). That is:

$$PVB = PVC \text{ or } \frac{BV(I)}{(1+i)^I} = \frac{CV(I)}{(1+i)^I}$$

Where BV(I) and CV(I) are benefits and costs values at year I.

Computation of IRR is an iterative process where i is system-atically varied until PVB and PVC are equal. Hand calculation is very laborious, but computer programs with IRR computations are available. Hand calculators with discounting functions also simplify the computations.

3. Composite rate-of-return. Composite rate-of-return (CRR) or 'realizable rate-of-return' is a variation of the internal rate-of-return (IRR) concept. CRR assumes there is a need to consider that the investor would reinvest his intermediate returns to the end of the time horizon.

An opposing view is that the IRR is the weighted average rate of growth of the capital only while invested. Thus, considering a reinvestment rate merely complicates the analysis without adding new information. The Forest Service takes this view and does not recommend computing composite rates-of-return.

15.3 - Relationship Between Benefit/Cost Ratio, Present Net Value, Equivalent Annual Increment and Internal Rate of Return. When the analyst uses several methods to calculate measures of efficiency, the relationships will be as follows: In the abscences of constraints on inputs and outputs or interdependences among the projects being considered.

Comparison of PVB to PVC	B/C Ratio	PNV	EAI	IRR
PVB > PVC	>1	>0	>0	>Discount Rate
PVB = PVC	=1	=0	=0	=Discount Rate
PVB < PVC	<1	<0	<0	<Discount Rate

15.4 - Discount Rates and Handling Inflation and Risk.

15.41 - Methods and Standards for Discounting. Discounting is the process of reducing values (costs and benefits) occurring over time to some common period, usually the present. Several programs are available for use in this type of analysis and many calculators have discounting functions.

15.42 - Recommended Discount Rates.

1. Forest Service rate. The basic discount rate used to evaluate long-term investments and operations in land and resource management is a real rate of 4 percent which has not included an inflation factor. Analysts should be aware that this rate differs from the rates used in other Federal agencies and for investments other than land and resource management.

2. Office of Management and Budget rate. Since 1969 the basic rate for all Federal agencies not covered by specific legislative requirements or guidelines has been 10 percent. This rate should be used to test the sensitivity of analyses to changes in discount rates. For specific direction on analysis of Forest Service activities see FSM 1971.21.

In financial analyses by industrial and commercial organizations inflation and risk often are handled by adjustment processes similar to discounting. The schedules of benefits and costs thus include current costs not adjusted for losses and the discount rate used includes components representing inflation and risk. In Forest Service practice, as in most other Federal agencies, neither adjusting for inflation or risk in a manner similar to discounting nor including inflation and risk components in the discount rate is recommended (sec. 12.2).

15.43 - Incorporating Inflation. In Forest Service analyses, the values in schedules of benefits and costs should be real values. That is, they should have been adjusted for inflation (if past values) or future values should not be increased for an assumed rate of inflation. If inflation, however, is assumed, and readjustment and discounting are correctly done, the measures of economic efficiency will not be affected in Forest Service analyses. If current values are used, and the analysis adjusts for both an interest rate i and an inflation rate r, the effects of the rates are multiplicative rather than additive. That is, the adjustment factor is:

$$F = \left(\frac{1}{(1+i)^N}\right) * \left(\frac{1}{(1+r)^N}\right) = \left(\frac{1}{((1+i)^N * (1+r))^N}\right)$$

and not:

$$F = \left(\frac{1}{(1+i+r)^N}\right)$$

If the interest and inflation rates are low, and the time horizon is short, the error cause by the additive assumption is small. If not, the error may become substantial.

One reason that real values are used instead of current values with inflation assumed is that projecting defensible rates of inflation is extremely difficult, involving many assumptions about economic variables and events outside the economic analysis of the project or program. If there is no advantage in doing so, it is simpler and easier to conduct the analysis in real values.

15.44 - Incorporating Risk and Uncertainty. (Sec. 12.2).

15.5 - Project Level Economic Analysis. There is no set format for economic analyses, though each should have a number of similar components. For each type of frequently performed analysis, such as timber sales, road construction, or vegetation control projects, it would save time to develop locally informal data sheets to aid the collection and analysis of data.

16 - USING ECONOMICS TO IMPROVE DECISION MAKING. While economics is but one of the factors managers need to consider in the decision process (others being technological, physical/biological, legal and social/political), there are a number of ways economics can be used in the decision process in addition to the traditional efficiency analysis described in sections 12-15. These additional analytical techniques provide the tools necessary to determine the relative economic desirability of proposed policies, programs, plans, or projects and improve the efficiency or effectiveness of proposed alternatives. Additional techniques may also be used by the analyst to examine the implications of changes in assumptions and the relative importance of different assumptions in the calculations of the measures of economic efficiency. As is true with the traditional efficiency analysis, these additional techniques do not provide the final decision itself but rather contribute to the quality of the decision process. It is important for the analyst to provide the decision maker with an understanding of the appropriate use of the different financial, accounting, cash flow, and efficiency evaluations that may be presented.

16.1 - Sensitivity Testing. This analysis is simply an extension of the calculation of the measures of efficiency described in section 15. Sensitivity analysis determines the sensitivity of the efficiency measures to changes in the variables originally used to calculate the measures. These variables may be those over which the Forest Service has no control but may influence the impact of the decision alternatives. They also may be variables that are controlled by the Forest Service and are decision sensitive.

By knowing which variables are in fact important, the decision maker will be better able to judge the relative reliability of the analysis as well as determine where to concentrate additional resources and analysis.

16.2 - Incremental Analysis. An incremental analysis is potentially useful to determine the optimal size or scale of a proposal. If the proposal can be considered as a discrete number of incremental additions to a specified base the optimal size is when the marginal benefits of the last increment exactly equal the marginal cost. Common examples where incremental analysis may be particularly useful are the determination of the optimal number of trees per acre to plant, the best level of fertilization for a range allotment, or the correct basal area per acre for thinning.

16.3 - Least Cost Treatment Combinations. Once a program alternative has been selected and implementation begins, it is often necessary to make decisions on the best way to accomplish treatments or to build facilities. This can be a major analytical task in the planning of specific projects.

Often in project level planning the objective is known and only the best combination of inputs or specific types of activities to be used requires further analysis. The preferred alternative is the proposal with the lowest cost - either in total or on a per unit basis. Because outputs are not valued this is really a cost effectiveness measure rather than an efficiency measure. In order to avoid analyzing different treatment alternatives for each project, an analyst may want to consider determining which treatment methods or combinations are most cost effective in a range of circumstances.

16.4 - Analysis of Minimum Cost Plus Net Value Change. This is analagous to the maximum present net value criterion and is often referred to the "least cost plus loss criterion". This analysis is particularly useful in determining the efficiency of protection proposals.

Protection outputs are not commodities or on-site uses directly, rather they are measures of net losses of future resource outputs avoided by the protection effort. In many cases, fires, and infestations have positive effects on some resources, and occasionally, such benefits may exceed the losses. For this reason, the term "net value change" is used to refer to the net effect of all changes caused by a casualty occurrence.

The objective of such analysis is to find the level of presuppression effort (usually expressed in terms of cost but the level can be expressed in other terms) for the minimum total cost (prevention effort, suppression effort, and net change in resource values).

Analysis of other types of protection and maintenance programs are simple conceptually, although the terminology may differ. Such analysis requires careful separation of costs into fixed prevention and variable damage control portions, identification and valuation of net value changes in resources (or effectiveness of facilities), and analysis of program increments to arrange them in order of effectiveness. All costs and benefits should be discounted as appropriate.

16.5 - Breakeven Analysis. Breakeven analysis is a particularly useful kind of analysis that can be used when it is difficult or impossible to determine output values (an alternative approach can be used when input costs cannot be determined).

In a breakeven analysis the question - What is the minimum price that will just make the program or project breakeven? - is answered. The breakeven point is the point at which all input costs are just balanced by the total output value. The decision maker can then compare this imputed unit value with the estimates of the value of the output. If significant time periods are involved in the production process, the breakeven analysis should be conducted on a discounted basis. If values are known but costs are not, the alternative formulation for the analysis might be used - How high can cost be before they equal or exceed the value of the output produced?

FSH 1909.17 - ECONOMIC AND SOCIAL ANALYSIS HANDBOOK
CHAPTER 10 - EVALUATING ECONOMIC EFFICIENCY
Contents

FSH 1909.17 - ECONOMIC AND SOCIAL ANALYSIS HANDBOOK
CHAPTER 20 - ECONOMIC IMPACT ANALYSIS
Effective Date: July 1988
Amendment No. 1

21 - ELEMENTS OF ECONOMIC IMPACT ANALYSIS. Economic impact analysis estimates the total effects of a program or project and the distribution of those effects among all sectors of an economy. The analysis measures the effects primarily by changes in employment and income within the economy of the geographic area most affected by the program or project.

The process is a series of steps outlined in this chapter that include:

1. Defining the scope and purposes of the analysis.
2. Selecting the method and measures for the analysis.
3. Defining the impact area.
4. Developing data for the impact area.
5. Developing the economic model.
6. Specifying the initial changes caused by program actions.
7. Estimating the economic impacts.

21.1 - Scope of Program or Project. All programs or projects produce economic impacts as long as they require inputs and produce outputs, either now or in the future. However, the impacts of individual small projects may not be large enough to analyze them accurately, may not be sufficiently significant to affect decisions to be made, may be relatively expensive to analyze relative to the effect on the decision, or may not be of appreciable public interest.

Section 1972.1 of the Forest Service Manual establishes direction on the types and sizes of projects for which full economic impact analyses should be made. For projects and plans on a relatively small National Forest, however, a partial analysis using multipliers derived from other analyses may be used, and the economic impacts may be estimated using the procedures described in sections 27 and 28. In such cases, the tasks described in section 26 of this handbook may be omitted.

As in economic efficiency evaluations, economic impacts can be estimated for activities already underway or completed, or for activities being planned for the future. Regardless of the size of the activities for which economic impacts are being estimated, or whether the activities are in existence or planned, they are called "programs" in this chapter.

21.2 - Purposes of Economic Impact Analyses. The first step in making an economic impact analysis is to define carefully the purpose of the analysis. This will affect subsequent definitions of impact area, selection of measures of impact, data needed on output and expenditure changes in alternative plans, and type and extent of the display of the analysis results.

Among the several purposes served by economic impact analyses are:

1. Describing the local economy. This is one of the first steps in preparing a National Forest plan or other analysis. The description will help the planning team to know what local industries are important, size of potential regional demands for recreation, and other matters. Such analyses do not require a predictive model, but descriptions of several assumed impact areas may be warranted.

2. Predicting impacts from changes in outputs and management activities of plan alternatives. This is the most common type of economic impact analysis. It requires the development of a predictive model, estimation of changes levels of output for each alternative, and calculation in impacts from those changes in output.

3. Determining the impacts of changing the structure of a local economy by introducing a new industry, or by the closure of an existing one. Such analyses not only require the development of a predictive model, but modification of it to accommodate the change in industrial sectors.

4. Analyzing the impacts of other aspects of resource management. These include the effects of resource constraints on local industries and the existence of pools of unemployed or under-employed labor.

21.3 - Ways to Estimate Economic Multiplier Effects. The principal objective of economic impact analysis is to estimate the effect of the economic transaction of the program or project on the overall economic transaction in an impact area. For each individual activity, an accounting can be made which, very simplified, would include such items as:

Inputs or costs		Outputs or benefits
Labor		Product A
Materials		Product B
Depreciation		Product C
Supplies		
Rent, profit		
Total	=	Total

Similarly, income and product accounts for an impact area would include analogous components, as:

Inputs or income	Outputs or products
Wages and salaries	Personal consumption
Property-type income	Government consumption
Indirect taxes	Capital investment
	Exports to outside
Imports from outside	
Total gross income	Total gross expenditure

The income and product accounts for an area are the sum of the component transaction within each account. A change in an individual transaction causes greater changes in the overall economy than only the direct change. This is because the material and supplies purchased are spent in part in other local sectors, wages and salaries are partially spent on locally produced goods and services, and the outputs may become materials for local industries. After several rounds of such effects, the total impact is some multiple of the direct impacts of individual activities.

The analytical problem is to estimate, reliably, the effect of changes of one or several activities on the overall economy of the impact area. The method that uses interindustry relationships most intensively is input-output analysis, which is the recommended Forest Service analytical method, and which is described starting in section 22.

22 - METHODS OF ESTIMATING ECONOMIC IMPACTS. Among the methods economists have developed for estimating the impacts of specific programs and projects, the Forest Service regards input-output analysis as the most flexible and useful system currently available. This method of analysis is the standard approach for making Forest Service economic impact analyses.

22.1 - Input-Output Analysis. Input-output analysis describes an economy as a system of interrelationships between industries. The analyst must evaluate the validity of the interrelationships and numerical estimates for the impact area in question. Include in this evaluation: Estimates of final demands for goods consumed by households, government agencies, capital investments, or exported out of the impact area, how the final demands are allocated to the industries that provide the consumption goods and services, how each industrial sector not only produces goods and services, but is a consumer itself, the requirements these industries have for intermediate goods from other industries, and services for which it produces wages and salaries, property-type income, and indirect business taxes.

As a formal economic model input-output analysis requires several significant assumptions that the analyst must consider to determine the appropriateness of using the tool for a particular evaluation. Among them are:

1. Industries produce outputs using fixed mixes of inputs. If the inputs are increased by a magnitude, then outputs are also increased by the same magnitude. Substitution of one input factor for another cannot occur, and no efficiencies or inefficiencies due to scale are recognized.

2. Each industry produces only one mix of commodities.

3. All required inputs are assumed to be available without limit; there are no shortages or scarce resources.

4. All production (final output) will eventually be consumed. It will be sold to intermediate consumers (to be used to provide other outputs), final consumers (e.g., household, governments), exported or placed in inventory for future sale.

5. All changes take place in an indeterminate period of time; the model has no explicit time dimension other than the data typically based on annual data.

While these assumptions are restrictive, they nevertheless simplify the problem of describing the interrelatedness of economies and may be relaxed as necessary to make modeling feasible. Recent research has developed techniques the analyst may use to construct accurate and reliable models that overcome many of the restrictions that result from these assumptions.

22.2 - Input-Output Tables. The table shown in exhibit 01 identifies the needed relationships and the components or quadrants of an input-output table.

22.2 - Exhibit 01

			Purchasing Sectors				
			Intermediate Demand	Final Demand			Total Gross Output
			Agriculture, Mining, Manufacturing, Trade, Services, Finance (1 . . . . . j . . . . . n)	Household Cons.	Govt. Expenditures	Gross Domestic Capital Formation	Exports	
			I Intermediate Production & Consumption	II Final Outputs of Producing Sectors				
Producing Sectors	Intermediate Inputs	Agriculture 1	$X_{11} \cdots X_{1j} \cdots X_{1n}$	C_1	G_1	I_1	E_1	X_1
		Mining :	:	:	:	:	:	:
		Manufacturing :	:	:	:	:	:	:
		Trade i	$X_{i1} \cdots X_{ij} \cdots X_{in}$	C_i	G_i	I_i	E_i	X_i
		Services :	:	:	:	:	:	:
		Finance n	$X_{n1} \cdots X_{nj} \cdots X_{nn}$	C_n	G_n	I_n	E_n	X_n
			III Primary Inputs to Production	IV Primary Inputs to Final Demand				
	Primary Inputs	Payments to Households	$H_1 \cdots H_j \cdots H_n$	H_C	H_G	H_I	H_E	H
		Government	$T_1 \cdots T_j \cdots T_n$	T_C	T_G	T_I	T_E	T
		Depreciation	$D_1 \cdots D_j \cdots D_n$	D_C	D_G	D_I	D_E	D
		Imports	$M_1 \cdots M_j \cdots M_n$	M_C	M_G	M_I	M_E	M
	Total Gross Outlays		$X_1 \cdots X_j \cdots X_n$	C	G	I	E	X

22.3 - Methods of Assembling Data. When the analyst concludes from his/her evaluation of the relationships and data that changes are required, several methods for gathering other information exists. The Department of Commerce develops a new national input-output tables every five years from a variety of economic data, particularly the economic censuses such as the Censuses of Manufacturers, Agriculture, Construction, Retail and Wholesale Trade, and Governments. Though these tables were not developed for states and smaller areas, they can be approximated by two methods:

1. Surveys to collect transaction data from industries in the impact area--distribution of sales to other sectors and final demand; purchases of intermediate goods and factors of production. Although some secondary statistical information may also be useful, such surveys are costly and require substantial lead time. The models produced are, however, generally regarded as superior.

2. Non-survey compilation of data from various statistical sources to estimate the values in the quadrants II and III, and deriving data for quadrant I from relationships in the national input-output model. Import and export flows, and other information, are generated by mathematical routines that consider those sectors present in an impact area. These models are much less costly and easy to produce, but nevertheless predict economic impacts reasonably well.

Data from non-survey compilations may be corrected or supplemented by information collected from industries or sectors of particular interest to the analysis. Such local data is often needed when new industries have come in to the area, or major technological changes have been adopted, since the year of the last national input-output tables and county-level data used.

22.4 - IMPLAN, the Forest Service System. The IMPLAN system comprises a data base that covers all counties in the U.S. and a set of computer programs to retrieve data and perform the computational tasks for input-output analysis.

Use the IMPLAN system for developing Forest Service economic impact models unless more appropriate or less costly options exist for a given impact area. The information in this handbook gives an overview of the IMPLAN process and is not dependent on any one system or version. Details of procedures may be obtained from the IMPLAN Analysis Guide and the IMPLAN users guide cited in section 29 - references of this handbook.

23 - MEASURES OF ECONOMIC IMPACTS. The primary measures of economic impacts of a public program are the net changes in income and employment in the affected impact areas. The best way to express them depends on the purpose of the study and the use of the results. The first task of an economic impact analysis is choosing which are most appropriate, unless the analysis is relatively standard, such as one for a National Forest plan.

Three general ways to measure the impacts on income and employment are:

1. By absolute measures, such as millions of dollars of additional income, or average number of jobs.

2. By multipliers--ratios of additional income or employment generated in the economy related to the direct income or employment produced by the program itself.

3. By response coefficients, which are similar to multipliers but are the ratios of additional income or employment generated to the increase in value of final sales of the output (instead of direct income), or to units of physical output itself such as MBF of timber or AUM's of range. Operationally these may be easier to use than multipliers themselves.

23.1 - Types of Impacts and Multipliers. Economic impact analyses can measure three levels of economic outputs or impacts produced by the activities of a program, namely direct, indirect, or induced effects.

23.11 - Direct Outputs. These outputs are those usually considered in economic efficiency evaluations, such as timber, forage, range, minerals, and recreation opportunities. There are two types:

1. Outputs, like recreation and many types of wildlife use, that are directly used by final consumers.

2. Intermediate outputs sold as inputs to other sectors which further process them, eventually producing products used by consumers.

Unlike economic efficiency evaluations, all direct outputs are measured in terms of contribution to final demands, or the expenditures to consume them. This should include the expenditures of the Forest Service, and perhaps other agencies, required for them, as well as expenditures of the users. See section 25 for the appropriate methods to use.

Only outputs actually used or consumed (real transaction have occurred) affect the economy. Unused recreation or range capacity, for example, and outputs for which users do not expend funds, such as local berry picking, should not be included.

23.12 - Indirect effects. This is the portion of the production of all supporting industries required to provide the inputs for the directly affected industries. Some of this production may require additional inputs and these additional inputs may require still more basic inputs. Ultimately, they are all based on inputs of basic productive factors--labor (measured as wages), land (rental income), and capital (interest and other returns to ownership).

A ratio of income or value produced by both the direct and indirect effects to the income or value of the direct outputs is called a Type I Multiplier (sec. 23.2).

23.13 - Induced Outputs. One particular component of indirect effects is separated out because of its importance. Indirect effects that are linked to activity by households (as receivers and spenders of income). This particular indirect effect is referred to as the induced effect.

A ratio between the income produced by the direct, indirect, and induced effects to income produced by the direct outputs is called a Type II Multiplier (sec. 23.2).

23.2 - Impacts and Multipliers for Small Areas. The indirect and induced impacts of a program, and the related Type I and II multipliers, are most appropriate on areas most directly affected by the program. For National Forest projects or Forest plans, for example, the area of greatest interest includes those surrounding communities, counties, and states in which the outputs are used, from which most on-site users come, and from which most workers in directly affected sectors live. Criteria for delimiting impact areas are given in section 24.

When expansion of programs in small areas requires in-migration of labor, do not limit analysis just to direct and induced outputs based on existing industry structure. When this occurs, a Type III Multiplier can be computed. This multiplier is calculated as the sum of values for direct, indirect and increased induced demands based on the in-migration divided by the value of the direct outputs.

23.3 - Components of Impacts and Multipliers. Separate all types of income, impacts, and multipliers into income components as follows:

Type of Income/Multiplier	Factors Measured
1. Personal Income	1. Wages and Salaries, and other labor income (includes pension and social security contributions).
2. Total Income	2. Rental Income, Interest, Dividends, Profits and Allowances for Depreciation.
3. Value-added	3. 1 and 2 plus Indirect Business Taxes.
4. Employment	4. Paid Work Generated by the Program.

Value-added calculated with economic impact models is often used to compute gross regional product or the value of all new production for the year modeled.

Jobs in some industries may be all full time, while many jobs in other industries, such as retail trade and services, may require part-time or seasonal workers. Data reported in "job units" needs to be converted into person years for consistency. The employment multiplier may be distorted for an industry using year-long workers which requires inputs from industries that employ mostly temporary or seasonal workers, commonly found in resource based industries. Correcting this distortion will require adjustment of jobs created (or lost) by the appropriate conversion factor, sector by sector.

24 - DEFINING THE RELEVANT IMPACT AREA. After the scope of analysis has been defined and the economic measures selected, the next step in an economic impact analysis is to define the impact area. Impact areas may vary depending on the policy issue being analyzed.

The impact area should be defined as (1) a functional economic unit of a size appropriate to the policy issue and (2) an area that includes most of economic factors that are most directly affected by the policy.

Counties are the smallest areas for which substantial and consistent economic information is available from the various censuses and other sources. They are thus the basic geographic unit of the IMPLAN data base, which generates the basic data for most Forest Service economic impact analyses.

Thus, a practical limitation is that economic impact areas must be some combination of individual counties. This limitation has serious consequences for some analyses. It may result in lack of focus on the communities of most interest, which may be overshadowed by other towns or cities within the same counties. When the impacts needed are for a specific community, other methods such as community specific survey techniques should be employed.

24.1 - Criteria for Defining Impact Analysis Areas. There is no step-by-step procedure for defining impact areas, and selection of counties must be based on judgment. Often adjustment in the impact area should be made after the initial area is defined and the data generated for it (see section 25). Consider the following potentially significant factors in defining the area: issues being addressed in the planning, economic center or centers, trade patterns, forest/county boundaries, worker places of residence, and use of program products from other counties.

24.11 - Economic Center. Select the counties of the economic center(s) or central city (or cities) most affected by the program. An economic center or central city/place is the region's largest and most highly developed city in the sense that it has the most diverse set of industrial sectors. In situations in which this center is a metropolitan area, however, the impacts of a Forest Service program may be relatively small compared to the metropolitans area economy. In a absolute sense these impacts may be large when compared with smaller rural economies.

24.12 - Trade Patterns Based on Raw-Material Outputs. If the program produces raw materials for other processes, consider what other raw materials are also used. If the bulk of these other inputs are produced in counties within reasonable transport distance, include the counties. An example of such "backward linked" counties might be the areas in which National Forest grazing permittees raise the hay and feed for winter feeding (and generally have their home ranches). On the other hand, raw materials processed by local plants may be intermediate products for further processing into consumer goods. Examples of such "forward-linked" industries are those that produce ties or lumber to be pressure treated, or made into pallets, millwork, or furniture (all in separate industry sectors). Of course, if all the locations of further processing were included in the impact area, it might become too large. Criteria for including counties are the following:

1. If the processed product is generally sold to final consumers in the area, include the county.

2. If the processed product is sold widely, but its production location depends on the program outputs for transport cost or other reasons, include the county.

3. If the production location is not dependent on local raw materials but the industry can easily substitute materials from a wide area, it is not necessary to include the county.

24.13 - Trade Patterns Based on the On-Site Use of Outputs. Recreation uses, including hunting and fishing, bring final consumers to forest or rangeland areas. Special land-use outputs, such as radar and telecommunication sites, power generation and transmission areas, are also on-site uses because they depend on specific land attributes. The county of residence of these users may or may not be included in the impact area depending on the policy issue.

24.14 - Counties with Program Lands. If the analysis includes estimating the consequences of 25 percent fund payments and payments in lieu of taxes, then all counties with forest land related to the program, and/or counties which receive payments in lieu of taxes, should be considered for inclusion in the impact area. However, it is not necessary to include them for that reason alone. Do not include counties if their contribution to economic impacts are negligible.

24.15 - Residences of Labor Force. Generally, include in the impact area counties in which numerous workers either in the program, or in industries dependent on program outputs, reside. Commuting often separates the residence of workers or owners of processing plants or commercial establishments from their places of work. Therefore, to properly capture and allocate the induced income and employment effects of Forest Service activities, the impact area should include major affected "bedroom" counties. The analyst must determine what constitutes a major bedroom community from data on commuting and residential patterns.

24.2 - Additional Impact Areas. In some situations, it may be important to analyze the impacts on one or more individual counties, as well as a larger impact area. Because analyses of impacts of additional areas using IMPLAN are relatively inexpensive, separate analyses are recommended rather than forcing anomalous situations into a single analysis.

Each impact area is a unique economy with a mix of characteristics, and results of analyses must relate to the characteristic of each area and the reasons why that area was selected.

Though the IMPLAN data base does not include for subcounty areas, it is possible to disaggregate data, if the important economic sectors of interest are concentrated in part of a county, and data on work force residences is obtained by survey. For the methodology, see the IMPLAN analysis manual (sec. 29).

25 - GENERATING AND MODIFYING BASIC DATA FOR IMPACT AREA USING THE IMPLAN DATA BASE.

25.1 - Generating and Reviewing County Data. Once the counties within the economic impact area have been selected, the next task is to retrieve the basic data from the data base. The essential required data for each county and for each sector existing in the county is:

1. Final demands: Personal consumption expenditures, gross private capital formation, inventory change, state and local government expenditures, federal government expenditures, and foreign exports.

2. Final payments: Employee compensation, property-type income (rent, interest, and profits), and indirect business taxes.

3. Total industry output.

4. Production employment.

All of the final demand and final payment data are in constant dollars of the data base year. Revisions to the basic data, and data used in applications of the model to program alternatives, must be converted to constant dollars of that base year.

Because these data are estimates based on diverse statistical sources, some of which may be several years old, review the data for each county included in the model. The most crucial, and obvious, review step is making sure that data is obtained for the proper counties. Other checks should pay special attention to sectors that may be affected by the program alternatives, or which are important locally, and comparisons of the total gross output levels with more recent data and local knowledge. For example, determine if important local industries recently changed levels of activity, or have closed, or if new industries moved in.

Check production employment against appropriate recent state and local data to see if employment is still at the approximate levels suggested by the data retrieved. Many sources of employment may not be comparable to IMPLAN data because of differences in data definitions.

In particular, examine data for sectors or industries that are unique to the area, or of "high profile," because of their economic or historical importance. Such industries may have been grouped with somewhat dissimilar establishments in the national sectors. Consequently, the national coefficients may not be representative of the local industry.

25.2 - Modifying Data at the County Level. Modify the basic data retrieved as follows:

1. Correct individual data items for sectors to more current or accurate values based upon the review. This is not difficult, though the procedures of the IMPLAN system must be followed carefully.

2. Delete or add entire sectors to the model. Eliminating a sector because the only plant or plants have closed, or would close under all alternatives, merely requires setting its total gross output to zero. Adding a sector, which is required if a new industry will be created by a program alternative, is more complicated. Estimates of the data listed above must be obtained from a larger area to determine approximate relationships of categories of final demand and final payment, and production employment to total gross output. Refer to guidelines for extending the economic impact analysis (sec. 28.2) and the IMPLAN Analysis Guide.

26 - DEVELOPING A REGIONAL ECONOMIC MODEL.

26.1 - Steps in Model Development. The steps in developing a regional model are largely computational tasks performed by computer programs that accomplish the following data manipulations:

1. Accumulation of the basic data for each county into totals for the impact area, and construction of a complete transaction table for all sectors. Information from the national interindustry transaction table (Quadrant I in Figure 1) is selected for the sectors present and adjusted for the area. A most important aspect is estimation of the amount of each sector's purchases that come from within the impact area (with the remainder "imported"), as well as the proportion of the outputs that are consumed as final demands or intermediate goods within the area (with the remainder exported).

2. Mathematical inversion of the resulting table or matrix to produce the multipliers. Inversion can be done under two assumptions:

a. Using an "open" model, which does not include the household sector, produces estimates of direct and indirect impacts but not induced effects. The multipliers computed are Type I.

b. Using a "closed" model, with the household sector within the inverted matrix, computes induced impacts also. The multipliers computed are Type II. They include the effects of wages, salaries, and other income of the household sector being recirculated in the economy. In the IMPLAN system, Type III multipliers, which provide for changes in the population base, can also be computed.

3. Aggregation of individual sectors should be done before the matrix is inverted.

Analysts must follow the procedures in the user manuals.

26.2 - Aggregating Sectors of the Regional Model. Experience has generally shown that the less the aggregation of impact area models, the more realistic the results. Therefore, aggregation to just a few sectors is unwise, despite cost savings but limited aggregation may be warranted.

If sectors are aggregated, several guidelines apply:

1. Do not aggregate a sector that will be directly affected by a program alternative because aggregation may introduce input requirements or sales of products that are not relevant.

2. Do not aggregate sectors with large total industry outputs in the impact area, even if the final demand for these sectors will not be directly affected by program alternatives.

3. Avoid aggregating sectors with different one-digit Standard Industrial Classification (SIC) codes. Sectors within the same one-digit codes often have a similar pattern of requirements and sales, while those in different groups may not be similar at all.

4. Do not combine industries that are unique to an area or are "high-profile" local institutions. These industries will be of special interest to the public, and thus should be kept separate for ease of identification.

26.3 - Review of Model Results and Multipliers. Review the multipliers resulting from the model. Note unusually large or small values and major differences between groups of industries.

The reasons for the differences can usually be traced to differences in input requirements or in distribution of sales between final consumption, intermediate goods within the area, and exports.

The review should highlight the sectors that will be directly affected by the programs alternatives and locally unique or important industries.

27 - SPECIFYING ECONOMIC CHANGES FROM ACTION PROGRAMS. Once the economic impact model has been constructed, it may be used to predict changes in the impact area economy. The essential next step in such application of the model is to determine how each program alternative will affect the area economy. This is often the most technically difficult aspect of economic impact analysis, and the one which most calls upon the analyst's knowledge of the local economy and ingenuity in devising approaches.

The primary application of such models in Forest Service planning is to determine the impact of changes in levels of output from alternative plans for National Forests, or from other programs. Other applications are evaluating constraints on the gross outputs of sectors, including limits on program expenditures, regional structure changes, and changes in the labor force.

27.1 - Specifying Changes from Alternative Levels of Program Activities. Program alternatives in natural resource management generally affect local and regional economies in two principal ways. First, the flows of outputs from the program are sold or used in the impact area, often affecting the businesses of many economic sectors. Second, the program must purchase goods and services from the local economy in order to perform the management activities.

The overall strategy in simulating the effect of such changes is to describe them as demands for final outputs expressed in dollars. The model will solve for the indirect and induced impacts. The procedure for converting changes in outputs into changes in final demand is as follows:

1. Identify the outputs that will be changed, the end stage of production (see next section) in harvesting or utilizing them, and their usual units of measure.

2. Determine the changes in outputs from current levels for each alternative.

The impact multipliers may be expressed in the form of response coefficients if the analysis is conducted for one output at a time (sec. 23).

3. Estimate the per unit values at the end stage of production.

4. Allocate per unit values to appropriate sectors in model.

5. Adjust values to constant dollars of the year of the data base.

27.11 - Identify Outputs and Processes. Specify the types of outputs in as much detail as possible. Broad categories such as developed recreation, or dispersed recreation should be reclassified into the various types, since each often has quite different associated expenditures and thus impacts. Timber should be subdivision into types if possible--softwood and hardwood sawtimber and pulpwood, fuelwood, and other products. Minerals should be separated into kinds, since each kind requires specific processing.

At the same time, the process by which the output is harvested, extracted, or used must be considered. The process starts with the output on the land but may extend to various stages of processing or use, depending on circumstances of the resource and the local economy. For example, some timber may be harvested and exported from the region as sawlogs; it should be valued as the final sale to export of logs. Other timber may be processed into lumber (an intermediate product) within the impact area, and the lumber should be valued as a final demand. Three general possibilities exist for the end stage of the process:

1. The stage (or sector) in which the output is finally consumed. This is the case for most types of recreation and wildlife use;

2. The stage (or sector) in which the output is exported as an intermediate product out of the impact area such as lumber;

3. The stage (or sector) which sells the output into a large competitive market area. Firms buying the output may obtain it from local sources but could as easily buy it from substitute sources elsewhere. Or the output is sold to too many industries to determine the expenditures in further processing.

Some outputs may have no economic impacts or inconsequential ones. They are important only if users pay for them, or incur costs in their harvest, extraction, or use. For example, people walking or berry picking in forests located near their residences may have no additional expense, and no appreciable decrease in other consumption. These activities are thus not part of regional or national income. (This is not a defect of impact analysis but the way income is counted in our economy. If a paid person washes clothes or prepares dinner, it is part of national income; if an unpaid person washes the same clothes or fixes the same dinner, it is not.) Instructions and examples for specific outputs are given in the IMPLAN Analysis Guide (sec. 29).

27.12 - Specify Changes in Physical Units. In most analyses, determine the changes in outputs levels, since such changes in income or employment are the information of interest. In other cases, it may be useful to determine the entire impact of current levels of output, or of total levels under each alternative plan, and those levels can be specified in place of the change.

Specify only the amounts of outputs associated with actual consumption. In some cases, the supply of an output, such as campsite days or forage capacity, may exceed that actually consumed. Outputs evaluated by Forest planning models, when properly formulated, are only those consumed.

27.13 - Estimate Per Unit Values. For each output calculate the value at the end stage of production in harvesting or use. For outputs that are sold as final goods or intermediate process, the appropriate value is the average selling price at the end stage of production specified. For example, if sawlogs are exported from the impact area, the average sawlog value is appropriate. For timber processed by sawmills in the area (after which it is exported or bought by diverse sectors), it is the average price for the products sold by the sawmills. Valid prices can often be obtained from appraisal information, or from trade sources. These prices usually are not the appropriate price to use in an efficiency analysis.

For most types of nonmarket final consumer outputs, such as recreation, fees (if any) may not represent the importance of their economic impacts. The appropriate values are the average total expenditures required to participate in one unit of the recreational activity, including travel, lodging, meals, and other incremental expenses. Sources of expenditure information are available from expenditure surveys and studies.

Local prices, preferably ones for the data base year, should be used if they are available. Otherwise prices may have to be adjusted to local conditions or adjusted by deflation factors to the base year.

27.14 - Allocating Values to Appropriate Sectors. For raw materials, assign the values to the sectors in the model at the end state of production specified for them. For example, values of sawlogs exported from the impact area should be assigned to the Logging sector; those for lumber processed by sawmills in the area to the Sawmill sector.

Special procedures are necessary for allocating the values of final consumer expenditures typically bought through wholesale and retail channels. Following the conventions in national income accounting, for such purchases only the trade margin or markup is assigned to the wholesale and retail trade sector, the remainder is assigned to the industries that manufacture the goods. These markups represent the value of the distributional services. For many personal consumption expenditures, this requires apportioning the values among numerous industries. Tables of suggested allocations are presented in the IMPLAN Analysis Guide (sec. 29).

27.15 - Adjusting Values to Constant Dollars. If the value data is not available in constant dollars of the base year, adjust the data by dividing them by price deflators. It is better to use deflators specific to individual sectors, if possible, rather than use aggregate national deflators, such as those for the gross national product.

27.2 - Direct and Indirect Changes in Government Expenditures. Three types of activities deserves the analyst's special attention. For each alternative plan, the land management activities of the Forest Service affect the economy not only through the production of outputs but by the purchase of goods and services. If timber is harvested, purchasers may get credits for the roads they build on National Forest land. In addition, the Federal Government shares receipts based on National Forest ownership.

In each case, the procedures for assembling the needed information are similar, though the Forest Service expenditures should be accounted for in the Federal Government sector and the receipt sharing through the State and Local Government sector. Project and allocate the anticipated expenditures or receipt shares needed for each alternative.

Since neither sector is within the usual interindustry transaction matrix (Quadrant I in exhibit 01), the analyst must disaggregate the funds to specific sectors. The first step is to determine the proportion going for salaries. Separate these amounts into types of personal expenditure according to procedures outlined in the IMPLAN Analysis Guide (sec. 29). Allocate the remaining funds using the most logical distribution of expenditures.

27.21 - Forest Service Expenditures. The non-salary expenditures are best distributed according to total Federal expenditures, but not including expenditures for national defense.

27.22 - Purchaser-Credit Roads. Road costs for which timber purchasers are given credit are not included in the selling price. The Federal government in effect pays for the construction of the roads, which become permanent assets. Purchaser credit funds can be handled as "other government expenditures" or as an expenditure in the "New Construction" sectors of IMPLAN. None of these funds go for salaries.

27.23 - Shared Receipts. The shared receipt payments related to National Forest System lands include the receipt-sharing of gross payments collected for outputs. A share (generally 25 percent) is given to state governments for redistribution to counties (the "25-percent fund"). Payments in lieu of taxes (PILT) are also made by the federal government. The payments are generally used for schools and roads. For each alternative, including the current program, estimate the anticipated payments, and determine how individual states distribute the funds.

For money spent on schools, the estimation of effects should be assigned to the State and Local Governments sector. Allocate the proportion spent on salaries according to the distribution of personal expenditures, and the remainder through the distribution of public school expenses given in the IMPLAN Analysis Guide. Assign payments spent on roads to the "New Construction sector".

28 - ESTIMATING ECONOMIC IMPACTS.

28.1 - Economic Impact Calculations. The analyst determines the total economic impacts from each alternative on each sector by aggregating the changes in final demand as estimated from each change in output and government activity. These aggregate changes are multiplied by the appropriate multipliers for each sector. In the IMPLAN system subprogram IMPACT is used to calculate the total impacts.

Tables are normally produced for both Type I multipliers, including the direct impacts, and Type II or Type III multipliers, which include the induced impacts of recycling the amounts spent by household on additional demands. These output tables show the changes in final demand, employee compensation, property-type income, total income, value added, and employment (number of jobs). Using the IMPLAN system they are also produced by the subprogram IMPACT. These impacts for separate sectors can be grouped or aggregated for ease of presentation.

28.2 - Extensions of Economic Impact Analysis. The analyst must consider several extensions of input-output analysis that have been developed to contend with limiting assumptions of the methodology. All of the following extensions are currently part of the IMPLAN system. Specific instructions are given in the IMPLAN Analysis and User Guides (sec. 29).

28.21 - Supply-Constrained Industries. An underlying assumption of input-output analysis is that the supply of any product to meet demand is potentially unlimited. Any sector can expand indefinitely as long as demands for its products increases.
Since this assumption is not always true, the analyst can specify that outputs of some sectors may be limited by resource constraints, while outputs of other sectors are solved by usual input-output techniques. The analyst must supply the limits of output of the constrained sectors from information outside the model.

Review the results from such analysis closely since the outputs of industries that require the products of constrained sectors may be too high, and are thus inconsistent. These additional industrial sectors in turn must be constrained also, and the analysis repeated.

28.22 - Structural Change. Another assumption of standard economic impact analyses is that industrial sectors not present in the original economy will not move into the impact area. If certain industries are apt to move into the area (or are required to harvest, extract, or use the outputs to be produced), then the analyst must modify the model to represent the new industries.

Inserting a new industry requires estimates of the approximate size of the industry, either in terms of total gross output or employment, and corresponding estimates of employee compensation, property-type income, and indirect business taxes. The proportions of these components of final payments may be approximated from data from another state in which that sector is active. Reanalysis of the model can be conducted under several assumptions:

1. Existing industries will not expand to meet the input requirements of the new industry, though some existing imports may be redirected to it.

2. All existing industries will add capacity to meet the input requirements of the new industry, and that new industries may in turn be attracted to the impact area.

Depending on the time frame of the analysis, the development of the economy in the impact area may be somewhere between these assumptions. The IMPLAN analysis guide should be consulted for procedures in handling new sectors.

28.23 - Labor Force Utilization. The analyst must also consider the assumption of input-output analysis that each new job is filled by someone from outside the impact area--that is, there is full employment within the impact area. Thus, when employment expands, each new employee would spend an additional amount, similar to existing workers.

In most cases, some new jobs would be filled by those unemployed, or underemployed, in the impact area. Instead of spending like another worker that migrates into the area, such new jobholders would spend in addition only the difference between the pattern of expenditures while unemployed, on welfare, or as underemployed and the pattern of expenditures with larger income when fully employed.

Procedures have been developed in the IMPLAN system to specify a pool of unemployed labor by category, from which new jobs are first filled. Only when the pool is empty, do new workers migrate in. In the reverse, when jobs are lost through changes in output from alternatives the pool enlarges.

29 - REFERENCES.

Useful methods and analyses can be found in the following publications:

Alward, Gregory S.; Palmer, Charles J. 1983. IMPLAN: An input-output analysis system for Forest Service planning. Proceedings of the First North American Conference on Forest Sector Models, 1981, Williamsburg, Virginia. A B Academic Publishing, Oxford. p 1231-140.

Miernyk, W. H. 1965. The elements of input-output analysis. Random House, New York, NY. 156 p.

Miller, Ronald E.; Blair, Peter D. 1985. Input-output analysis: foundations and extensions. Prentice-Hall. Englewood Cliffs. NY. 464 p.

USDA Forest Service. 1985. IMPLAN Version 1.1: analysis guide. Land Mgt. Plan. sec., USDA Forest Service, Fort Collins, CO. vp.

USDA Forest Service. 1983. IMPLAN User's guide. Land Mgt. Plan. Sec., USDA Forest Service, Fort Collins, CO. vp.

The components, or quadrants of the table, are as follows:

1. The upper left quadrant (I) has rows and columns for each industry sector, numbered from 1 to N. The columns indicate the industries from which each industry buys its intermediate goods; the rows indicate where each industry sells its output. Firms in each industry often buy and sell to others in the same industry.

2. The upper right quadrant (II) shows the amount of sales of each industry, from 1 to N, to final consuming sectors-- household, government, capital expenditure, and exports from the impact area to all areas outside. The sum of each complete row--sales to both other industry and final consumers--is the total gross output of the industry.

3. The lower left quadrant (III) indicates the purchases of each industry (or payments) for basic factors of production-- wages for labor, indirect taxes to government, rental and other property type income, depreciation (or the consumption of capital), and for imports from outside the impact area. The entire column for each industry sums to the total gross outlays, which equal the total gross output on the right border.

4. The lower right quadrant (IV) records the primary inputs into final demand sectors, such as salaries of government employees and imports from outside the impact area consumed directly by households.

FSH 1909.17 - ECONOMIC AND SOCIAL ANALYSIS HANDBOOK
CHAPTER 20 - ECONOMIC IMPACT ANALYSIS
Contents

REFERENCES

FSH 1909.17 - ECONOMIC AND SOCIAL ANALYSIS HANDBOOK

CHAPTER 30 - SOCIAL ANALYSIS

Changes in the availability or in the permitted uses of forest resources can be of great importance to residents of affected communities, to commercial users, to recreationists, and to the public at large. Social impact analysis is one of the tools the Forest Service uses to identify the effects of proposed actions on these forest publics. This chapter sets forth basic principles, techniques, and general guidance for conducting social impact analysis.

30.1 - Authority.

1. The National Environmental Policy Act of 1969 (NEPA) requires integrated use of the natural and the social sciences in all planning and decisionmaking that affect the human environment. The human environment includes the natural and physical environment and the relationship of people to that environment (40 CFR 1508.14). NEPA requires that unquantified environmental amenities and values receive the same serious consideration as economic and technical factors.

2. Forest Service land management planning regulations require the integration of social science knowledge into the forest and regional planning process (36 CFR 219.5).

3. Forest Service Manual section 1973.03 mandates social impact analysis if potential social effects of agency policies or actions are important to the decision.

30.2 - Objectives.

The objectives of conducting social impact analysis are to:

1. Inform agency decisionmakers and publics of the variety of potential social effects that might occur as a result of agency actions.

2. Identify potential public needs and concerns that resource managers must consider in their decisionmaking.

3. Assess the effectiveness of program planning, implementation, and social impact mitigation.

30.4 - Responsibility.

1. Social Science Analysts. Social Science Analysts should work with other specialists using an interdisciplinary approach to:

   a. Plan the depth and focus of environmental analysis, the analytical tasks and standards, the public participation plan, and other analysis tasks.

   b. Identify social science information needs and collect, organize, and interpret necessary data.

30.5 - Definitions. The following are concepts used in this chapter. Other applicable definitions are in other chapters of this handbook; 40 CFR 1508; FSM 1905; FSH 1909.17, section 05; and FSH 1909.15, section 05.

1. Area of influence. A delineated geographic area that includes the population most affected by past, present, or proposed actions of a Forest Service Unit. Depending on circumstances, an area of influence may be local to inter-national in its scale. An area of influence used in estimating economic and social effects of an action is also called an impact analysis area.

2. Community cohesion. The degree of unity and cooperation evident in a community as it defines problems and attempts to resolve them.

3. Community stability. A community's capacity to handle change without major hardships or disruptions to component groups or institutions. Measurement of community stability requires identification of the type and rate of proposed change and an assessment of the community's capacity to accommodate that level of change.

4. Comparison community. A community whose experiences with actions are similar to those presently proposed for another community and whose experiences may be helpful in predicting and mitigating possible adverse effects of the proposed actions.

5. Environmental analysis. (FSH 1909.15, sec. 05).

6. Impact, social (also social effect). A change in social and cultural conditions which directly or indirectly results from a Forest Service action (FSM 1973).

7. Infrastructure. A set of basic public and commercial facilities and support services. Common elements include schools, stores, streets, housing, parks, telephones, water service, police and fire protection, hospitals, and social services.

8. Institutional analysis. An examination of institutions within an area of influence and their expected responses to Forest Service actions.

9. Interdisciplinary team. A group formed to use an interdisciplinary approach to ensure the integrated use of the natural and social sciences and environmental design arts in planning and decisionmaking, as required by the National Environmental Policy Act (FSH 1909.15, sec. 11.7).

10. Lifestyle. (FSH 1909.17, sec. 05).

11. Minority. (FSH 1909.17, sec. 05).

12. Mitigation. (40 CFR 1508.20).

13. Public involvement. (FSM 1905; FSM 1620).

14. Site-specific. A term applied to an action such as a timber harvest, mineral development, or road or water project that involves a limited, often well-defined geographic area.

15. Social analysis. The collection and evaluation of information about the social context and social effects of Forest Service activities.

16. Social category. A classification of people with a common social characteristic, such as age, nationality, occupation, hobby, outlook, or educational level.

17. Social group. People who cooperate to pursue common interests and to attain mutual goals.

18. Social and economic overview. A document or organized file that describes a Forest Service Unit in its social, economic, and historical context.

19. Social impact analysis. A component of the environmental analysis process that uses social science information and methodology to determine how present programs or proposed actions affect humans.

20. Social organization. The structure of a society described in terms of roles, relationshps, norms, institutions, infrastructure, and/or community cohesiveness and stability.

21. Social science analyst. A person who does social science analysis, such as an agency social scientist, a designated social science coordinator, or an outside contractor.

22. Social variable. An indicator used to measure the social impact of Forest Service management alternatives. Examples include population statistics, types of institutions, and personal opinion as reflected in attitudes or as demonstrated by behavior.

23. Subculture. A distinctive pattern of beliefs, values, norms, and customs shared by a portion of the population, often because of a common age, ethnic heritage, occupation, or religious or ideological orientation.

24. Value, social. A shared standard of preference or desirability, such as good health, honesty, success, and prosperity, or the desire to develop natural resources or to preserve natural beauty.

30.6 - Role of Social Impact Analysis in Environmental Analysis. Much social impact analysis in the Forest Service is the work of interdisciplinary teams responding to National Environmental Policy Act and National Forest Management Act requirements. Social impact analysis is usually an important component in the analysis of such actions as legislative proposals, major agency policy changes, land management planning, and site-specific projects with human impacts. Environmental analysis, including social impact analysis, is a flexible

process that permits variations in activity sequence and revision of earlier work as the analysis proceeds. The social information required for each analysis varies with the type, complexity, and social importance of the proposed action. In each analysis, use valid existing documentation to avoid duplication of efforts (FSH 1909.15, sec. 11.4). Exhibits 01 and 02 show how social impact analysis tasks are integrated with environmental analysis in the analysis of site-specific proposals and in land management planning.

FSH 1909.17 - ECONOMIC AND SOCIAL ANALYSIS HANDBOOK

FSH 1909.17 - ECONOMIC SOCIAL ANALYSIS HANDBOOK

30.6 - Exhibit 01

How Social Analysis Tasks Are Integrated with the Environmental Analysis Process

A Analysis Activities in a Convenient Sequence 1/	**B** The NEPA Process. (40 CFR 1500 to 1508)	**C** Related Social Analysis Tasks (FSM 1970)
Scoping	Study the proposed action to determine its nature and importance, the extent of environmental analysis required for an informed decision, and possible action alternatives. Plan the analysis process, select analysis, determine analysis appropriate interdisciplinary skills; and invite the participation of potentially affected persons, groups, and communities.	Initiate social effects analysis when the potential effects of agency policies or actions are important to the decision. Conduct a preliminary investigation to identify or validate issues, select key variables for areas, and assess data needs and sources. Help identify public and agency concerns and management opportunities.
Collecting and Interpreting Data	Data and analysis included should be commensurate with the importance of the expected environmentatl effects. If desired, develop a social overview document or file to present this information.	Depth of analysis depends on importance of expected social effects.
Formulating Alternatives	Develop reasonable alternatives, including "no action," the proposed action, and viable action alternatives.	Assist in formulating alternatives that respond to all important public and agency social concerns. Consider effects on lifestyles; attitudes, beliefs, and values; social organization,; population and land use, and civil rights.

FSH 1909.17 - ECONOMIC AND SOCIAL ANALYSIS HANDBOOK

30.6 - Exhibit 01 - Continued

A Analysis Activities in a Convenient Sequence 1/	B The NEPA Process. (40 CFR 1500 to 1508)	C Related Social Analysis Tasks (FSM 1970)
Estimating Effects	Discuss possible effects of the action and its alternatives, including direct, indirect, and cumulative effects and their significance. Include both beneficial and adverse social, economic, physical and biological effects, and possible mitigation measures.	Estimate social and economic changes that would result from each alternative. Report effects by alternative on forest users, by forest-dependent communities, urban areas, others who value the forests, women and minorities civil rights, and consumers.
Selecting a Preferred Alternative	Evaluate and compare alternatives. Identify the agency's preferred alternative, if one exists.	Help evaluate and compare the social and economic effects of each alternative so that these are considered along with other factors.
Monitoring Program Implementation	Agencies may provide for monitoring to ensure that decisions have expected results and that mitigation commitments are met.	Observe the effectiveness of program implementation, including mitigation efforts, through direct observation and conversation with knowledgeable people. Provide suggestions for program improvement.

1/ There is no fixed analysis sequence and steps often overlap.

FSH 1909.17 - ECONOMIC AND SOCIAL ANALYSIS HANDBOOK

36 – Exhibit 02

How Social Analysis Tasks are Integrated with Land Management Planning

A Analysis Activities in a Convenient Sequence 1/	B NEPA Process Applied to (36 CFR 219.12)	C Related Social Analysis Tasks (FSM 1970)
Scoping	Determine purpose and need by identifying and evaluating public issues, management concerns, and resource use and development opportunities. Develop criteria to guide the planning process, based on laws, administrative direction, public and management input, and ecological, technical, economic, and management and concerns and	Initiate social effects analysis when the potential effects of agency policies or actions are important to the decision. Conduct a preliminary investigation to identify or validate issues, select key variables for analysis, determine analysis areas, and assess data needs and sources. Help identify public and agency concerns and management opportunities.
Collecting and Interpreting Data	Maintain a current inventory of data appropriate for planning and managing resources. Determine the unit's ability to supply goods and services at specified levels of management production.	Depth of analysis depends on importance of expected social effects. If desired, develop a social overview document or file to present this information.
Formulating Alternatives	Develop a broad range of reasonable alternatives that respond to issues, concerns, and opportunities, and that provide a basis for maximizing net public benefit, consistent with sound forest management practices. Include a "current level" and an RPA Program alternative.	Assist in formulating alternatives that respond to all important public and agency social concerns. Consider effects on lifestyles, attitudes, beliefs and values; social organization; population and land use; and civil rights.
Estimating Effects	Estimate the physical, biological, economical, and social effects of each alternative, including expected market and nonmarket outputs, and direct and indirect benefits and costs.	Estimate social and economic changes that would result from each alternative. Report effects by alternative on forest users, forest-development communities, urban areas, others who value the forests, women and minorities, civil rights, and consumers.

30.6 - Exhibit 02 - Continued

A Analysis Activities in a Convenient Sequence 1/	B NEPA Process Applied to (36 CFR 219.12)	C Related Social Analysis Tasks (FSM 1970)
Selecting a Preferred Alternative	Evaluate the significant physical, biological, economic, and social effects of each alternative, using planning criteria. Recommend a preferred alternative.	Help evaluate and compare the social and economic effects of each alternative so that these are considered along with other factors.
Monitoring Program Implementation	Evaluate implementation at designated intervals to determine how well the unit applied management standards and has met objectives. Recommend needed changes in management direction.	Observe the effectiveness of program implementation, including mitigation efforts, through direct observation and conversations with knowledgeable people. Provide suggestions for program improvement.

1/ There is no fixed analysis sequence and steps often overlap.

FSH 1909.17 - ECONOMIC AND SOCIAL ANALYSIS HANDBOOK

31 - CONDUCT SCOPING. Scoping is a procedure for determining the depth and focus of environmental analysis necessary for making an informed decision (FSH 1909.15, sec. 05). In order to determine the scope of an environmental analysis, the responsible official must know the social context of the proposed action, including the most important issues and concerns. This information is also necessary for estimating the social consequences of an action and its alternatives. Resulting documents also provide potentially affected persons with quantitative and descriptive information about the proposed action (FSM 1973.02).

31.1 - Initiate Social Impact Analysis During Scoping. Initiate social impact analysis when preliminary scoping determines that important social effects could result from a Forest Service decision on a proposed action or its alternatives (FSM 1973.03). This analysis tells the decisionmaker:

1. The variety and intensity of possible social effects.

2. The location of affected populations.

3. The interrelationships between social and other factors.

4. Whether it is possible to mitigate adverse effects that could occur (FSH 1909.15, sec. 24).

Designate a social scientist or other person familiar with the affected social environment (hereafter called social science analyst) to compile and help interpret the social information required in the scoping process.

31.2 - Consider Social Conditions in Scoping. Most routine Forest Service actions are small in scale and generate few important social effects. But some major actions such as forest planning, mineral and recreation developments, or a combination of numerous smaller actions produce a complex pattern of impacts that merit careful study. In scoping the current social situation and the possible effects that could result from proposed actions, consider the following factors:

1. Categories of people the activity is likely to affect: for example, residents of nearby communities, forest products industries, forest users, environmental groups, minorities, women, retirees, local business people, and adjacent landowners (40 CFR 1501.7(a)(1)).

2. How the action compares with historical trends: past and present economic activities, rates of population change, community stability, public reactions to similar changes in the past, and local traditions (FSH 1909.15, sec. 61.4).

3. Socioeconomic and sociocultural conditions the action is likely to affect.

   a. Socioeconomic effects (sec. 35.4) include changes due to the action in income, employment, population, local revenues, and business activity.

b. Sociocultural effects (sec. 35.5) include changes in community institutions, values, interpersonal relationships, and perceptions of the environment.

4. Sources of effects: direct, indirect, induced, and cumulative (40 CFR 1508.7 and 1508.8).

5. Duration and intensity of effects: short or long term (FSH 1909.15, sec. 11.2); how significant (40 CFR 1508.27).

6. Location and magnitude of the action: whether it is local, statewide, regional, or national in its effects (FSM 1973.3).

31.3 - Plan the Analysis. Complete these steps in conducting social impact analysis (FSM 1973.1). Plan and coordinate each step as part of the overall environmental analysis (sec. 30.6, ex. 01).

1. Begin a preliminary social investigation as soon as there is a clear understanding of the nature of the proposed action and of the need for social analysis. The following are appropriate scoping objectives for the preliminary investigation:

a. Determine the types, range, and intensity of social effects usually associated with such actions.

b. Identify groups, communities, and categories of people the action might affect. Delineate the area(s) of influence (sec. 31.41).

c. Explore social issues, concerns, and opportunities to ensure that important matters receive appropriate consideration. Learn the background of each issue, who has a stake in the outcome, and possible ways to resolve controversial issues.

d. Assess the adequacy of existing data for predicting the impacts of Forest Service activities. For example: Is there sufficient information? Is the information recent and relevant? Focus on the most important issues and concerns (FSH 1909.15, sec. 11.5) and the data required to analyze them.

e. Identify the most relevant social variables (sec. 33).

f. Determine whether additional field work is necessary to fill data gaps.

2. Analyze the present social situation and existing trends to use as a base for projecting the social effects of different alternatives in agency planning (sec. 34).

3. Work with other specialists to formulate reasonable alternatives and estimate the possible effects of each alternative, including the proposed action (sec. 35). This helps to identify social information needed in the environmental analysis.

31.4 - Identify Agency-Community Linkages. Determine how Forest Service activities and various social categories, groups, and communities affect each other. Usually linkages between the Forest Service and local residents are most numerous and visible. There are also important ties between some Forest Service activities and citizens who do not reside in the immediate area, those interested in wilderness, wildlife, outdoor recreation, and natural resource development.

The nature of the proposed action determines the most important links between National Forest units and the affected population. The action may create new links and alter existing ties. It is useful to develop a list of questions to help identify existing linkages and to collect the information needed to describe them. Decisionmakers and knowledgeable resource personnel should review the questions for relevance. The following is a list of suitable questions:

1. Who uses the resources of the Forest Unit? Does the Unit supply a large portion of each user's need for goods and services?

2. Are other local businesses and industries indirectly linked to agency programs?

3. Where National Forest lands are involved, what activities or conditions occur on adjacent lands and what are their ties to the National Forest?

4. What portion of local government revenues depend, directly or indirectly, on agency activities?

5. Do American Indians and other groups have ties to Forest sites and resources?

6. If the proposed action is site-specific, do some individuals and groups have strong feelings about its location and desirability?

31.41 - Determine the Area of Influence. Delineate an area (or zone) of influence large enough to include the people most subject to the direct and indirect social effects of various program alternatives. Many of the strongest and most stable links (sec. 31.4) between the Forest Service Unit and the public are evident in this area.

1. Size. The size of the area of influence depends on the activity. For example, an area influenced by a major recreation development would be much larger than an area affected by the upgrading of a local road. An agency action with widespread social effects may warrant delineation of two or more areas; for example, a local zone of direct, intense, and frequent effects and a larger regional or national zone of more subtle or infrequent effects. In the larger zone, the links to the Unit are usually weaker and the Unit's resources are a less crucial part of the area's economic and social activities.

2. Linkage to Economic Impact Analysis Area. If the area of social influence roughly coincides with the economic impact analysis area for the same action, use the same area for both analyses to simplify social data collection. This is sometimes feasible in integrated land-use planning. However, if there is no identified economic impact analysis area or if it is clearly inconsistent with the area of social influence, select the area of influence appropriate for the social impact analysis.

3. Delineation of Boundaries. When feasible, delineate local areas of influence along county lines to facilitate data collection and coordination with local units of government. When counties are large and internally diverse, be sure to note other distinctive population features caused by mountains, drainages, travel routes, industries, and cultural or lifestyle patterns (sec. 31.42). Similarly, if a larger regional area of influence is a useful tool, define it along county or State boundaries.

31.42 - Delineate Subareas. If possible, divide a diverse area of influence into subareas with distinctive social and economic characteristics. Delineate on the basis of one or a combination of:

1. Community type (for example, size, principal industries, or cultural history).

2. Geographic location (for example, counties or drainages).

3. Proximity to the location of the activity (for example, within easy commuting distance or farther away).

4. The distribution of occupations and/or lifestyles within a rural area (for example, areas where coal miners and ranchers are the dominant residents might be useful units of analysis where coal development is occurring).

5. Other pertinent characteristics, such as settlement patterns or recreation activities, but do not delineate subareas solely on the basis of location of interest groups.

Insofar as possible, the subareas should not overlap, yet must include all of the people the action affects. For examples of subareas and their uses, see the sample worksheets and summaries in section 38.4.

31.5 - Consider Social Analysis Documentation. The complexity and importance of the social issues may warrant preparation of a social and economic overview or other reference document for use in the analysis.

31.51 - Social and Economic Overview. A social and economic overview is an optional reference document prepared during scoping for forest land management planning or other major actions. An overview is a published or unpublished report, or an accessible file of data with a summary and interpretation in narrative form (sec. 38.1).

A well-designed social and economic overview:

1. Describes the social, historical, and economic context of a Forest Service Unit and identifies problems, opportunities, and potential sources of controversy.

2. Includes the most recent and reliable social, demographic, and economic data.

3. Discusses socioeconomic and sociocultural trends pertinent to Forest programs.

4. Identifies important relationships among physical, biological, economic, and social aspects of forest management.

5. Facilitates the design of effective public involvement programs within the area of influence.

6. Organizes appropriate social and economic information for developing forest plans, programs, or project-specific environmental documents. If the social and economic overview (SEO) is a written document, rather than file data, and copies are readily available, it may be referenced in other environmental documents (40 CFR 1502.21).

31.52 - Other Social Analysis Reference Documents. The responsible official may request other, more focused social background reports for specific projects or situations. Examples are: economic impacts of phosphate mining on ranchers, social effects of a pesticide spraying program, effects of a reduced timber harvest on local businesses, social impacts of a large recreation complex in a retirement area, and social effects of coal development on a neighboring Indian reservation.

31.6 - Identify Special Concerns. Determine if there are areas of social life accorded special consideration by law or tradition. For example, the Forest Service has a legal mandate to protect certain resources, such as cultural sites and historic places (36 CFR 800 and FSM 2360). Also consider the legal rights and existing privileges of minorities, women, adjacent landowners, local governments, and National Forest users (FSH 1909.15, sec. 24). Examples include the right to equal employment opportunities; mining, grazing livestock, or fishing on public lands; the need for access to private inholdings or tribal religious sites; and the health and safety of National Forest users.

31.7 - Develop Criteria. Develop criteria and standards to guide social impact analysis (FSH 1909.15, sec. 11.91).

Criteria for social analysis may be derived from Federal laws and policies, public concerns, consultation with other experts, the professional standards of the social sciences, prior experience, and other sources. Criteria are necessary to:

1. Determine the Depth of the Analysis. How to identify the boundaries of the area of influence, level of inventory required, or degree of detail for the discussion of anticipated effects.

2. Select and Measure Variables. How to focus the analysis on social variables that are most relevant to the decision at hand (sec. 33.4).

3. Formulate Alternatives. How to develop reasonable alternatives (FSM 1920, 1950; FSH 1909.15). Other criteria may be necessary to ensure an adequate range of alternatives and to address all major issues.

4. Evaluate Alternatives. How to evaluate social effects of alternatives. The social science analyst shall consider issues, concerns, and opportunities; sociocultural and socioeconomic trends in the area of influence; characteristics and preferences of affected communities; and the expected type and distribution of impacts (sec. 35 and sec. 36.1).

31.8 - Anticipate Data Needs. Social data needs must be consistent in time and effort with the scope of the environmental analysis and the issues the analysis must address. Comprehensive information is necessary to analyze unfamiliar actions and actions that have a high potential for social and economic impacts.

32 - CONDUCT INDEPTH SOCIAL IMPACT ANALYSIS. If the action or its alternatives could have a significant effect on the quality of the human environment (sec. 36.2), a detailed social impact analysis is mandatory. Include findings in an environmental impact statement (FSM 1952). Ensure that the disciplines of the persons conducting the analysis are appropriate to the scope of the analysis and to the issues identified in the scoping process (40 CFR 1502.6).

33 - SELECT VARIABLES. Focus a social impact analysis on public and agency issues and concerns identified during scoping. Select the most appropriate social variables, collect valid data to describe them, and provide the social information necessary for a sound decision.

33.1 - Select Measurable Variables. To compare social conditions before and after a Forest Service action and to determine the significance of changes, select social variables that permit measurement or narrative description of these changes. Choose variables that accurately portray the most important social changes likely to occur under each alternative.

Some social variables, such as average age, income, or educational level, are readily available and easily expressed in numbers. It is also possible to measure and report qualitative changes, such as worker morale, community stability, and recreation satisfaction. Except when using scientific survey instruments, it is more meaningful to use brief descriptive phrases or a narrative for analyzing and comparing variables that measure values, attitudes, or other qualitative social behavior (sec. 38.4, ex. 01 through ex. 04).

33.2 - Consider a Wide Range of Variables. Consider the potential effects of each alternative on the lifestyles, attitudes, beliefs, values, social organization, population, land-use patterns, and civil rights within the area of influence (FSM 1973.2). Select relevant variables within these

broad categories of effects (sec. 33.3) to measure potentially important changes and to estimate expected effects. Obtain suggestions and data from case studies, environmental documents, acknowledged experts, and other sources that describe the experiences of comparable Forest Service Units and communities affected by similar actions. Identified issues and concerns suggest additional variables that merit examination.

33.21 - Lifestyles. Patterns of work and leisure, customs and traditions, and relationshps with family, friends, and others are elements of lifestyle. Focus an analysis on individual and community lifestyles that Forest Service policies and practices affect. People may be affected because of:

1. Direct economic relationships to the Forest Service, for example, through employment in an industry using Forest Service commodities (timber, minerals, or forage) or holding special-use permits (ski areas, resorts, outfitters, and guides).

2. Induced economic effects from Forest Service activities; as in locations where recreational use of the National Forest is the foundation for the local tourism industry. An agency policy change that modifies forest recreation might affect employment in hotels, restaurants, and industries that provide supplies and services to the primary tourist industry (laundry and dry cleaning, food products, or fuel).

3. Esthetic and amenity ties to forest lands; for example, recreationists and the residents of adjacent private subdivisions place a high value on either the esthetic amenities of public lands (such as open space, scenery, peace, and solitude) or the amount, kind, and quality of recreation opportunity.

33.22 - Attitudes, Beliefs, and Values. Consider the feelings, preferences, and expectations people have for forests and the management and use of particular areas. Examples include the desire to harvest a forest's commodities or enjoy its esthetic qualities; preferred or unwanted management practices; or the desire to preserve familiar, sacred, archaeological, and historic sites.

Forest settings or products have emotional meanings to many people. American Indians (and others) use National Forest sites for spiritual renewal and cultural observances. Cedar groves, trails, firewood, Christmas trees, huckleberries, solitude, wind in the treetops, streams, landscapes, and wildlife have significant emotional and symbolic meanings to many people.

Changes in Forest Service policy may result in practices that have an impact on people's feelings about agency activities: their likes, dislikes, perceptions, and fears. Important components of these feelings include their sense of personal freedom, self-sufficiency, and control over their future. Public involvement and interview data provide impressions about personal and community values and value changes. It is also possible to measure these impressions scientifically by using attitude scales. Changes in demographic characteristics (such as rapid growth and loss of jobs) often affect attitudes, beliefs, and values, as well as the other social categories discussed here.

33.23 - Social Organization. Look for effects on three dimensions of social organization: social institutions, community cohesion, and community stability (sec. 30.5).

Institutions such as the family, school, businesses, and city government satisfy human needs. Rapid population growth in a town might affect all of these components. Local governments experience fiscal pressures from increased demand for public schools and services. Retail businesses expand along with membership in civic groups and churches. The influx of new people with different lifestyles and values is a source of stress to some residents and weakens community cohesion. New and old residents have divergent needs and different ways to satisfy them. Community stability is weakened when changes are disruptive enough to interfere with community efforts to solve problems and meet the needs of residents.

33.24 - Population Characteristics. Consider population variables, such as the size, rates of change, and composition of the population. These are potentially very important when major Forest Service actions change the number or type of locally available jobs, community services, and housing options. However, most Forest Service actions do not involve substantial population changes.

33.25 - Land-Use Patterns. Review the types, intensity, and spatial distribution of land uses; for example, agricultural, industrial, residential, or recreational uses. Forest Service actions may affect the location, density, and type of land use; the proportion of open space; pollution levels; the supply of water; and energy resources.

33.26 - Civil Rights. Consider the effects of each alternative on civil rights, minority groups, women, and consumers (FSH 1909.15, sec. 24). The social categories described in section 33.2 are appropriate areas to investigate for civil rights effects.

The phrase "civil rights" implies fair and equal treatment under the law, both within the agency and in its relations with the public (FSM 1703). The Forest Service participates in special programs to enhance opportunities for equal participation of women, minorities, and the handicapped (FSM 1761 and 1762).

Identify and document instances in which a proposed action may adversely affect civil rights.

33.3 - Select Key Variables. Each category of social effects (sec. 33.2) includes many variables, and some of them may be important to the decision on a proposed action. Exhibit 01, Reminder List of Social Variables, provides a handy reference list of variables that are measurable numerically or by means of attitude surveys, expert opinion, or personal observation. Most of these variables are not significant factors in the analysis of routine Forest Service actions. However, major programs, policy changes, and site-specific actions along with combinations of lesser actions, such as mines, ski areas, energy facilities, or timber harvests, can have important effects on many of these and on other variables.

FSH 1909.17 - ECONOMIC AND SOCIAL ANALYSIS HANDBOOK

33.3 - Exhibit 01

Reminder List of Social Variables

When the social effects of a proposed action may be important to a decision, identify and analyze the appropriate social variables. The following variables have been identified in a variety of previous environmental analyses. They are grouped into the six categories of social effects described in section 33.2. Consider a variable if:

a. There might be significant variations in the effects expected under different alternatives.

b. It may be possible to resolve or better understand an issue or concern because of an analysis of this variable.

1. Lifestyles

   a. Types of jobs available; these vary by skills, income, season, and business cycle.

   b. Percentage of unemployed in the local labor force.

   c. Family income and consumption patterns.

   d. Size, number, and characteristics of ethnic cultures and subcultures.

   e. Existing and incoming occupational subcultures.

   f. Recreation preferences, use patterns, and amenity options.

   g. Degree of privacy, isolation.

   h. Relationship of lifestyle to infrastructure and forest resources (mill employee, recreationist, or retired person).

2. Attitudes, Beliefs, and Values

   a. Public conceptions of appropriate uses of forest land.

   b. Scope and intensity of demonstrated support or opposition to the proposed action.

33.3 - Exhibit 01--Continued

c. Customs and traditions in the affected area.

d. Religious or subcultural orientations toward certain sites or resources.

e. Local perceptions of incoming workers, recreationists, or retirees with different lifestyles.

f. Attitudes about economic development by outsiders.

g. Programs of organized special interest groups.

3. Social Organization

a. Community cohesion (degree of unity and cooperation).

b. Community stability (ability to absorb and manage change).

c. Source and focus on leadership.

d. Family and friendship networks.

e. Traditions of mutual trust and aid.

f. Nature and frequency of antisocial behavior, including crime, delinquency, drug and alcohol abuse, and vandalism.

g. Child and spouse abuse, fights, rowdy behavior, and other symptoms of stress and anxiety.

h. Infrastructure capacity: housing, schools, utilities, streets and highways, shopping facilities, social services, medical services, parks, and other recreation sites.

i. Tax structure and rates; other public revenues.

j. Type, diversity, and membership of service and special-interest organizations in the affected area.

k. Opportunity for effective participation in Federal, State, and local governments.

4. Population

33.3 - Exhibit 01--Continued

a. Number, density, and distribution of residents and visitors, including seasonal variations.

b. Age and sex characteristics of residents, in-migrants, and visitors.

c. Racial and ethnic composition.

d. Types, rates, and duration of in-migration and out-migration.

e. Available human resources (educational level, talents, skills).

5. Land-Use Patterns

a. Existing land uses, such as timber, wildlife habitat, recreation, mining, and grazing, and their interactions.

b. Compatibility of proposed changes in use with present uses of the site and adjacent lands.

c. Agency use of fire, herbicides, pesticides; clearcutting practices.

d. Extent of pollution and waste disposal.

e. Sites of historical, cultural, or scenic value.

f. Zoning requirements.

6. Civil Rights

a. Civil rights implications related to any or all of the variables listed in the above five categories.

b. Barriers to equal access by minorities and handicapped created or removed through the proposed action(s).

c. Past and present evidence of discriminatory practices in the locale and the potential interaction of this with the proposed action(s).

d. Potential for participation as contractors or subcontractors by small business, minority-owned business, small disadvantaged business, and women-owned business concerns in contracts, grants, and cooperative agreements generated by the proposed action(s).

33.4 - Apply Selection Criteria. Reduce the number of appropriate variables by eliminating those that fail to meet analysis needs or standards. The following criteria help to determine this. Relevance and potential significance are the most important criteria; consider them first. Then screen variables that meet these criteria against other criteria.

1. Relevance. The variable actually relates to the proposed action. To locate relevant information:

a. Determine the nature of the proposed action; that is, what activities are expected. Also consider when, where, why, and how the action could occur.

b. Identify who could be affected by the action and its alternatives. Explore how these persons might be affected.

c. Decide whether analysis of the variable helps to understand the issues identified during scoping.

d. Determine what else the decisionmaker should consider before selecting an alternative.

2. Significance. Forest Service actions (or other alternatives considered) affect or are affected by the variable, and the potential effects are important.

3. Availability. It is possible to obtain data to describe changes in the variable.

4. Efficiency. Measurement of the variable reduces the need for other data and measures.

5. Sensitivity. The measure of the variable clearly registers changes because of the proposed action.

6. Reliability. The measure yields consistent results.

7. Validity. The measure truly represents the variable condition.

34 - COLLECT AND INTERPRET DATA. Obtain social data from Forest Service units; other Federal, State, and local agencies; private sector groups; conversations with informed residents; and personal observations during field visits (sec. 38.2).

34.1 - Gather Social Data. Most sociocultural and socioeconomic data fall into four categories: (1) statistics, (2) written material, (3) observations, and (4) respondent contact data. There is no uniform "best" category of information available for all social variables. Use the selection criteria in section 33.4 to help identify appropriate information.

34.11 - Statistics. Look for pertinent statistical data. These include numerical tabulations of population characteristics (age, sex, income, and labor force categories) or types of behavior (such as patterns of outdoor recreation and interview or questionnaire survey responses). Some data (for example, the U.S. Census) come directly from the people involved and are a matter of public record. If data are obtained without the conscious knowledge of the persons or groups tabulated, it may be necessary to treat these data as confidential. The most useful statistical data are those collected at regular intervals and with fairly consistent standards because these data allow for comparisons over time.

34.12 - Written Materials. Determine social conditions and effects from existing written materials that provide factual information or report social behavior (including attitudes, beliefs, and values). Examples are letters to editors, newspaper articles, written testimony, local histories, graduate theses, annual reports, and research studies. Content analysis systems help analyze written data (FSH 1609.13). Some of these systems store information in a retrievable form and yield tabulated summaries of the results.

34.13 - Observations. Derive observations from talking with people, watching live television coverage of events, attending community meetings and other events, and system-atically monitoring and recording selected variables.

Use caution in the way you gather data. A set of nonrandom observations may yield data that are unrepresentative of the local population or too diverse for meaningful generalizations. Observational data are usually rich in context and meaning and can increase the understanding of the possible effects of an action. Such data are important sources of information for understanding conditions and trends in rural areas where other data are limited.

Procedures for collecting observational data are similar to first-hand investigative reporting and require a degree of immersion in the community. Increase data credibility by keeping careful field notes on each event observed; specify time, place, occurrences, persons involved, and other pertinent details.

34.14 - Respondent Contacts. Seek and record respondent-contact data. Options include the results of interviews, opinion surveys, or other direct-contact methods used to learn more about people's attitudes, opinions, experiences, and preferences. Keep in mind the following attributes of such data:

1. Respondents sometimes provide valuable information or insights that are not available from other sources.

2. Most of the data collected consist of attitudes or self-reports of behavior rather than actual behavior.

3. Unless a random sample is used, the responses are not representative of the total population.

4. Office of Management and Budget (OMB) approval is necessary for Federal Government-sponsored surveys where 10 or more people receive the same set of questions (5 CFR 1320; FSM 1377).

Consider conducting surveys when social information vital to the analysis is lacking and existing surveys by other Federal agencies or State and local governments cannot supply the desired information.

Interviews and questionnaires are good ways to get large numbers of responses from a cross-section of the population. Questionnaires are inexpensive to administer and computers can tabulate them readily, whereas interviews provide more immediate and detailed information. Design and pilot test the survey instrument and obtain OMB approval before collecting and processing the data. Consult a standard social science methods textbook for details about developing and administering surveys (sec. 38.5).

Forest Service social science analysts frequently obtain information from knowledgeable agency employees and from existing public response files (sec. 34.2). These sources are very accessible, pertinent to the analysis, and exempt from OMB clearance requirements.

Exhibit 01 lists examples of each of the four types of social data.

FSH 1909.17 - ECONOMIC AND SOCIAL ANALYSIS HANDBOOK

34.14 - Exhibit 01

Examples of Four Types of Social Data[1]

1. Statistical Data

   a. Demographic data (population size, age structure, percent married, number and permanence of households).

   b. Housing vacancy rates, tourist facility occupancy rates, average rent paid, percentage of owner-occupied dwellings.

   c. Traffic counts, vehicle registrations, commuting time, transportation alternatives.

   d. City or county hospital beds, school classrooms, power generating capacity, telephone hookups, full-time judges and police officers, social services case loads.

   e. Employment, income, weeks worked per year, worker turnover, absenteeism, distance to work.

2. Written Data

   a. Letters to the editor, Forest Supervisor, or District Ranger.

   b. Research studies, novels, nonfiction accounts, newspaper articles, radio and television documentaries.

   c. Written testimony (and transcribed oral comments) at hearings and listening sessions.

   d. Posters, circulars, and newsletters and formal resolutions from interest groups.

   e. Historical records and documents, newspaper archives, annual reports, feasibility studies, environmental statements.

3. Observational Data

   a. Systematic observation of use patterns or conditions (what people say or do about the appearance of their neighborhoods, smoke or dust problems, water quality, and recreation areas).

   b. Reports of behavior or "climate" at hearings, meetings, or rallies.

34.14 - Exhibit 01--Continued

c. Land and resource uses (visual evidence of effects, whether legal, illegal, temporary, or permanent).

d. "Unobtrusive" measures (noting evidence of litter, paths, fishermen, camping equipment

4. Respondent Contact

a. Public opinion polls, social surveys (to learn the number of people who believe that their neighborhood is deteriorating, favor or oppose proposals, would take another job, or express concern about unemployment).

b. Interviews with agency personnel.

c. Data collection via user registration, permits, applications.

d. Agency "response forms" (citizen comments about Forest Service alternatives) or visitor use forms. Regional Offices of Information must approve the use of response forms.

e. Onsite user interviews (traffic destination surveys, user satisfaction studies).

f. Ballot measure votes (special district formation, legislative proposals).

g. Citizen and "expert" comments on potential impacts.

[1]Do not regard this as a standard list.

34.2 – Review Public Participation Data. Forest or Regional Information Offices usually maintain files of letters, response forms, newspaper articles, and other data related to current agency programs. These files are readily accessible and can help identify likely issues, potentially affected people, and additional sources of information. The files do not contain sufficient information for an indepth social analysis but they may be a good source of initial data.

Public participation files are most useful when they are up-to-date, oriented toward the same actions and potentially affected populations as the present analysis, and extensive enough to provide a range of individual and group perspectives.

34.3 - Compile and Verify Data. Data pertinent to the issues or concerns are important for evaluating alternatives. Use a number of sources and methods to derive data on social conditions and to estimate social effects. For example, observation provides clues to needed respondent-contact data (which questions are of public concern?). Using several data sources enables one to evaluate the validity of each source. If there is a close correspondence between what is indicated by statistical data and by observational data, each source may be valid. Use as many types of data (sec. 34.1) as necessary to describe the total affected environment adequately and to identify possible effects of each alternative (40 CFR 1502.16). Review available statistical data and written social data to identify additional data needs.

Serious errors may result when you use data from one source to extend trends identified by another source unless the data are comparable; that is, the two sets have been compiled under the same standards. For example, one data source indicates that 20 percent of the local labor force works in the wood products industry, but the computation does not include government, agriculture, and the unemployed. A more recent source includes one or more of these categories, and as a result, wood products employees appear to be only 15 percent of the total labor force.

34.4 - Interpret Data. Social information is sometimes extensive and may be inconsistent. The analyst's task is to present the information in a way that increases its value to the decisionmaker.

1. Identify and focus the analysis on the most relevant and potentially significant social variables (sec. 33.4).

2. Analyze these variables to determine the social conditions, environmental relationships, and anticipated social effects most pertinent to the decision.

For example, if the proposal is for a pesticide spraying program and the program is likely to have social effects, focus the analysis on:

a. The variables most likely affected.

b. The nature and severity of the effects.

c. Individuals and groups interested in or affected by the action and the basis for their support or opposition.

d. Possible ways to mitigate unwanted social effects.

When interpreting data, it is essential to see interest groups in a larger social context that includes other view-points and to consider events in a historical perspective. Increase the information value of items selected for the analysis by fitting them into a larger social context, organizing them chronologically, and projecting them into the future.

34.41 - Minimize Bias. The social science analyst must make a deliberate effort to be impartial in the analysis. What is a positive effect to one group may be negative or unimportant to another, and the analyst must clearly indicate this when presenting the results of the analysis.

34.42 - Consider All Affected People. Consider the social effects of an action and its alternatives on each potentially affected group or category of people. Do not limit social analysis to the concerns of organized interest groups because:

1. The analysis of public involvement materials system-atically considers expressed concerns of interest and preference groups.

2. Social impact analysis seeks a comprehensive view of social effects. Some potentially affected people are not members of a vocal interest group. Interest groups seldom include a representative sample of the affected population.

3. Members of interest groups also belong to other social units (occupations, neighborhoods, or ethnic groups), so agency actions may affect each differently.

A knowledge of the motives, goals, and expectations of each group or category provides a basis for predicting the social effects of agency actions. Explore these early in the analysis to expedite the estimation of effects (sec. 35) when the agency has formalized alternatives.

Potentially affected interest groups and categories with special needs or concerns might include: American Indians, other racial or cultural minorities, older and handicapped citizens, commodity users (timber, minerals, or grazing lands), women, recreationists, outfitters and guides, conservation groups, and adjacent landowners.

34.43 - Establish Time Frames. Most current statistical data sources date back at least 20 to 30 years and thus provide a basis for identifying and projecting trends. This information is necessary in the formulation of a "no-action" alternative to use as a basis for estimating the effects of other alternatives (sec. 35.1). A proposed action may continue much longer, but it is difficult to project most economic and social trends more than 10 or 20 years into the future with some assurance of accuracy or certainty.

34.5 - Organize Data. Organize information efficiently to facilitate scoping, formulating alternatives, estimating the effects of alternatives, and identifying mitigation measures. Begin data organization at the onset of the analysis process and continue as you acquire new information and insight.

34.51 - Use Appropriate Graphics. Maps, graphs, and other graphic aids efficiently summarize and facilitate comparison of data. Use a Forest Service map or a State road map to define and illustrate the area of influence. For instance, use dotted lines to delineate activity locations or analysis subareas. Often, the area of influence is small enough to portray in adequate detail on a single page. When using a Government map, cite the source. Obtain written permission before publishing maps obtained from the private sector.

Graphs are effective for portraying relationships, whether among social units, time periods, or steps in a process. Tables permit easy comparison of data such as unemployment rates or population shifts over time. Matrices are useful for comparing two sets of data in several ways. For example, list agency alternatives on one axis of a matrix and different social variables on another. Then summarize the effects of each alternative on each variable in the squares and compare them (sec. 38.4). Photographs or sketches are a good way to convey visual impacts.

35 - ESTIMATE EFFECTS. See FSH 1909.15, section 23, for direction on formulating alternatives, which include the proposed action, no action, and other reasonable alternatives. In general, estimate the social effects of a proposed action and its alternatives when:

1. Social effects relate to the identified issues and concerns and may be important to the decision at hand (FSM 1973.03).

2. There are important differences, by alternative, in the type, intensity, and duration of social effects.

Methods for estimating the social effects of each alternative include:

1. Consultation with experts whose training and experience enable them to predict the most probable outcome of each alternative.

2. Computer modeling to project outcomes from different sets of assumptions (sec. 35.4 and sec. 38.3(2)).

3. Social science field work to determine which social variables the proposed action is most likely to affect. Use appropriate projection techniques to estimate the effects each alternative is likely to produce (sec. 35.4 and sec. 38.3 (1-2)).

4. Interdisciplinary team judgments of what could happen, based on a review of all available pertinent data. These data include public response files (sec. 34.14), studies of similar situations (sec. 38.3(3)), and personal experience with such actions.

Review the general social effects categories specified in FSM 1973.2 and the variables selected for analysis (sec. 33.2) to ensure that the analysis does not overlook critical effects. Often, both socioeconomic and sociocultural variables are important to the analysis of the social effects categories. Exhibit 01 illustrates this relationship.

FSH 1909.17 - ECONOMIC AND SOCIAL ANALYSIS HANDBOOK

35 - Exhibit 01

	Category Affected	Socioeconomic Variables	Sociocultural Variables
1.	Lifestyle	No. employed in recreation, mining or logging	No. who camp out, fish, or enjoy hiking
2.	Social organization	Capacity of local hospital or school facilities	Patterns of mutual aid in time of need
3.	Values, attitudes, beliefs	Desire to harvest timber	Desire for privacy, solitude, or scenic beauty
4.	Population	No. moving to take new jobs; size of payroll	Age, sex, norms, and values of new residents

35.1 - Focus on Agency-Induced Changes. Social analysts must distinguish between social change induced by Forest Service actions and social change that would occur without the action.

Project the no-action or "baseline" alternative first (FSH 1909.15, sec. 23.1). Then project the expected effects of each action alternative and compare them with the baseline alternative. Attribute any differences to the action alternative under comparison. For example, suppose projections indicate that jobs would decline 5 percent under "action" alternative B and would decline 10 percent under no-action or baseline alternative A because of automation and the changing age structure of timber stands. Alternative B's socioeconomic effect is to reduce by half the loss of jobs that would otherwise occur.

35.2 - Identify Other Sources of Change. Continuing social and economic changes occur under "no-action" because of external factors, for example:

1. Changing market conditions for forest commodities and services.

2. Independent actions by other agencies or by the private sector.

3. Minor shifts in Forest Service management emphasis permitted under present direction.

4. Changes in public preferences and forest-use patterns.

5. Local population shifts unrelated to Forest Service activities.

Agency activities have little or no influence on these changes. However, estimate these changes and project their effects in the discussion of the no-action alternative. Avoid erroneously attributing important effects from other sources to the proposed action.

35.3 - Consider Resource Interrelationships. Estimate social effects in a context of physical, biological, economic, and social factors to avoid overlooking important interrelationships (FSH 1909.15, sec. 24). For example, a major change in water quality or availability could affect certain species of game fish, local recreation options, the cost of cleaning and purifying water, and the travel-tourism industry.

35.4 - Estimate Socioeconomic Effects. Many effects of forest management actions reach the public through the private economic sector. A Forest provides commodities and opportunities to the local, regional, and national economies; buys goods and services from them; provides local payrolls; and shares the receipts collected with local governments. Because the extent of forest resource utilization differs among alternatives, varying amounts of commodities flow to affected industries. Profits, employee earnings, and ultimately tax revenues also vary.

Knowledge about the extent of these changes is critical to social impact analysis because it provides a basis for estimating related effects on other segments of the economy, the community, and the lives of individuals.

35.41 - Use of Economic Models. Input-output (I-O) analysis (ch. 20) uses a system of computer programs to estimate socioeconomic effects that originate in the economic sphere. An I-O analysis can detect and document the ways that a change in one sector of the local economy stimulates changes in other sectors. The Forest Service Input-Output Model for Planning (IMPLAN) describes the structure and trade flows of county economies. It can make effective, short-term predictions of the effects that changes in forest outputs may have on county economies, individually or in combination. IMPLAN is most useful in multi-county trend analysis, as is done in forest and regional land management planning.

Input-output models identify economic trends and relationships useful in comparing alternatives. Regard the numbers (jobs and income) produced by the model as indicative of the relative impacts of the different alternatives and not as accurate predictions of actual changes.

The IMPLAN model has been of limited value in the analysis of small areas of influence because it is programmed with county-level data based on the decennial U.S. Census. When using IMPLAN or other predictive models for social analysis, take into account the level and date of the data in the system. When either community-level or more current information is needed, consult appropriate Federal, State, and local sources (sec. 38.2).

To illustrate one use of current data, Federal and State employment and unemployment statistics are updated each month. It is possible to locate, organize, and interpret employment trends for a small area on a case-by-case basis.

Prepare a table to show employment (by sector, such as manufacturing, mining, or retail sales) and unemployment trends. Then estimate the significance of local conditions by comparing levels and percentages of change with past years, other localities, and State and Federal averages.

35.42 - Population Analysis. If a proposed action could generate substantial changes in locally available employment, analyze population characteristics and trends. A loss of jobs for an extended period implies out-migration of workers and their families. Make assumptions about the number of jobs filled by local workers, the number of incoming workers, and the number and size of the families that will accompany these workers. Various studies provide a basis for these assumptions (sec. 38.5).

If a proposed action could result in important changes in the size or composition of the population in the area of influence, project future trends and estimate the related social and economic effects. Five general methods are available for projecting current trends and conditions into the future. These are (1) simple trend extension,
(2) economic input-output models, (3) use of population multipliers, (4) community comparison, and (5) the use of experts.

The IMPLAN model estimates population at the county level under a variety of assumptions. Trend information is necessary for building the no-action alternative (sec. 35.1 and sec. 35.2) and for estimating the social effects of the alternatives. Projection techniques are described in section 38.3 and in sources 1 and 3 in section 38.5.

35.43 - Infrastructure Impacts. Rapid population changes affect county and community facilities and services, both public and private. These may include housing, utilities, streets, schools, parks, playgrounds, retail stores, social and medical services, and churches. The severity of the impacts depends on the size and duration of the action as well as the capacity of affected communities to absorb the additional people. Only 50 incoming workers could overload a rural community of 300 people. However, most small cities with 5,000 residents or several neighboring small towns of from 300 to 500 residents may have adequate housing and services for 50 new workers.

A small town has fewer available local workers than a large town, so more labor is "imported" to do a given amount of work. However, isolated villages with fewer than 1,000 people usually lack adequate public and commercial services, even for their own residents. Thus, both present and incoming population data are needed for estimating infrastructure impacts.

35.44 - Fiscal Impacts. Fiscal impacts sometimes occur because of changing Forest outputs and population changes relating to Forest programs. The level of Forest outputs determines Forest Service payments to counties and may affect tax revenues derived from the production of goods and services in the area of influence. Rapid population growth and infrastructure expansion create additional expenses for local government that are funded through taxes, grants, or borrowing. After growth stabilizes, funding needs usually stabilize within a few years. Population decline results in revenue losses and a reduction in local government employment.

Knowledge of the age, sex, and occupational structure of the area of influence is useful for estimating the fiscal impacts of various alternatives. For example, an alternative that increases local government costs and tax revenues would have an adverse effect on retirees living on fixed incomes.

When fiscal information is essential to the analysis, consult a Forest Service fiscal staff officer about agency payments to State and local governments. Consult appropriate departments of State, county, and city government for additional fiscal data.

35.5 - Estimate Sociocultural Effects. Sociocultural effects are social consequences of Forest Service activities that are noneconomic in origin or cannot meaningfully be reduced to monetary terms. These effects include changes in people's norms, values, customs, sense of well-being, social relationships, and basic institutions (sec. 33.2, ex. 01). The potential sociocultural effects of most major actions are important to affected people and the agency. Be sure to understand these effects before beginning decisionmaking and implementation. Describe relevant sociocultural conditions and effects in the most appropriate and effective way (quantitative, graphic, or precise narrative).

When estimating sociocultural effects, determine whether a proposed action complements, aggravates, or has little effect on conditions in the area of influence. The same proposal may be regarded as beneficial in one location and as undesirable in another because communities differ in their economic needs, proximity to the action, and knowledge about the changes likely to occur. Look beyond the public's current impressions of a proposed action. People often modify their views about the action after implementation because their subsequent experiences differ from their expectations. Activities that prove to be environmentally sound, socially responsive, and locally perceived as necessary earn increased public support.

Sociocultural effects are sometimes inconsistent with socio-economic effects, so it is important to understand both before making a decision. For example, one area of influence is heavily dependent on timber production but also has high unemployment. The Forest Service economist estimates that a proposed recreation development would create 200 jobs locally--a positive socioeconomic effect. However, many local residents oppose the accompanying influx of tourists. The unemployed loggers and mill workers are unwilling to change careers and lifestyles and to enter the service occupations with the low pay offered by the travel-tourism industry. They prefer to wait for the timber market to improve or to look for jobs in other sectors or locations.

Communities vary widely in their potential to accommodate population increases. This ability depends on size, financial resources, administrative expertise, local outlook toward growth, available outside assistance, and surplus infrastructure capacity (sec. 35.43). Nevertheless, extremely rapid, extended growth has a potential to surpass any community's ability to adjust and may create serious problems, at least in the short run.

Exhibit 01, How Rapid and Extended Changes May Affect Community Institutions, demonstrates how the socioeconomic, fiscal, and sociocultural impacts that result from continuing population growth could affect different institutions. References listed in section 38.5 are useful in identifying and estimating these combined impacts.

FSH 1909.17 - ECONOMIC AND SOCIAL ANALYSIS HANDBOOK

35.5 - Exhibit 01

How Rapid and Extended Changes May Affect Community Institutions

Individuals and Family Groups

Shortage of adequate housing; inflation of prices and rentals.

Multiple-family occupancy of some single-family dwellings; other make-shift living arrangements.

Local inflation increases hardship for persons with fixed incomes.

Greater incidence of anxiety, mental illness, alcoholism and other drug abuse, and suicide.

Increase in the frequency of divorce, separation, remarriage, and illegitimate births.

Improved job opportunities, especially in rural areas; some young people drop out of school to take well-paying jobs.

Increase in the percentage of single male residents during project construction.

Greater percentage of mothers employed outside home.

More frequent abuse of spouses and children.

Quality of Neighborhood and Community Life

With continuing in-migration, greater racial, cultural, and lifestyle diversity.

Increased support for newer, less conventional social and cultural activities in the community.

Expanded social and employment opportunities for women and minorities.

Decline in the effectiveness of informal community controls and an increase in formal-legal relationships.

Increase in most categories of adult crime and juvenile delinquency; more people feel insecure and lock their homes and cars.

Greater competition for the use of recreational facilities.

Realignment of friendships as new issues separate friends and new contacts permit alternatives.

35.5 - Exhibit 01—Continued

Increased noise; pollution of air and water; more litter on streets, sidewalks, and highways.

Schools, Churches, Voluntary Associations

Increased variety of church denominations and sects.

New alternatives to conventional morality and established customs exist.

Organized groups oriented toward resource conservation or development become more prominent.

Crowded schools; pressure for more classrooms, buildings, personnel; more competitive athletic teams and other groups but more difficult to qualify for them.

Social clubs and lodges gain members; new leadership patterns emerge; some shifts in relative prestige and influence of different organizations.

New voluntary organizations form, some to deal with various effects.

Increased student and teacher turnover; greater need for special programs for particular students.

More lifestyle and leisure options for residents.

Local Government

Political activity more intense, competitive, with wider participation.

Overburdened public services: police, fire, libraries, hospital, jails, juvenile homes, social services, parks, playgrounds, swimming pools.

Increased traffic, street damage; inadequate parking, abandoned cars.

Insufficient public utilities: water, sewer, solid waste, and power generation facilities.

Time is required to plan: meanwhile uncoordinated real estate development occurs in absence of zoning.

Revenues for expanding facilities either very inadequate or lag 2 to 3 years behind needs.

FSH 1909.17 - ECONOMIC AND SOCIAL ANALYSIS HANDBOOK

35.5 - Exhibit 01--Continued

Increases in litter, theft, vandalism, and animal control problems.
Long-range prospect of gains in per-capita revenues.

Increasingly complete community services are developed.

Social Aspects of Private Economic Sector

Decline in production due to absenteeism; increased employee turnover.

TV cable, telephone, water, power companies unable to meet hookup demands.

Increased business activity; national chains open branch operations; some small businesses are displaced.

Shortage of responsible professionals and technicians: doctors, lawyers, dentists, repairmen, carpenters, mechanics, electricians, plumbers.

Loss of trained employees to higher-paying jobs in new industries.

Retail outlets unable to handle business volume with former courtesy and efficiency.

Real estate, construction, mobile home, vehicle dealership, other growth-related businesses thrive.

Income redistribution due to higher rents, wages, profits, and land values; some people gain, others lose.

Greater variety of commercial services become available.

35.6 - Identify Effects on Civil Rights. The Forest Service is prohibited from discriminatory practices within the agency and in transactions with the public (FSM 1710). The analysis should identify any infringements on civil rights that could result from a proposed action or its alternatives (FSM 1730).

35.7 - Consider Direct, Indirect, and Cumulative Effects. Consider both direct and indirect social effects in the environmental analysis (40 CFR 1502.16, 40 CFR 1508.8). Direct social effects are those caused by natural resource management actions, such as the impact of Forest Service roading and free-use policies on local firewood users. A new road in a heavily forested area usually increases recreation use. An oil and gas leasing program may stimulate exploration and development.

Indirect and induced (ch. 20) social effects are the often unintended secondary consequences of the action and its direct effects. For example, new arterial roads that open several drainages for timber harvest might increase jobs and payrolls, revitalize civic organizations, and stimulate expansion of public services. Development and sustained production on oil and gas leases or mining claims increase local business volume, employment, and tax revenues.

Cumulative effects occur when direct and indirect effects from more than one action overlap, increasing the total impact (40 CFR 1508.7). A major oil and gas discovery usually brings many companies into an area and intensifies social impacts. New workers move to the area. Local governments and businesses lose employees to oil and gas developers who pay higher wages. Housing, schools, and local services may be unable to meet expanding needs. This could in turn increase rents, taxes, and the price of consumer goods and services, making the area less attractive to persons on fixed incomes.

35.8 - Provide Effective Description of Effects. Estimation of social effects is a compromise between detail and significance. Objectively consider each geographic subarea (sec. 31.42), assess changes in the most relevant social variables (sec. 33), and identify the most significant effects.

Describe effects in quantitative terms, if feasible, and in brief narratives (FSM 1970.6). The exclusive use of symbols "+", "-", "0", or "?" is discouraged because use of these symbols masks rationale, source, and qualification of the estimate. Document sources of data and estimates by experts.

When there is insufficient information to make credible estimates of the effects of an action with a potential for significant adverse impacts on the human environment, see 40 CFR 1502.22. If similar actions have occurred previously under comparable enviromental conditions, it may be possible to infer the range of probable effects from such examples.

Work sheets are useful to summarize and compare selected variables or general categories of effects (sec. 33) by alternative and for each subarea analyzed. Collect and summarize the most significant effects of the decision on social life. Examples of worksheets and narrative summaries of social effects for two alternatives are in section 38.4, exhibits 01 through 04.

35.9 - Identify Mitigation. Usually, the Forest Service is not responsible for the direct mitigation of social effects that occur outside of National Forest boundaries and jurisdiction; but other governmental units may need to act. The Forest Service is directed by statute and agency regulations to provide civic and public officials with quantified and descriptive measures of the projected impacts of agency actions so that potentially affected people can develop appropriate strategies to deal with them (National Environmental Policy Act, sec. 102(d)(g); FSM 1973.02(3)). A careful projection of expected impacts helps other Federal agencies, States, counties, and communities to avoid or mitigate adverse effects that fall within their jurisdiction (40 CFR 1502.14, 1502.16).

36 - EVALUATE ALTERNATIVES. The decisionmaker must consider social and economic effects that are important to the decision (FSM 1973.03). Review, compare, and weigh the effects of each alternative using alternative evaluation criteria that reflect social as well as other concerns.

36.1 - Develop Social Criteria for Evaluating Alternatives. Social analysis continues throughout the environmental analysis. New social information becomes available, providing a better understanding of potential effects. Review alternative evaluation criteria developed during scoping (sec. 31.7) and adapt or extend them, if necessary, to be responsive to identified issues and concerns. From a social analysis perspective, an alternative that avoids or resolves adverse social impacts and prolonged conflicts is preferable to one that does not.

Alternative evaluation criteria are human values applied to Forest management; for example, clean air, scenic beauty, economic efficiency, increased employment, or the protection of endangered species. In evaluating social effects, consider criteria that reflect widely shared values such as democracy, economic opportunity, local autonomy, and "being fair." The following are examples.

1. Quality of Social Life. An alternative protects and enhances the quality of life preferred by affected residents. A high quality of life may include:

   a. An economic structure compatible with locally preferred work and leisure patterns.

   b. Forest uses and practices in harmony with community beliefs and values.

   c. An absence of disruptive conflicts within the community.

   d. Optimism about the advantages of living in the area.

2. Community Stability. Community stability (sec. 30.5 and sec. 33.23) depends on the type and rate of population change, the consistency of changes with local values, the effectiveness of local leadership, and the volume of forest output to the private sector. Under the best alternative, proposed changes are consistent with the local capacity to adapt facilities,

services, and institutions. Clearly identified community preferences, knowledge of existing trends, and evidence of the ability to adapt help to define acceptable rates and types of sociocultural and socio-economic change.

3. Equitable Distribution of Effects. All individuals, groups, or communities do not share social effects equally, so any alternative is likely to benefit some people and negatively affect others.

An alternative may be socially preferable when the individuals and groups that benefit from it also pay most of the direct and indirect costs of implementing the alternative. Accordingly, it is less desirable if one group benefits while others pay most of the costs.

The analysis of the equitable distribution of effects requires careful study. A positive effect in one community may be perceived as negative in another.

4. Effective Mitigation. The alternative avoids, restricts, or adequately compensates for adverse social effects.

5. Long-term Justification. The alternative considers the resource needs of future generations and includes measures to ensure adequate future supplies.

36.2 - Determine Significance of Effects. (40 CFR 1502.1, 40 CFR 1508.16, 40 CFR 1508.27).

36.3 - Compare Alternatives. Compare alternatives on the basis of social, economic, and other evaluation criteria. To simplify the comparison of the social effects of each alternative, summarize important effects in meaningful phrases in a summary table (sec. 38.4, ex. 05). If possible, enter these effects on a master table that also summarizes economic, biological, and physical effects by alternative. This permits easy comparison of each factor in the context of the others. Identify alternatives that offer the best mix of benefits for the environmental costs incurred, including a preferred alternative, if there is one (FSH 1909.15, sec. 25).

37 - DOCUMENT, IMPLEMENT, AND MONITOR.

37.1 - Document Findings. (FSH 1909.15, ch. 30 and 40). When a social impact analysis is complex or controversial, keep a written record of the social portion of the analysis process even if a formal background document is unnecessary (FSM 1952; FSH 1909.15, sec. 31). Information gathered during scoping is thus readily available for further analysis; it is easy to review, revise, and compare the data; and issues considered during the analysis are recorded for future reference. A suitable outline for such a record is:

1. Nature of the proposed action: who, what, when, where, how, and why.

2. Potentially affected area, social characteristics that are relevant to the analysis, and social issues identified.

3. Possible social effects and mitigation opportunities under each identified alternative.

4. Comparison of the social effects of each alternative.

If the proposed action is not categorically excluded, include social analysis findings in the appropriate environmental document. Note in the narrative the information sources and methodologies used in the analysis or identify them in foot-notes or a reference section. Include supporting documents prepared for the analysis in the appendix or ensure that these documents are readily available. If incorporating other documents by reference (to avoid duplication or technical details), briefly describe their content and indicate their source(s).

37.2 - Implement the Decision. (FSH 1909.15, ch. 50).

37.21 - Monitor Implementation. Monitor implementation of the action to ensure achievement of desired results. This may require periodic visits to the affected area, or it may involve telephone conversations with field personnel, representatives of local government, and other sources to obtain current impressions of the action's effects. During the monitoring phase, the social science analyst has an opportunity to assess the accuracy of social effects projections and to identify any program adjustments that would help reduce unwanted effects. The analyst must report any important discrepancies between expected and actual effects to the decisionmaker or designated staff personnel.

38 - TECHNIQUES AND PROCEDURES APPENDIX.

38.1 - The Social and Economic Overview. The social and economic overview is a description and analysis of selected social, geographic, demographic, historical, and economic conditions and trends with projections into the future. An overview may be a very general document for use as a reference in routine Forest planning or a more focused report dealing with the social and economic context and possible effects of a site-specific action. The length of the overview depends on the scope and complexity of the analysis, but the presentation must be concise, relevant, and readable.

The responsible official determines whether to prepare a separate overview document. If published, relevant sections of it may be incorporated by reference in other documents. If a contractor prepares the social and economic overview, it is expedient to request a separate, publishable document as background information for a variety of analysis efforts.

Normally, a social and economic overview does not include technical economic analyses of Forest Service actions that are available elsewhere; for example, benefit/cost ratio calculations, present net value estimates, or other methods of economic efficiency analysis (FSM 1971). The overview contains social and economic data of general interest, such as the nature of the existing economic structure, labor force characteristics, population shifts, income distribution, industry trends, resource supply needs, transportation factors, land-use patterns, and pertinent social and cultural information (sec. 33.2).

The social and economic overview should:

1. Have a table of contents, introductory summary, appropriate graphs and tables, cited data sources, and appendices for detailed supporting data.

2. Define and map the area(s) of influence.

3. Describe the geographic, economic, and social features of the area of influence, its State or regional context, and the links (relationships) between the Forest units and the area of influence.

4. Discuss the lifestyle, values, concerns, social organization, population characteristics, civil rights considerations, and land-use patterns of the area of influence and explain their significance to Forest management (sec. 33).

5. Identify relevant social and economic trends and project their future course. Project trends and expected Forest uses 10 to 20 years into the future and consider trends over the past 20 or 30 years to aid in interpreting current and future conditions. Trends may be extended further, but longer range projections are less accurate.

6. When appropriate, present a strategy for the analysis of major Forest Service actions currently under consideration. Depending on the available data, it may be possible to analyze salient issues, identify critical social and socioeconomic variables for estimating effects, discuss the effects of various action alternatives, or cite sources and methods for acquiring necessary data.

7. Note problems of data reliability, inconsistency, or gaps in relevant information that may affect the estimation of effects (40 CFR 1502.22).

38.2 - Sources of Social Data.

1. U.S. Census Documents. Summary volumes are available in most libraries and from the Government Printing Office. Complete sets are in most university libraries. These include periodic censuses of population, housing, agriculture, and business for the Nation, States, and counties. Censuses have comparable data for past decades and are thus very useful for documenting trends. Two summary publications, Statistical Abstract of the United States and the City and County Data Book, are valuable desk references.

2. Other Federal Agencies. Other resource management and recordkeeping agencies, such as the Bureau of Land Management, Department of Energy, Bureau of Economic Analysis, the Corps of Engineers, and the Federal Bureau of Investigation publish useful information. Some of these agencies have compiled social data for resource programs which, when applicable, may be incorporated by reference (40 CFR 1502.21 and FSH 1909.15, sec. 11.4 and sec. 32.4). Comparing data early in the analysis helps ensure the use of valid, consistent sources.

3. State and Local Government Agencies

a. Planning Agencies. These agencies collect data on such subjects as local budgets, school enrollments, tax assessments, zoning regulations, current population estimates and projections, tax receipts, and anticipated development activities. Because Forest Service planning regulations (36 CFR 219.7) require a review of State and local planning efforts as part of the Forest Service planning process, contact and coordinate with these planning agencies. Examine their programs for the utility of their data and avoid a duplication of effort (40 CFR 1501.7 and 40 CFR 1506.2).

b. State Departments. Each State has departments of government that compile data about economic trends, social services and other State programs, agriculture and forestry, environmental quality, State parks and recreation, energy, and other subjects. Some States publish this information in yearbooks and all States issue periodic topical reports.

Health and welfare data include vital statistics, health and illness data through time, case load by type, information about specific populations, and inventories of medical personnel, support equipment, and facilities. Public safety agencies have information about crime, emergency service capacities, and problem areas and trends. Job service offices have information about employment conditions and trends.

c. Universities. Many university departments and social science research institutes conduct studies and publish materials about social and economic conditions, population shifts, resource development, public opinion, and other topics relevant to social impact analysis.

d. Economic Development Groups. Local or regional development offices provide data about current business activities, natural resource availability, labor force composition, employment data, impending development activities, housing occupancy information, and tourist facilities. Normally, information such as the available utility services and the number of connections by type and year are available.

4. Public and University Libraries. Libraries afford convenient access to many of the publications suggested above. They also employ reference librarians to assist patrons who seek specialized data. Libraries frequently have special collections that provide social information of State and local interest, including local history.

5. Business and Industry. The business sector may provide plans and time schedules for resource development projects, annual reports to stockholders, payroll and employee data, and information about new technologies with social and economic implications.

6. Special-Interest Organizations. Wildlife, recreation, wilderness, and other special interest groups offer information about environmental concerns, recreation use patterns, and the perspective of their membership.

7. In-Service Data Sources. Many pertinent data sources exist within the agency.

a. Public Participation Data. Public participation data, such as letters, response forms, petitions, and recorded meeting notes, provide valuable insights into some of the issues raised by the general public. Commonly, the participants in this process do not represent the total population and the data omit some affected segments (FSH 1609.13).

b. Forest Service Personnel. Agency employees are especially helpful in documenting historical events that have helped to shape the communities associated with the Unit. These personnel can provide personal observations, local written data, or leads to additional respondent contact data.

c. Other Sources. Agency environmental documents, maps, computer inventories, and other sources provide accessible, authoritative background information useful in preparing social overviews or estimating the effects of proposed actions.

38.3 - Projecting Social Effects.

1. Trend Extension. Trend extension is the projection of past population, economic, and social trends to selected years in the future. Projections usually are quantitative and based on a specific set of assumptions. For example, on the basis of past recreation increases and population growth, one can project that recreation use from the area of influence will increase by 8 percent per year during the next 10 years and that recreation visitation from cities and suburbs near the area of influence will increase by 10 percent per year. Alternatives that will not meet that level of use may have adverse social effects, such as crowded campsites and diminished enjoyment.

Trend extension can be a quantitative projection of units (houses, miles of road) that will be produced per year. One can plot straight line or curvilinear projections mechanically on graphs. It is crucial to report all of the assumptions (for example, population growth) behind the projection. Make allowances for any anticipated events that would change the assumptions and thus change the projected trends.

2. Population Multipliers. The term "multiplier" denotes a number that expresses the relationship between population growth and it social and economic effects. The use of multipliers is based on the assumption that changes in employment and population size are the key to predicting other social changes such as an increased demand for facilities and services. Two approaches are summarized below.

First, assess social effects and needs quantitatively, such as numbers of doctors, hospital beds, police cars, classrooms, or overnight campsites. Then calculate changes in service levels for some standard population unit, such as 1,000 persons, basing them on average needs (available in sources such as sec. 38.5, no. 2). For example, each additional 1,000 people in an area may suggest a need for one more doctor and four hospital beds. Use judgment to adjust results; for example, an area with 3,000 people already may have 5 doctors and 20 hospital beds, or only one doctor and no hospital.

The social scientist also uses employment fluctuations resulting from changes in Forest Service programs or policies as a basis for estimating population changes. If proposed rural development would create 500 "basic" jobs during the construction phase and if field work indicates that 70 percent of the workers will be nonlocal and average 1.3 dependents per worker, the increased population could result in serious social and economic impacts. It is possible to estimate the increased demand for housing, medical, educational, and recreational facilities. Using other multipliers derived from the experiences of other populations in similar situations, it is also possible to project the number of new "nonbasic" jobs in business and government. At the county level, each new basic job usually creates between 0.5 and 2.5 additional nonbasic jobs providing goods and services.

Observe some cautions in the use of population and employment multipliers. The relationship between commodities and employment is not rigid because transportation costs for raw materials, unused production or service capacity, overtime, and automation may change the relationship between increased economic activity and the number of workers. Similarly, the tie between new jobs and population change is not rigid because of differences in local-hire employment rates, rural commuting, the duration of the project, locally available amenities, housing market conditions, educational opportunities, the diversity of the local economy, and other factors.

When computer models are not available or are inapplicable, the use of employment and population multipliers is another technique for projecting the effects of changes into the future. These multipliers provide a systematic, traceable method for identifying direct and indirect effects of an action. Be sure to document the assumptions behind the technique when reporting the estimates. Appropriate local multipliers should be available from a unit economist, the county planner, or from State sources.

3. Community Comparisons. To learn about the possible social consequences of a proposed action, locate comparable communities that have experienced a similar action. Estimate the effects of the alternatives on the basis of what occurred in the comparison communities. The community comparison technique is more useful in analyzing site-specific developments than in land management planning social impact analyses (SIAs). For example, when the proposal is for a new ski resort, observe what happened in another place where a similar resort was built.

Match the comparison community and the proposed action as closely as possible with the community and project under analysis, for example, in size, rural-urban composition, distance from metropolitan areas, and major sources of employment. Various social effects bibliographies list case studies that may be reviewed to identify common patterns. (sec. 38.5).

38.4 - Sample Matrices and Narratives of Social Effects. Exhibits 01 through 5 are examples of matrices and narrative statements that can illustrate social effects.

FSH 1909.17 - ECONOMIC AND SOCIAL ANALYSIS HANDBOOK

38.4 - Exhibit 01

WORKSHEET: Social Effects Matrix

Alternative: No action. Outputs and significant practices: Commodity outputs continue at present levels as will TSI and range and habitat projects. Few visible changes from residences, recreation sites, and highways. Developed recreation facilties have slight (+5,000 recreational vehicle days per year) increase in use.

CATEGORIES OF SOCIAL EFFECTS

UNITS OF ANALYSIS	Population Change and Land-Use Patterns*	Lifestyle, (Work, Leisure, Customs, etc.)**	Attitudes, Beliefs, and Values**	Social Organization** (Cohesion and Institutions)
County Seats (Government and Service Industries)	Significant in-migration and growth (3%/yr). Conversion of nearby forests and farms to residences and ranchettes. Sources: Wayne & Benton Co. Planners	Diverse and growing service economies. Urban/surburban ways of life.	Towns large enough to accept the diversity of values. Middle class/white collar values dominant.	Growth and newcomers bring new issues and needs. Most handled easily because of urban diversity and sufficient resources.
West Side Rural (Forestry and Wood Products)	Population stable, many young adults migrate. No major change in land uses.	Long established logging and mill communities. Some jobs lost to automation. Hunting, fishing, & firewood important. Seasonal employment.	Work hard and play hard. Family and long-standing friendships important. Cooperation.	Highly cohesive communities, with sufficient public services to handle needs of current population.
East Side Rural (Forestry, Tourism, and Ranching)	2%/yr growth--retirees and second homes. Conversion of ranch & low elev. forest to recreation and residential use. Source: County Land Use Plans	Old ways of ranching and woods work--or new leisure lifestyles. Hunting, fishing, & firewood important to all. Visuals important to newcomers.	Conflicts between old rural values & new urban, leisure values. People get along by "not noticing."	Badly divided community. Newcomers need expanded public and private services, oldtimers resistant.
Southern Valleys (New Rural Lifestyle, Farming, Crafts)	Population growing (2%/yr) but big in-migration of 1970s is over. Zoning has greatly slowed conversion of farms and forests.	Small farms, handicrafts, tourism. Both oldtimers and newcomers strive for self-sufficiency. Firewood and clean water very important.	Increasing comfort between oldtimers' rural values and newcomers' "counter culture." Similarities appreciated, differences tolerated.	Frictions and infrastructure deficiencies of 1970s now disappearing. Increasing cohesion and quality of life.

Sources: * Chapter 1, Social and Economic Overview
** Chapters 5 and 6, Social and Economic Overview

38.4 - Exhibit 02

WORKSHEET: Social Effects Matrix

Alternative: C Outputs and significant practices: Because of reduced expenditures in timber and roading activities, timber harvest is reduced by 10 percent during the first 3 decades. Range and habitat improvements allow 25 percent increase in domestic AUM's and 10 percent increase in deer herd. Large developed recreation site in Green Pine Valley south of Pineville will quadruple RVD's on the Green Pine Ranger District by 1995.

CATEGORIES OF SOCIAL EFFECTS

UNITS OF ANALYSIS	Population Change and Land-Use Patterns*	Lifestyle, (Work, Leisure, Customs, etc.)**	Attitudes, Beliefs, and Values**	Social Organization** (Cohesion and Institutions)
County Seats (Government and Service Industries)	A slight slowing of population growth and land conversion except for the resort-related growth in Pineville.	Little change, except for some new emphasis on tourism industries in Pineville. "Flashier" ways of life appear there.	No changes, except for new leisure & conspicious consumption.	No problems, except for growth-related strains in Pineville.
West Side Rural (Forestry and Wood Products)	Population decline, outmigration of young families, no change in land uses.	Loss of jobs, younger relatives move away. Greater importance of firewood, fishing, and hunting.	Little changes, except for increased strain on families from outmigration.	Cohesiveness of informal network increases, but government and business feel the pinch of the cutback.
East Side Rural (Forestry, Tourism, and Ranching)	Less conversion of ranchland to residential use. Population growing, but at a slower rate. Influx of newcomers slows.	Little change; ranching strengthened, woods work cut back. Newcomers become more settled.	Oldtimers less threatened, newcomers expect to be a smaller minority. Slightly less conflict.	Community less strongly divided. Oldtimers more accepting of increased services, while newcomers are less demanding.
Southern Valleys (New Rural Lifestyle, Farming, Crafts)	Population growth 10%/yr during construction of the Green Pine resort. Reviewed conversion of farm and forest land.	Many aspects of resort life at odds with both newcomers' and oldtimer's ways of life. Wood stove use threatened and water quality down. Seasonal unemployment reduced.	Oldtimers and newcomers find common values and attitudes as resort styles assert themselves. Resort people typically unaware of their impact.	Cohesion formed in opposition to resort. Large strain on infrastructure. Lower quality of life for many, some advantages to people statewide.

FSH 1909.17 - ECONOMIC AND SOCIAL ANALYSIS HANDBOOK

38.4 - Exhibit 03

Sample Narrative Summarizing the Social
Effects of the No-Action Alternative

County Seats--Capable of handling highest population growth rate in the area of influence without undue strain. Residential growth occurring on farm and forest land. Newcomers share many values with oldtimers, and sense of cohesion is moderate. County changes are in the directions desired, so sense of control is high.

West Side Rural Areas and Communities--Cohesive communities, some loss of young adults because of lack of jobs. Analysis predicted the decline in logging and timber stand improvement work is likely to pick up the slack, so sense of control and self-sufficiency is high. Population and land-use patterns are stable.

East Side Rural Areas and Communities--Retirees and recreationists are coming into the area, with resulting loss of ranch and forest land to residential uses. Increased concern over visual qualities. Increased conflict between newcomers and oldtimers. However, newcomers regard life in the area as a pronounced improvement over their previous residences. Oldtimers see a loss of control and a new way of life replacing traditional ways.

FSH 1909.17 - ECONOMIC AND SOCIAL ANALYSIS HANDBOOK

38.4 - Exhibit 04

Sample Narrative Summarizing the Social
Effects of Alternative C

County Seats--Few social effects different from those of the no-action alternative, except for Pineville which experiences growth and some disruption from the resort development.

West Side Rural Areas and Communities--Reduction in harvest, roading, and timber stand improvement all have some negative effects. Unemployment and out-migration to nearby areas increase somewhat and public and private services decrease. Strains on facilities but local formal and informal networks help to cope. Community cohesion increases.

East Side Rural Areas and Communities--Change that has been occurring slows with improvement in health of ranching industry. Recreational and retirement newcomers not growing as rapidly and become better integrated into the community.

South Valley Communities--The growth and changes in lifestyles associated with the Green Pine resort will cause significant change, value conflicts, and disruption. Oldtimers and former newcomers become more cohesive, but because of mutual opposition to resort. Environmental degradation a major concern. Some negative impacts on resort patrons and employees as tensions make communities less hospitable.

38.4 - Exhibit 05

Comparison of Social Effects of the Alternatives

	No-Action Alternative	Alternative A (High Timber Departure)	Alternative B (Low Cost and Amenity Emphasis)	Alternative C (Low Cost, Grazing and Resort)
County Seats	High population growth but no major effects outside of communities' ability to cope.	Slight increase in population over No-Action. No major effects beyond coping capacity.	Population growth less than No-Action. No significant effects.	Similar to No-Action Alternative in social effects, except for Pineville's growth and some disruption there.
West Side Rural Areas and Communities	Stability, but out-migration of young, and other long-term changes.	Economic boom and in-migration for first first 20 years. Problems from growth, but prosperity helps solve them. Many potential problems in downturn 25 years ahead.	Major negative impacts because of mill closures. All aspects of community life impacted. Depression and out-migration. Long-term effects severe.	Negative economic and community impacts, but generally within ability of communities and families to cope.
East Side Rural Areas and Communities	Changing nature of community from ranching to retirement. Conflicts.	Timber activities increased, visual impacts on retirees create conflicts in communities. Ranching community fading.	Ranching and forestry disappearing as viable parts of community. Retirees becoming dominant group.	Increased stability of community from revitalization of ranching. Retiree's growth slowed, but their integration into the community is facilitated.
Southern Valley Communities	Stabilizing trends after changes and conflicts of the past 20 years.	Same as No-Action Alternative.	Few direct effects. Stabilization slowed by conflicts and hard times spilling in from neighboring areas.	Major disruption of the community. Large population increase from people with very different lifestyles and values. Major community conflicts.

FSH 1909.17 - ECONOMIC AND SOCIAL ANALYSIS HANDBOOK

38.5 - References. The following sources are available from the Social Analysis Library at the Office of Environmental Coordination in the Washington Office. Most volumes are also available at a university library.

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FSH 1909.17 - ECONOMIC AND SOCIAL ANALYSIS HANDBOOK
CHAPTER 30 - SOCIAL ANALYSIS
Contents

ZERO CODE

Economic and social analyses are integral parts of Forest Service planning and decisionmaking (FSM 1970.3). This handbook discusses how the policies and guidelines set forth in FSM 1970 Economic and Social Analysis should be used in the evaluation of the economic and social effects of policies, programs, plans, and projects. The objective of this handbook is to promote consistent use of economic and social analysis in resource plans, programs, and projects within the Forest Service.

This handbook is written to guide Forest Service economists, social scientists, planners, and analysts at the Washington Office, Regional Offices, Research Stations, and National Forests, and in cooperating organizations involved in joint planning of policies and programs. It is not intended as a replacement for functional economic handbooks, but rather as a vehicle to complement, supplement, and provide supporting material of a general nature that applies to all economic analyses.

01 - AUTHORITY. FSM 1970.1 outlines relevant authorities directing that economic and social analyses be conducted to aid Forest Service decisionmaking. Four in particular provide guidance on how such analyses should be made and used: (1) The Forest and Rangeland Renewable Resources Planning Act (RPA), (2) The National Forest Management Act (NFMA), (3) the Forest Service regulations to implement NFMA at 36 CFR Part 219, and (4) the National Environmental Policy Act (NEPA) and implementing regulations at 40 CFR Parts 1500-1508. The relevant texts of the laws are contained in Agriculture Handbook 453, the Principal Laws Relating to Forest Service Activities. The text of the planning regulations is in FSM 1010. The NEPA regulations are set out in FSH 1909.15.

05 - DEFINITIONS. Terms important to economic and social analysis are defined at 36 CFR 219.3, FSM 1905, in this section, and in section 30.5 of this handbook.

1. Analysis period, long-term. In an analysis, a time horizon of expenditures that is two or more 5-year Resources Planning Act (RPA) planning periods in duration. The RPA program, Regional plan, and Forest plan analyses have long-term periods.
2. Analysis period, short-term. In an analysis, a time horizon of expenditures that is only one or two years or less in duration. A budget analysis is short-term.

3. Asset.

   a. Capital Asset. A natural resource, manmade structure, facility, or improvement in natural resources used as an input in production processes.

   b. Residual Asset. The remaining value of a capital asset at the end of the time horizon of the planning or analytical process.

4. Benefit.

a. Direct benefit. A primary benefit that responds to specified objectives of the policy, program, project, or expenditure.

b. Induced benefit. A primary benefit that is incidental to the objectives of the policy, program, project, or expenditure.

c. Net Public benefit. See FSM 1905.

d. Primary benefit. A benefit accruing to resource owners from a primary output and that may be direct or induced or may be a residual asset. Primary benefits are components of net public benefits.

e. Secondary benefit. A benefit accruing to parties other than the resource owners, including effects on local, regional, and national economies and on consumers of outputs. Secondary benefits are not necessarily included in net public benefits.

5. Benefit-cost ratio. A measure of economic efficiency computed by dividing total discounted primary benefits by total discounted economic costs.

6. Capital formation. As used in IMPLAN is defined as the Value of purchases from sectors both inside and outside the region used by individuals, governments, and industries in the area as investment (land, plant, and equipment used in production processes).

7. Capital investment. Activities that create or improve capital assets to obtain benefits occurring during several planning periods.

8. Complex planning action. A planning action in which individual components of the alternatives require separate decisions (see FSM 1970.62).

9. Costs.

a. Associated cost. In functional analyses dealing with a specific resources or activity, an impact on the costs of other activities, including reduced or additional transportation and protection costs.

b. Cost effectiveness. See FSM 1905.

c. Cost efficiency. See FSM 1905.

d. Direct cost. A cost that directly contributes to the production of the primary outputs of an activity, project, or program.

e. Economic cost. Total fixed and variable costs for inputs, including costs incurred by other public parties and, if appropriate, opportunity costs and cost savings.

f. Fixed cost. A cost that is committed for the time horizon of planning or the decision being considered. Fixed costs include fixed ownership requirements, fixed protection, short-term maintenance, and long-term planning and inventory costs.

g. Investment cost. A cost of creating or enhancing capital assets, including costs of administrative or common-use transport facilities and resource management investments.

h. Joint cost. A cost contributing to the production of more than one type of output.

i. Non-Forest Service cost. A cost of investment and operating activities paid by cooperators or other non-Forest Service agencies which are part of Forest Service management programs, or which contribute to the outputs included in the analysis.

j. Opportunity cost. The value of a resource's foregone net benefits in its most economically efficient alternative use.

k. Separable cost. An identifiable portion of the costs of jointly used, manmade resources or services required by or contributing to only one objective or output.

l. Site-specific cost. A cost (of resource management and investments) that reflects the specific conditions at individual sites or classes of resources.

m. Transaction cost. The total economic cost incurred in acquiring inputs, including such costs as design, legal fees and permits, and transportation.

n. Unit cost or cost per unit. Total cost of production divided by the number of unit produced.

o. Variable cost. A cost that varies with the level of controlled outputs in the time horizon covered by the planning period or decisions being considered.

10. Decision unit. The smallest component of an alternative for which relevant inputs (costs) and outputs (benefits) are analyzed.

11. Demand analysis. A study of the factors affecting the schedule of demand for an output, including the price-quantity relationship, if applicable.

12. Direct coefficients. The value of inputs (or intermediate products) required by a producing industry from a selling industry to produce a dollar's worth of output. Also called technical coefficients or input requirements.

13. Discount rate, nominal. Discount rate expressed in terms of current dollars, and thus affected by the rate of inflation.

14. Discount rate, real. A discount rate adjusted to exclude the effects of inflation.

15. Economic efficiency. The usefulness of inputs (costs) to produce outputs (benefits) and effects when all costs and benefits that can be identified and valued are included in the computations. Economic efficiency is usually measured using present net value, though use of benefit-cost ratios and rates-of-return may sometimes be appropriate.

16. Economic impact.

a. Direct economic impact. Effects caused directly by forest product harvest or processing or by forest uses.

b. Indirect, economic impact. Effects that occurs when supporting industries sell goods or services to directly affected industries.

c. Induced economic impact. Effects that occur when employees or owners of directly or indirectly affected industries spend their income within the economy.

17. Employment. Labor input into a production process, measured in the number of person-years or jobs. A person-year is 2,000 working hours by one person working year long or by several persons working seasonally.

18. Evaluation. An assessment of policies, programs, plans, or projects based on economic and social measures.

19. Exports. As used in IMPLAN are defined as outputs or products produced but not consumed or used in production of other outputs in the impact area. Includes both exports to other areas of the U.S. and international exports.

20. Final demands. As used in IMPLAN are defined as the sum of all purchases for consumption by households, government, capital formation, or for export from the region. (The exports may be intermediate products in the regions to which they are exported.)

21. FORPLAN. A linear programming system used for developing and analyzing forest planning activities.

22. Good.

a. Merit good. An output deemed worthy by political process or by governmental authority of being provided to the public free, at a minimal charge, or at actual cost. Examples are free firewood, picnic grounds, recreation travel on roads, and hiking trails.

b. Nonmarket good. An output that is not normally exchanged for money in a market. Usually no market has evolved because ownership of the good is not clear, exclusive use is not possible under current laws, or it is not possible to consistently define the good.

c. Public good. An output for which it is impractical to impose a charge, either because it must be supplied to all if it is supplied to one or because the costs of collection and control exceed likely revenue.

23. Household consumption. Purchases of households in the area from producing industries in the region, and from other primary input sectors (households as wages and salaries, government services, and imports from outside areas). Also called personal consumption.

24. Impact analysis area. The delineated area subject to significant economic and social impacts from Forest Service activities included in an economic or social impact analysis.

25. Impact analysis subarea. The specific area within an analysis area that is subject to localized economic or social impact from Forest Service activities.

26. IMPLAN. A computer based system used by the Forest Service for constructing non-survey input-output models to measure economic input. The system includes a data base for all countries in the U.S. and a set of computer programs to retrieve data and perform the computational tasks for input-output analysis.

27. Imports. As used in IMPLAN are defined as purchases of products for use in production of other products and for final consumption from outside the impact area. Includes both imports from other areas of the U.S. and international imports. Competitive imports are the same as local domestic products which are not produced in quantities sufficient to meet local demands or which obtain a share of the local market formerly supplied by local producers. Noncompetitive imports are products not produced locally.

28. Income. Employee compensation, profits, rents, and other payments to households.

29. Incremental analysis. A comparison between the change in discounted benefits and the change in relevant discounted costs for each change in program or project size.

30. Industry. A class of firms engaged in raw material production, manufacture, or trade that produces homogenous or at least similar outputs or products using the same or similar production processes and inputs.

31. Interindustry transactions. The value of inputs (or intermediate products) required by purchasing industries within the area from selling industries within the area.

32. Intermediate products. Outputs or products produced in the area and used as inputs in the production process of another industry.

33. Investment.

a. Joint-use investment. Investments used to produce several benefits.

b. Resource management investment. Investments that improve natural resources (including land, vegetation, or animal populations) to increase future net benefits or to reduce losses in several planning periods.

34. Least-cost analysis. Determination of the least cost means of attaining specified results.

35. Lifestyle. The characteristic way people live, indicated by consumption patterns, work, leisure, and other activities.

36. Low income. Household income below the poverty level as defined by the U.S. Department of Health and Human Services. In 1988, this level was $5,770 for a family of one and $11,650 for a family of four.

37. Market. The processes of exchanging a good or service for money or other goods or services according to a customary procedure. A market may occur in a specific place or throughout an area by individual transactions.

38. Market area. The area from which a market draws or to which it distributes its goods or services and for which the same general price structure and price influences prevail.

39. Market assessment. A market study describing sources of supply and demand for a good or service, pricing processes, and influences on value.

40. Market subarea. Portions of a market area in which differences in local costs of production or transport affect price.

41. Minority. Persons as specified in Directive 15, Office of Federal Statistical Policy and Standards, U.S. Department of Commerce, Statistical Policy Handbook (1978). Specified minority groups include Blacks, American Indians/Alaska natives, Asian & Pacific Islander, and Hispanics.

42. Multiplier. A ratio of a measure of total change in income or employment to the direct income or employment change. The measure to total change may be direct plus indirect change (Type I Multipliers); or direct, indirect, and induced change (Type II Multipliers); or direct, indirect, and interactive increased induced demands based on population increase (Type III Multipliers).

43. Outputs.

a. Controlled output. The amount of an output which management has the legal and practical ability to control with management activities.

b. Direct output. An output that fulfills specified objectives of the policy, program, or project being evaluated.

c. Non-controlled output. The amount of an output which will occur regardless of management activity.

d. Joint outputs. Two or more outputs that are produced together in a production process.

44. Present net value, primary. The present net value which includes only the benefits and costs of producing primary outputs, and excluding secondary benefits.

45. Price. The unit value of an output expressed in dollars.

46. Price elasticity. A measure of the sensitivity of the quantity of a good or service exchanged to changes in price.

47. Primary inputs. Payments made in producing industries for inputs that are not outputs produced by local industries. They include employee compensation (wages, salaries, fringe benefits), property-type income (profits, rents, royalties, interest, dividends), indirect business taxes (excise, retail sales, and other taxes businesses have to pay when purchasing goods and services), and imports.

48. Production function. A quantitative description of the relationship between inputs and outputs in a production process.

49. Production process. A procedure that transforms inputs into outputs.

50. Programmatic analysis. Evaluation conducted at the Forest or program level considering sets of activities or projects to accomplish objectives, defined in terms of specific results and responsibilities for accomplishments.

51. Project. See FSM 1905.

52. Quality of output. The usefulness or desirability of a good or service, expressed as a physical measure, index, or grade.

53. Rate-of-return. The financial yield per unit cost determined as the rate of interest at which total discounted benefits equal total discounted costs. (Internal rate-of-return is a similar measure appropriate to the benefits and costs that affect private firms or individuals.)

54. Receipt sharing. The sharing of receipts received from resource management with State and county governments, such as the Forest Service 25 percent fund payments.

55. Schedules.

a. Benefit and cost schedule. List of the sequence of benefits and costs over time.

b. Input and output schedule. List of the sequence of management activities and outputs over time.

56. Short-term evaluation. Evaluation of a plan or project for a limited time period, at the end of which the residual assets still retain a significant present net value.

57. Stage of production. One of several production processes in a series that converts raw materials into final goods or services used by consumers.

58. Structural change. Change in composition or mix of economic and social activities or industries.

59. Tax. As used in IMPLAN is defined as an obligatory payment to a government that goes into a fund for general governmental support purposes. Taxes do not include social security and other employment insurance, or other payments for benefits received directly by the payer.

60. Technology change. A change in the relationship between inputs and outputs in a production process resulting from the implementation of new technology, or a new application of existing technology.

61. Time horizon. Time limit for planning or evaluation.

62. Time period. Interval of time in a production process.

63. Underemployed. Unemployed persons not actively seeking employment but who would, given the opportunity. This also includes persons employed part-time who could work full-time, and persons who are capable of doing work with higher requirements.

64. Unemployed. Not employed but actively seeking employment.

65. Value.

a. Market value. The unit price of an output normally exchanged in a market after at least one stage of production. Market value is expressed in terms of prices as evidenced by market transactions.

b. Nonmarket value. The unit price of a nonmarket output normally not exchanged in a market at any stage before consumption; it is thus necessary to impute nonmarket value from other economic information.

66. Value added. The sum of employee compensation, indirect business taxes, and property type income. Value added is essentially the income accuring to society when an output is produced and sold.

67. Value analysis. An analysis to determine the basic function of a proposal and how to accomplish what the lowest total cost.

FSH 1909.17 - ECONOMIC AND SOCIAL ANALYSIS HANDBOOK

ZERO CODE

Contents