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RPA Assessment of Outdoor Recreation: Past, Current, and Future Directions

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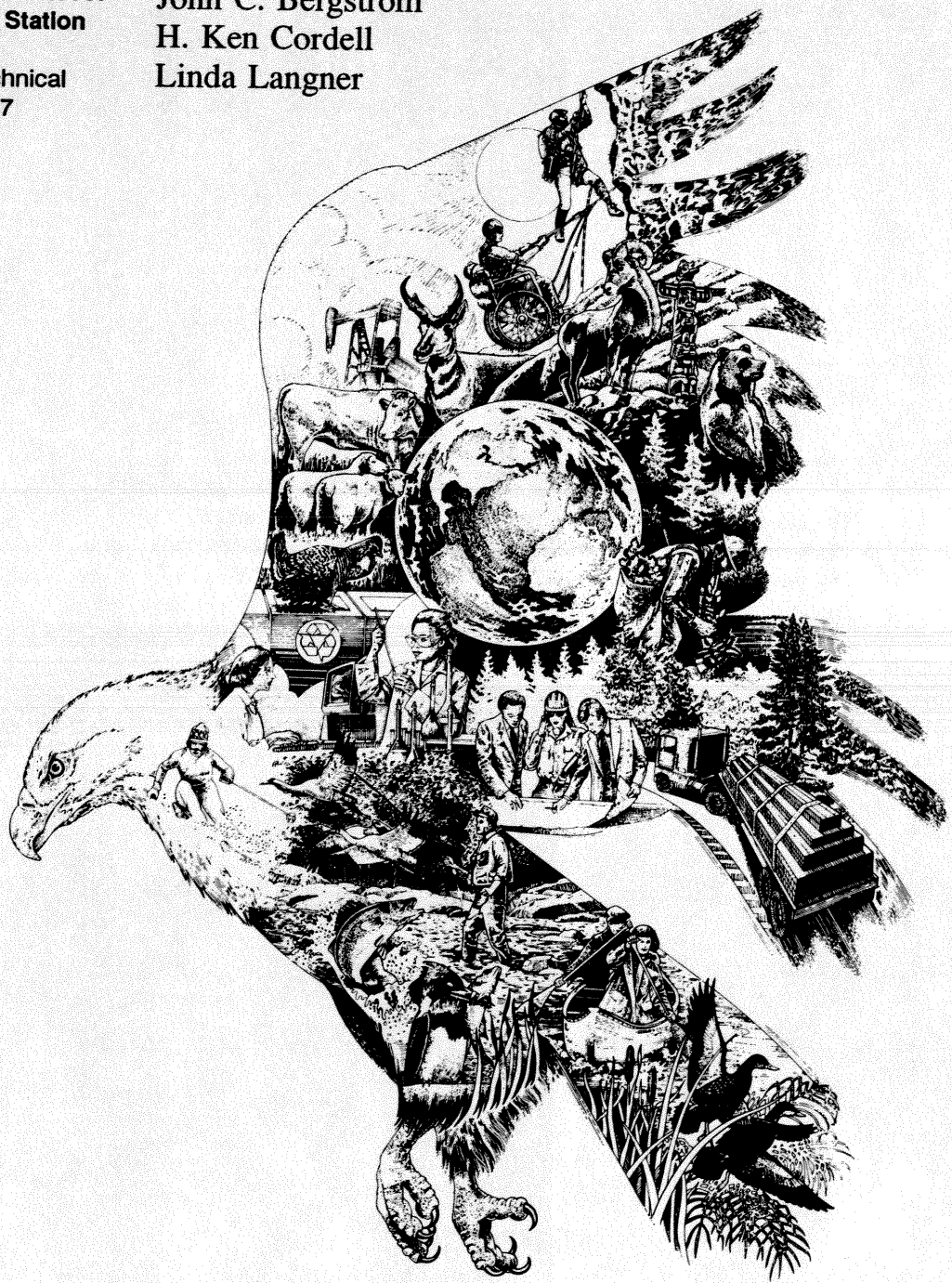

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Abstract

In 1974, the U.S. Congress passed the Forest and Rangeland Renewable Resources Planning Act (RPA). This legislation requires the Secretary of Agriculture to assess the demand and supply situation for the Nation's forest and rangeland resources every 10 years. The Secretary of Agriculture has designated the USDA Forest Service as the lead agency for the RPA Assessment. The first RPA Assessment was published in 1975, a year after the passage of the 1974 Act. The second was published 5 years later in 1980. The third (the 1989 Assessment) was completed in 1989 and published in 1990—commencing the 10-year interval for publishing future Assessments. In this paper, the outdoor recreation sections of the RPA Assessments conducted to date are reviewed. The results of a survey on current policy and management applications of the outdoor recreation results published in 1989 RPA Assessment are also presented. By and large, it appears that these results are providing useful and valuable input into natural resource policy and management decisions in the United States. The paper concludes with a discussion of limitations of the 1989 Assessment and opportunities for improving the applicability of the outdoor recreation results to policy and management decisions. Priority issues identified for future RPA Assessment efforts include national demand and supply trends, regional demand and supply trends, units of measure for recreation quantity, the effects of quality on recreation demand and supply, the effects of demographic changes on recreation demand and supply, and estimation of the net economic value and regional economic impacts of outdoor recreation.

Keywords: Demand and supply analysis, natural resource policy and management, research applications, future research needs.

I. Introduction

This paper reviews outdoor recreation demand and supply analyses conducted for previous RPA Assessments, examines current applications of the 1989 Assessment, and presents a framework for future analyses. In Section II, recreation demand and supply analyses conducted for the 1975, 1980, and 1989 RPA Assessments are reviewed briefly. Current applications of the 1989 RPA Assessment recreation demand and supply assessment results are reviewed in Section III. A general conceptual framework for addressing some of the issues and problems related to the application of Assessment results to resource policy and management is discussed in Section IV. This discussion leads to some general implications, discussed in Section V, for recreation demand and supply analyses conducted for future RPA Assessments.

II. Review of Outdoor Recreation Demand and Supply Analyses Conducted for Previous RPA Assessments

In 1974, the U.S. Congress passed the Forest and Rangeland Renewable Resources Planning Act (RPA). This legislation requires the Secretary of Agriculture to assess the demand and supply situation for the Nation's forest and rangeland resources every 10 years. The RPA was amended extensively in 1976 by the National Forest Management Act (NFMA). In addition to specifying detailed procedures and guidelines for National Forest management, the NFMA amendments officially linked the RPA process and products to National Forest management (Shands 1981). Additional minor amendments were added to the RPA by the Food, Agriculture, Conservation, and Trade Act of 1990. These amendments direct the Secretary of Agriculture to assess the effects of global climate change on forest and rangeland resources as part of the RPA process.

The Secretary of Agriculture has designated the Forest Service, U.S. Department of Agriculture, as the lead agency for the RPA Assessment. The first RPA Assessment was published in 1975, a year after the passage of the 1974 Act. The second was published 5 years later in 1980. The third (the 1989 Assessment) was completed in 1989 and published in 1990—commencing the 10-year interval for publishing future Assessments. The three Assessments published to date are briefly reviewed in the next section. It is important to note that in these Assessments, the terms demand and supply are used both in a technical sense and a broad sense. In the technical sense, the terms refer to economic demand and economic supply as they relate to price. In the broad sense, demand refers to overall participation or consumption, and supply refers to the overall availability of recreational opportunities. In this paper, the terms are also used in these technical and broad senses.

1975 Assessment

Demand assessment—In the 1975 Assessment, outdoor recreation demand was assessed using existing data and reports because little time had

passed since passage of the RPA Act. The analysis used a two-step approach. First, participation functions were estimated for individual recreation activities, and the participation functions were used to estimate the proportion of the U.S. population that participated in each activity. Second, the quantity of recreation demanded per participant was calculated from estimated participant demand functions. The total quantity of activity k demanded was estimated by multiplying total population by the probability of participation in activity k by the per-capita quantity of activity k demanded by participants (Adams and others 1973; Cicchetti and others 1969; Kalter and Gosse 1970).

The participation functions estimated in the first step of the recreation demand assessment were specified as:

$$Y = f(INC,EDUC,RES,CENRG, AGE,RACE,SEX,MARS,FAMSZ, PHYS,WORK,VAC), \quad (1)$$

where

Y = variable indicating whether individual i participated in activity k (1=participant; 0=nonparticipant),
INC = individual family income,
EDUC = individual education level,
RES = individual residence (urban or rural),
CENRG = U.S. Bureau of Census region where individual resides,
AGE = individual age,
RACE = individual race,
SEX = individual sex,
MARS = individual marital status,
FAMSZ = size of individual's family,
PHYS = variable indicating whether or not the individual was physically challenged,
WORK = number of days worked per week by the individual, and
VAC = number of vacation days taken per year by the individual.

Participation equations corresponding to (1) were estimated for outdoor recreational activities using data from the 1972 National Recreation Survey. Separate participation equations were estimated for vacations, trips, and outings. "Vacations" were defined as "the most recent overnight journey taken during the summer quarter of 1972." "Trips" were defined as "other overnight excursions." "Outings" were defined recreation occasions that occurred "within 1 day" (Adams and others 1973).

The participant demand functions estimated for the second step of the demand assessment process were specified as:

$$Q = f(PRC,INC,AGE,RACE, SEX,CENRG), \quad (2)$$

where

Q = average number of activity k days demanded by participant i[1], and
PRC = average price or cost of an activity day, and all other variables are as defined for Equation (1).

Equation (2) was estimated using data from the 1972 National Recreation Survey (Adams and others 1973).

Equations (1) and (2) were used to predict the number of recreation activity days Americans would demand through 1978. First, future changes in the independent variables in (1) and (2) were projected. These values were then substituted into (1) and (2) to estimate future participation rates and quantity of days demanded per participant. Expected participation rates and quantities demanded per participant were combined with projections of future population to estimate the total number of activity-days demanded in the future (Adams and others 1973). For reporting in the 1975 Assessment document, the demand projections taken from the Adams and others (1973) study were converted to indices with 1975 as the base year (USDA 1977).

Supply assessment—The supply analysis for the 1975 Assessment was more limited than the demand analysis. A number of secondary sources were used to estimate current (1974-75) quantities of resources and facilities that supported the recreation activities considered in the demand analysis. The total number of public and private developed campsites,

[1] An "activity-day" was defined as "one person participating in an activity for any part of one calendar day" (Adams and others 1973).

for example, was estimated from published campground directories (USDA 1977).

Demand/supply comparison—The 1975 Assessment did not provide a separate quantitative or qualitative comparison of future demand and supply trends. It briefly and qualitatively assessed opportunities for increasing the supply of recreation resources and facilities. In certain cases, this qualitative supply assessment was combined with the quantitative demand projections to provide general observations and insights on the future demand and supply situation for outdoor recreation (USDA 1977).

1980 Assessment

Demand assessment—The first step in the demand analysis for the 1980 Assessment was to estimate participation functions like those of the 1975 Assessment for individual recreation activities. These participation functions were specified as:

$$Y = f(PRIC,INC,EDUC,RES,AGE,RACE,SEX,WORK,VAC,PARKS,FACIL), \quad (3)$$

where

PRIC = proxy for the price or cost of participation,
PARKS = the number of parks within a close proximity, and
FACIL = available recreation resources and facilities, and all other variables are as specified for Equation (1).

Data for estimating the participation functions were obtained from several sources, including the 1977 nationwide Outdoor Recreation Survey, the 1972 Bureau of Outdoor Recreation Survey of Public Recreation Facilities, and the 1973 National Association of Conservation Districts Private Sector Recreation Inventory (Hof 1979; Hof and Kaiser 1983).

Next, projected future values for the right-hand-side variables were substituted into Equation (3) to estimate expected participation rates (defined as the percentage of the U.S. population expected to participate in each activity). The expected number of future participants was then estimated by multiplying the projected participation rate by the projected population. Participant projections for each activity were converted to indices with 1977 as the base year (USDA 1980).

Supply assessment—The supply assessment for 1980 was limited to the current quantities of resources and facilities that supported certain recreation activities. These quantities were estimated from secondary sources, and long-run projections of supplies of recreation resources and facilities were not attempted. Compared with the 1975 Assessment, the 1980 Assessment contained expanded information on the quantities of privately owned recreation resources and facilities available to the public (Cordell and others 1979; USDA 1980).

Demand/supply comparisons—Like the 1975 Assessment, opportunities for increasing the supplies (quantities) of recreation resources and facilities were qualitatively assessed. These qualitative assessments of future recreation resource and facility availability (supply) were combined with quantitative assessments of future participation (demand) to compare with future demand and supply. The comparisons of recreation demand and supply in the 1980 Assessment were more extensive and focused than those for the 1975 Assessment, but they were still very broad and general (USDA 1980).

1989 Assessment

Demand assessment—In the 1989 Assessment, recreation demand was modeled at an aggregate or community level rather than at the individual level. The aggregate demand functions estimated for the 1989 Assessment were specified as:

$$DTRIPS = f(PRICE,POPC,INCC,AGEC,FARMC,SUITC,SUBSC), \quad (4)$$

where

DTRIPS = total quantity of activity k trips demanded by community i,
PRICE = price or cost of an activity k trip,

POPC = total community i population,
INCC = percent of community i population with income ≥ $30,000 per year,
AGEC = percent of community i population age 18 to 32 years,
FARMC = percent of community i population living on farms,
SUITC = average suitability of sites available to community i for activity k, and
SUBSC = an index of substitute recreational opportunities available to community i.

The primary sources of data for estimating these equations were the Public Area Recreation Visitors Study (PARVS) conducted between 1985 and 1989 and U.S. Census data (Bergstrom and Cordell 1991; Cordell and Bergstrom 1991).

The estimated demand functions were used to project "maximum preferred demand" for various outdoor recreation activities. Maximum preferred demand was defined as the amount of recreation trips Americans would desire to consume in the future if the price or cost of trips remained the same as in 1987. For reporting purposes, maximum preferred demand projections for each activity were converted to indices with 1987 as the base year. Data from the 1982-83 National Recreation Survey and the 1985 National Hunting and Fishing Survey were used to estimate the baseline numbers of trips reported in the 1989 Assessment (Cordell and others 1990; USDA 1989).

Supply assessment—In the 1989 Assessment, recreation supply was conceptualized as having a physical component and a human component. The former encompasses the recreation resources and facilities that support recreation activities. The latter encompasses what people do with these resources and facilities—the process by which people combine recreation resources and facilities with their own equipment, time, talents, and skills to produce outdoor recreational trips. The theoretical basis for this trip "production" process is household production theory (Cordell and Bergstrom 1991).

Inventories of recreation resources and facilities, such as swimming pools and beaches, available to communities were estimated from various secondary sources. These quantities were then weighted by population and distance to calculate the effective amounts of recreation resources and facilities available to communities (Cordell and others 1990; USDA 1989).

The quantities of recreation trips communities were expected to produce and consume were calculated by first estimating aggregate consumption functions of the form:

$$CTRIPS = f(POPC, INCC, AGEC, FARMC, SUITC, SUBSC, ROC), \quad (5)$$

where

CTRIPS = total quantity of activity k trips consumed by community i, and
ROC = effective amounts of recreation resources and facilities available to community i for activity k, and all other variables are as defined for Equation (4).

The primary sources of data for estimating Equation (5) were the Public Area Recreation Visitors Study (PARVS) and U.S. Census data (Cordell and Bergstrom 1991).

After aggregate consumption functions were developed for various outdoor recreation activities, future changes in the right-hand-side variables, including the effective amounts of recreation resources and facilities, were projected. These projections were then substituted into the estimated consumption functions to calculate the numbers of recreation trips communities were expected to produce and consume in the future. Following the household production theory framework, the projections of expected consumption of recreation trips were interpreted in the 1989 Assessment as the future expected supply of recreational trips. For reporting purposes, the projections of expected supply were converted to indices with 1987 as the base year (Cordell and others 1990; USDA 1989).

Demand/supply comparisons—The 1989 Assessment formally and quantitatively compared recreation demand and supply. The demand assessment projected numbers of recreation trips Americans would prefer to take in the future, given changes in population size and characteristics but holding the price or cost of trips constant. The

assumption of constant trip price or cost implies that the effective amounts of recreational resources and facilities must increase at rates sufficiently high to keep the price or cost of participating in outdoor recreational activities constant. Thus, maximum preferred demand can also be interpreted as unconstrained consumption of trips with respect to recreation resources and facilities.

The supply assessment projected numbers of recreation trips Americans would be able to take in the future, given changes in population size and characteristics, as well as changes in the effective amounts of recreation resources and facilities that might cause the price or cost of trips to increase (or decrease). The expected supply of recreational trips takes into account expected changes in effective amounts of recreation resources and facilities available to communities. Changes in the effective amounts of these resources and facilities, in turn, are expected to change the price or cost of recreational trips. Expected supply can therefore also be interpreted as constrained consumption of trips with respect to available recreation resources and facilities.

In the 1989 Assessment, the recreation demand and supply projections were compared to find apparent gaps between the future demand and supply of recreation trips for individual activities. These gaps represent the difference between the quantity of trips Americans would prefer or desire to take in the future (maximum preferred demand) and the quantity they will be expected to take (expected supply). Expected gaps for each activity were reported on a percentage basis (Cordell and others 1990).

III. Overview of Current Applications of the 1989 Assessment Results

How are the Assessment results used? What issues and problems have arisen in applications of the results to forest policy and management? How can the Assessment be more useful to resource managers and policymakers? These and other questions were addressed in an informal survey of individuals in various positions who use Assessment results.

From January 1992 to April 1993, individuals in the USDA Forest Service and other organizations listed in Appendix I were interviewed in person or by phone. While this list does not represent a scientifically selected random sample of Assessment users, it does represent a reasonable cross-section of potential users.

Interviewees were asked to: (1) describe how they use the Assessment results; (2) identify particular issues and problems they have encountered in applying the results; and (3) suggest new analyses and information that would be useful in future Assessments. Compiled responses are summarized in the remainder of this section. Because of the limited sample of potential Assessment users interviewed, the compiled responses should be interpreted with caution and not generalized too broadly.

Because of institutional arrangements established by the RPA, the most extensive user of the Assessment results is the USDA Forest Service. Since the Forest Service conducts the Assessment, many individuals in the agency are familiar with the Assessment and its results. The RPA also directs the Forest Service to use the results of the Assessment to help guide its programs for National Forest Systems, Research, State and Private Forestry, and International Forestry.

The process for integrating the RPA resource assessments into the Forest Service programs mentioned above is illustrated in figure 1. In addition to requiring the Secretary of Agriculture to conduct the Assessment, the RPA legislation requires that a national-level Program be developed for the Forest Service. The RPA Program is the Forest Service's strategic plan for forest policy and management.

The framers of the RPA envisioned institutional linkages among the RPA Assessment, the RPA Program, regional-level data collection and planning, and forest-level data collection and planning. As shown on the left side of figure 1, the intention of the RPA is that data collected at the forest level be aggregated at the regional level, and eventually aggregated at the national level. One of

the potential uses of these data is to provide data for the national Assessment.[2]

The right side of figure 1 illustrates the intentions of the RPA with respect to the application of the Assessment results. The results of the national Assessment provide a basis for the development of the national Program. The national Program is a strategic plan that provides long-term policy and management guidance for National Forest Systems, Research, State and Private Forestry, and International Forestry.

How have the linkages illustrated in figure 1 operated in practice? Interviewee responses suggest that the 1989 Assessment results were used in the development of the 1990 Program but not in a direct, analytical manner. Rather, it appears that certain key findings of the 1989 Assessment were used to guide development of the 1990 Program in a more indirect, qualitative manner. For example, the 1989 Assessment results suggest a substantial increase in the future demand for recreational trips of short duration to sites close to home (day hiking trips and picnicking trips are examples). National Forests relatively close to major urban areas can provide many opportunities for recreation trips of 1 day or less. The 1990 Program placed greater emphasis on providing recreational opportunities on National Forests near urban areas.

The 1989 Assessment suggested likely shortages of opportunities for many specific activities. It appears from interviews that these demand/supply projections were used indirectly and qualitatively to guide development of the 1990 Program. One result was a focus in the 1990 Program on providing a greater diversity of recreational opportunities on National Forests.

One of the intents of the RPA is to guide regional and forest planning and management. Interviews suggest that the national recreation goals and objectives stated in the Program sometimes contributed to a greater emphasis on providing diverse recreation opportunities in regional and forest planning. Some interviewees stated that the Program helped them to understand Agency priorities for recreation management on National Forests. Overall, however, responses suggest that the linkages between the RPA Program for recreation and regional and forest planning and management are rather loose.

Interviewee responses suggest that aside from information embodied in the RPA Program, the national Assessment results are not widely used in regional and forest planning and management. At least one region sampled, however, used the Assessment recreation demand/supply projections in the development of its regional planning guide. In addition, many regional and forest personnel are familiar with the Assessment results and utilize them for other purposes. For example, a number of interviewees reported that they use the Assessment results as background information for presentations dealing with National Forest management. Some also reported that although they do not directly use the national Assessment results in forest planning and management, the results provide them with valuable insights about recreation demand/supply analyses.

Many of the decisions that dictate forest policy and management are made within the Washington, DC, "Beltway" in the White House, the Congress, the Department of Agriculture, and the Forest Service Washington Office (WO). For example, these entities interact to determine the Forest Service annual budget.

Interviews suggest that the 1989 Assessment results have had an important influence on the development of resource policy in Washington, DC—particularly congressional policy. For example, one of the key findings of the 1989 Assessment is a growing demand for most forms of outdoor recreation at sites located close to home. This finding was used by the Forest Service WO to support requests to Congress for adequate funding of Forest Service recreation programs.

Because the Assessment contains recreation use and trend information not readily available elsewhere, Assessment results, therefore, are often used to help meet information requests. The Assessment information provided to Congress in this manner influences policy decisions in ways that are neither traceable nor predictable.

[2] The national-level Assessment is conducted using data from many sources within and outside of the USDA Forest Service.

Many policy decisions that affect forest policy and management are made within the Forest Service. The Forest Service has an extensive staff of policy analysts and researchers who provide information that facilitates policy decisions. Interviewee responses suggest that the Assessment results are widely used by Forest Service policy analysts and researchers. Responses also suggest that upper-level Forest Service administrators sometimes use the Assessment results directly when making internal policy decisions.

The Congressional Research Service regularly uses the 1989 Assessment as a reference document when responding to requests from Members of Congress and their staffs about the use of National Forests for outdoor recreation. Other government agencies, private resource management interest groups, and private consultants appear to use the Assessment as a general reference document on a more limited basis.

Outside the Forest Service, college and university faculty and staff use Assessment results in their research, which generates journal articles and other publications. This literature may be used by the Forest Service and other agencies to facilitate policy, planning, and management decisions. The extent to which Assessment results support recreation research programs is difficult to assess.

Issues and Problems Related to the Application of the 1989 Assessment Results

Interviewees indicated a number of issues and problems related to the application of the 1989 Assessment results. One problem consistently mentioned was the lack of regional demand/supply projections. Many stated that regional demand/supply projections would greatly enhance the usefulness of the Assessment for regional and forest policy and planning. This information gap has been at least partially filled by the 1993 Assessment Update, which includes limited regional demand/supply projections.

Another consistently mentioned problem was the lack of information on the effects of quality changes on recreation demand/supply relationships. For example, the 1989 Assessment did not address how changes in congestion will affect the demand for certain recreation activities. It also failed to consider the potential effects of changes in the condition of natural resources like water quality and constructed facilities (campsites, bathrooms, trails, etc.) at recreation sites on demand/supply relationships.

Issues and problems related to units of measure were also mentioned frequently. One specific issue is the lack of consistency in the recreation quantity measures across the three Assessments published to date. The 1975 Assessment measured recreation quantity in activity-days. The 1980 Assessment measured recreation quantity in terms of participation. The 1989 Assessment measured recreation quantity in terms of trips. These different units of measure make it difficult to compare and reconcile demand/supply projections reported in the 1989 Assessment with those reported in the 1975 and 1980 Assessments.

Responses suggest that the changing units of measure across the published Assessments makes it difficult to apply Assessment results to national policy decisions. Differences in measures of recreation quantity also hinder the application of the results to regional and forest planning and management. At the regional and forest levels, recreation quantity is often measured in recreation visitor-days (RVDs). Because the 1989 Assessment measures recreation quantity in terms of trips, the Assessment's demand/supply projections are not compatible with regional and forest analyses.

A number of interviewees also voiced concern about the implications of unique local considerations in applying Assessment results to forest planning. Special preferences for certain types of recreation by people near a National Forest may need to be considered. Special local supply conditions (e.g., availability of substitutes) also may have major implications on the applicability of national and regional projections to a particular National Forest. For example, systems that limit recreation use, such as white-water rafting limits, may restrict available supply of certain recreational opportunities on a National Forest.

Some respondents reported that local political concerns could hinder effective application of higher level Assessment results. For example, the Assessment results may suggest that a particular

region or forest should provide more opportunities for a certain type of recreational activity. However, for any number of potential reasons, local political forces may challenge the decision to increase those opportunities.

Several people noted that the application of Assessment results at the forest level is difficult because the implications of the projections for a particular forest may not be clear. For example, the 1989 Assessment predicts that a considerable shortage of opportunities for day hiking may develop. This result may suggest the need to develop new day-hiking trails in a particular National Forest. Planners and managers, however, would still need to determine exactly how many miles of new trails to develop and where to locate these trails. The Assessment provides little guidance for these practical on-the-ground decisions because of its intended broad, national scope.

Several interviewees suggested widespread application of the Assessment results is hindered by the limited amount of ground-truthing presented. Ground-truthing analysis would involve comparing Assessment projections to actual observations. The question here is one of credibility and believability of the Assessment results. For example, are projections of increased demand for a certain activity, say primitive camping, consistent with actual trends in the issuance of back-country camping permits? The more consistent Assessment results are with events observed by resource planners and managers on the ground, the more likely that those people will incorporate Assessment results into their planning and management.

A more institutional problem consistently given by interviewees as a reason why the Assessment results are not used more extensively in regional and forest planning and management is the timing of the RPA Assessment. The 10-year interval between RPA Assessments is not always synchronized with the 10- to 15-year interval for forest planning. Thus, in many cases, the Assessment results are not timely for use in forest management plans.

Most interviewees felt that the levels of detail and description in 1989 Assessment publications were adequate to document the Assessment results. However, some suggested ways to improve the presentation of results, including publishing only the key demand/supply results. This document would be considerably briefer than recent Assessment documents. Detailed demand/supply statistics could be made available on computer discs. Another suggestion was to continue to publish a document (as was done in 1990) that describes the linkages between the Assessment, the RPA Program, and regional and forest planning and management.

New Analyses and Information

Interviewees suggested some new analyses and types of information to include in future Assessments. Interviewees would like to see more analyses on the effects of site quality, including the condition of natural resources on recreation demand and demand/supply relationships for specific types of settings.

Desired region-specific information included user characteristic profiles, expenditure profiles, and demand/supply projections. Interest in analyses related to different regions and settings extends to examination of urban recreation demand/supply relationships vs. rural recreation demand/supply relationships. An important distinction between urban and rural recreation is that a considerable amount of urban recreation (e.g., recreation at local neighborhood parks) may involve negligible trip expenditures. Measures of economic demand, benefits, and impacts like the travel-cost method and input-output models that rely on observations of travel expenditures may not adequately assess the contribution and importance of urban recreation to society.

Interviewees consistently mentioned the need for new analyses and information on the economic effects of outdoor recreation on regional and local economies. The need for more analyses and information on historical trends in recreation demand and supply was also consistently mentioned. Previous Assessments have focused on future trends in recreation demand and supply.

Several interviewees mentioned the need for more analyses and information on the implications of increasing customer diversity for recreation and wilderness management. For example, what are the long-term implications of the wave of new immigrants on recreation demand and supply?

What other key social and demographic changes should public and private organizations focus on to prepare for future changes in recreation demand and supply?

Several interviewees called for new analyses and information focusing on ecosystem management. The Forest Service is placing increasing emphasis on managing National Forests on a more holistic, sustainable basis. This emphasis may strongly influence the application of recreation demand and supply analysis results to resource policy and management.

A related need included more and better information to facilitate tradeoff analysis. For example, managers may be concerned with assessing the tradeoff between developing a new mountain bike trail and the potential loss of prime wildlife habitat. Data on the opportunity costs of alternative management actions are needed to perform tradeoff analysis.

Several interviewees recommended that ex post validation studies be conducted to verify the accuracy of the Assessment demand/supply projections. The 1989 Assessment provides projections of the number of outdoor recreation trips Americans are expected to take in the years 2000, 2010, 2020, 2030, and 2040. The specific steps of ex post validation study of these projections follow. In the year 2000, a study could be conducted to estimate the actual number of recreation trips taken by Americans. These estimates could be compared with the projections for the year 2000 reported in the 1989 Assessment. Any differences in the estimates could then be analyzed to gain insight into the accuracy of the 1989 Assessment projections. Similar validation studies could be conducted in future years.

The need for additional information on supply functions for recreation opportunities was noted by several interviewees. These functions would provide a statistical relationship between management inputs and recreation opportunity output. A particular challenge faced in the development of recreation supply functions is the proper specification of inputs and outputs.

Interviewees suggested more analyses and information may also be useful in the following areas: breakdown of demand/supply projections by Federal Government agency; private-land recreation demand/supply relationships; backlogged work and capital investment; effects of national environmental quality on recreation demand/supply trends; passive use of recreation resource and wilderness areas (e.g., existence values); and the use of private land for recreation.

IV. Conceptual Framework for the Outdoor Recreation Component of the RPA Assessment

Some suggestions outlined in the previous section are within the scope of the Assessment as it is currently conducted, some probably are not. The Assessment cannot meet all resource policy and management needs, but a strategy should be developed for maximizing the usefulness of the Assessment within the constraints of time, budgets, and the legislative intent of the Assessment.

According to the original RPA legislation, one of the primary intents of the Assessment is to provide a broad overview of recreation (and other resource) demand and supply trends in the United States. The three Assessments already completed appear to have met this intent reasonably well. Because of its national scope and emphasis, built-in data collection, data analysis, and administrative constraints limit the ability to answer certain, highly specific or specialized recreation demand and supply questions. Because of the legislative scope of the Assessment and practical constraints imposed on conducting the Assessment, there is a need to prioritize the various recreation demand and supply issues that will be addressed by future Assessments. The greatest concerns of the greatest number of interviewed Assessment users led to the following priorities for future Assessment efforts: (1) national recreation demand and supply trends (historical and future); (2) regional demand and supply trends (historical and future); (3) effects of quality changes on recreation demand and supply trends; (4) flexibility between units of measure for recreation quantity; (5) effects of demographic/socioeconomic changes on recreation demand and supply trends; and (6) net economic value and regional economic impact.

Geographic Scope of the Assessment

The first two priority issues relate to the geographic scope of the Assessment recreation demand and supply analyses. Much of the Assessment analysis is focused at the national level. The usefulness of the Assessment results for forest policy and management would be facilitated by providing more regional and subregional demand and supply analyses.

As illustrated in figure 2, national-level demand and supply functions for outdoor recreation can be conceptualized as being derived from regional-level demand and supply functions. These regional demand and supply functions, in turn, can be conceptualized as being derived from subregional demand and supply functions. Thus, in theory, it is possible to disaggregate national demand and supply functions to regional demand and supply functions.[3] Further disaggregation would result in subregional demand and supply functions. As illustrated in figure 2, it is also possible, in theory, to aggregate from subregional demand and supply functions to regional demand and supply functions, and from regional demand and supply functions to national demand and supply functions.

In order to disaggregate national demand and supply functions to the regional level, the particular regions of interest must first be specified. While the administratively defined Forest Service regions may suit many Forest Service needs, such a breakdown may not be useful to other Assessment users such as the National Park Service and the U.S. Army Corps of Engineers. Regional breakdowns could be defined primarily by terrain (Great Plains, Mississippi Valley, etc.), various political boundaries (Southeastern States, Midwestern States, etc.), or ecoregions.

Disaggregation from the regional level to the subregional level is more problematic. The primary problem is specifying regions and subregions so there is a logical and consistent connection between the regional and subregional demand and supply functions. For example, for the 1993 Assessment Update, regional recreation demand functions were estimated for administratively defined Forest Service regions. In accordance with the Assessment objectives, these regional demand functions incorporated the demand for recreation on all private and public land, not just Forest Service land.

Suppose one was interested in disaggregating the demand functions for a particular region to derive recreation demand functions for each National Forest in that region. It would be difficult, conceptually and empirically, to separate the demand for recreation on a particular National Forest from the demand for recreation on all types of private and public land in the region. An alternative would be to estimate recreation demand functions for each Forest in a region separately. These Forest demand functions, however, would not aggregate to generate the regional demand functions because functions for private land would be missing.

The relationships between recreation demand and supply trends determine recreation consumption trends (Cordell and Bergstrom 1991). Two sets of consumption trend lines are shown in figure 3. On the right hand side of figure 3, the lines labeled "UC" represent an unconstrained consumption. Unconstrained consumption is the amount of activity trips Americans would desire to take if the availability of recreational opportunities was sufficient to keep the cost of an activity trip constant.

The lines labeled "CC" on the right-hand side of figure 3 represent constrained consumption. Constrained consumption is the amount of activity trips Americans would take in the future given constraints on availability of recreation opportunities that may cause the price of an activity trip to increase. The price or cost of an activity trip would increase; for example, if the demand for recreation opportunities is increasing faster than the supply of opportunities, recreation opportunities are becoming more scarce (Cordell and Bergstrom 1991).

The size of the difference or gap between unconstrained consumption and constrained consumption represents the relative increase in scarcity of a type of recreation opportunity.

[3] For the 1993 Assessment Update, regional recreation demand functions were derived from the national recreation demand functions estimated for the 1989 Assessment.

Projected gaps are therefore likely to concern forest policymakers and managers. Gaps can occur at the national, regional, and subregional levels.

Because of the legislative intent of the Assessment and inherent modeling and data limitations related to aggregation and disaggregation, the primary focus of the Assessment is likely to remain national. However, it appears to be conceptually and empirically feasible, and highly desirable from a forest policy and management perspective, to place a higher priority in future Assessments on improving and expanding regional recreation demand and supply analyses. Conceptual and empirical problems (primarily the lack of data) are likely to continue to limit the extent of subregional recreation analyses.

Some planners and managers strongly desire improved and expanded recreation demand and supply information at the forest level. Perhaps the most practical solution is for regional and forest-level analysts to take the lead in this effort and to receive help from the national RPA Assessment team. A coordinated effort would facilitate collection of data for analyses at all levels. Coordination would also help ensure that national, regional, and subregional (e.g., forest level) demand and supply analyses are conducted in a theoretically and empirically consistent manner with a minimum of redundancy.

Quality Considerations

Closely related to the geographic scope of the Assessment is the issue of the effects of quality changes on recreation demand and supply. The quality of recreation experiences, for example, is likely to vary across regions. This situation is illustrated in figure 4. In Region A, the quality of recreation opportunities may be high, resulting in a high demand for activity trips as shown by D(H). The supply of high-quality recreational opportunities, however, may by relatively low as shown by S(H). In Region B, the quality of recreational opportunities may be about medium, resulting in a lower demand for activity trips as shown by D(M). The supply of medium-quality recreational opportunities in Region B, however, may be greater resulting in a relatively greater supply of activity trips as shown by S(M). In Region C, the quality of recreational opportunities may be low, resulting in a low demand for activity trips. The supply of low-quality recreational opportunities in Region C, however, may be high resulting in relatively high supply of activity trips.[4]

Because of the effects of quality differences on regional recreation demand and supply, different gaps for a recreational activity may occur across regions (fig. 5). For example, Region A may be characterized by an increasing demand for high-quality recreational opportunities, such as groomed hiking trails, and a constant or decreasing supply of such opportunities. In this case, a large gap between unconstrained and constrained consumption would occur. Region C may be characterized by increasing demand for lower quality recreational opportunities, such as primitive hiking trails, and an increasing supply of such opportunities. In this case, a small gap between unconstrained and constrained consumption would occur. The consumption trend lines shown for Region B in figure 5 depict a medium gap case.

Quality differences may cause considerable differences in recreational opportunity gaps across regions. These regional quality and gap differences are obscured when data are aggregated to estimate national consumption trends and gaps. Thus, if the assessment of regional quality effects is an important issue for the RPA Assessment, methods for incorporating quality effects into regional demand, supply, and consumption functions should be improved.

Quality differences may also affect recreation demand and supply relationships at the subregional level. For example, suppose Region A is composed of four subregions (fig. 6). Subregions 1 and 2 are characterized by high demand for high-quality recreational opportunities but low supply of such opportunities. Subregion 4 is characterized by a low demand for low-quality recreational

[4] Quality differences across regions do not necessarily imply that recreationists consider recreational opportunities across regions as substitutes. For example, for a hiker living in the Southeastern United States, hiking opportunities in the Cascade Mountains of Washington State may not be viewed as a substitute for hiking opportunities in the Appalachian Mountains of western North Carolina.

opportunities and a relatively high supply of such opportunities. The demand and supply functions for Subregion 3 depict a medium or average situation.

The subregional demand and supply relationships shown in figure 6 determine subregional consumption trends over time and the projected gaps between unconstrained and constrained consumption at the subregional level over time. Because of differences in demand and supply relationships among subregions, gaps in neighboring subregions may be quite different (fig. 7). These subregional gap differences are obscured when consumption trend lines are aggregated and reported at the regional level.

Information on the effects of quality changes on recreational opportunity gaps in subregions would facilitate planning and managing for expected shortages of particular recreation opportunities. Thus, it would be desirable to devote more effort to improving methods for analyzing quality effects at the subregional level. Given RPA budget and time constraints, accomplishment of this task would most likely require a cooperative effort between analysts at the subregional or forest level, the regional level, and the national level.

Another major quality issue at the national, regional, and subregional levels is the effects of quality changes over time on recreation demand and supply. For example, if public recreational facilities deteriorate because funding for repair and maintenance is lacking, what will be the effect on recreation consumption or participation? Addressing such questions requires that more effort be devoted to measuring and modeling the effects of quality changes on recreation demand and supply over time, as well as geographic space.

Recreation Quantity Measures

Measures of recreation quantity include trips, activity-days, RVDs, and numbers of participants. The preferred unit of measure depends upon the forest policy or management problem or issue under consideration. For some problems or issues, the number of trips may be of greatest interest. For other problems or issues, a measure of total participants or different people may be preferred. For still other problems and issues, activity-days, activity occasions, or RVDs may be needed.

One way to generate recreation demand and supply information for different quantity measures is to conduct a separate demand/supply analysis for each unit of measure. Because of budget and time constraints, however, independent analyses for each unit of measure are not likely to be practical for the RPA Assessment. A more feasible course is to develop conversion factors for deriving one unit of measure from another. Such a system would allow for analytical "cross-walking" between different units of measure. Using simple conversion factors to cross-walk between units of measure is a limitation because it may ignore important structural differences in the demand functions for trips vs. days, days vs. activity occasions, etc.

Even with a standard conversion system, one unit of measure needs to be selected as the base. The unit that seems most consistent with the economic theory of demand and supply is trips or visits (Bockstael and McConnell 1981; McConnell 1975; Ward and Loomis 1986). Therefore, we suggest that trips serve as the base unit of measure for recreation quantity for the RPA Assessment.

If trips are the measure of recreation quantity, data collection and analysis efforts for the Assessment should focus on direct estimation of recreation-trip demand and supply relationships. Conceptually, once recreation demand and supply relationships have been estimated for recreation trips, conversion factors can be applied to indirectly estimate recreation quantity for other units of measure. For example, in figure 8, the demand and supply functions in the first column represent functions estimated from primary data on recreation-trip demand and supply. An example of this type of primary data would be data collected in on-site interviews with recreation visitors on the number of annual trips taken to the site for various activities. Using appropriate conversion factors, activity day or RVD recreation quantity measures can be derived from recreation-trip quantity measures.

In figure 9, the consumption trend lines in the second column represent unconstrained and constrained consumption for trips estimated from primary data. Once these functions have been estimated, appropriate conversion factors can be

applied to indirectly derive consumption measures for activity-days or RVDs. As illustrated in figure 9, appropriate conversion factors could also be used to indirectly derive consumption measures for the number of activity participants.

Assessment of recreation demand and supply relationships for various types of settings or landscapes may also be of interest for resource policy and management. As illustrated in figure 10, it is theoretically possible to develop conversion factors for deriving measures of trips to a particular setting (such as trips to wilderness areas for any activity) from measures of activity trips (such as trips for backpacking, horseback riding, hunting, and fishing). Additional conversion factors could then be used to derive setting-day and setting-RVD measures from the number of trips to a type of setting.

The consumption trend lines in the second column of figure 11 represent consumption of activity trips estimated from primary data. Appropriate conversion factors can be used, as illustrated by figure 11, to derive consumption projections for setting trips, setting days, or setting RVDs. Appropriate conversion factors can also be used to project numbers of participants expected to recreate at various settings.

Effects of Demographic and Socioeconomic Factors

Another priority issue for the Assessment is expanding and improving analyses of the effects of demographic and socioeconomic changes on the demand for recreation. The American population is experiencing several megachanges — large, population-wide changes that may be of particular interest. One megachange is the increasing mean age of the American population caused by the aging of the baby-boom generation. Another megachange, which has been in process for decades, is the decreasing proportion of Americans who reside in rural areas or have some sort of rural background. A more recent, ongoing megachange is the increasing proportion of the American population whose cultural roots are primarily non-European.

Megachanges and localized microchanges in American population characteristics may significantly affect preferences and demands for outdoor recreation. There is a need for conceptual models that explain the expected relationships between changes in population characteristics and changes in the demand for various types of recreation experiences. These conceptual models can be used to derive empirical equations for estimating expected changes in recreation demand or consumption.

Net Economic Value and Regional Economic Impact

Of considerable interest and importance for resource policy and management are the net economic value and the regional economic impact of outdoor recreation in the United States. The net economic value of recreation refers to the net benefits of recreation measured in terms of consumer's surplus. Net economic value (consumer's surplus) is the appropriate measure of economic benefits for national economic development or economic efficiency analysis. Regional economic impact here refers to the effects of recreation expenditures on a regional economy. Measure of impact should include gross output, employment, and income. Regional economic impact is the appropriate measure of economic benefits for regional economic development or distributional analysis (Stoll and others 1987).

In the past, estimates of the net economic value of recreation have been generated during formulation of the RPA Program, which was largely independent of the RPA Assessment demand and supply analysis. Regional economic impacts of recreation were generated in case-by-case analyses that were separate from both the RPA Assessment and Program efforts. Overall efficiency and cost effectiveness of data collection, analysis and use might be increased by estimating net economic value and regional economic impact of outdoor recreation during the RPA Assessment—the situation in the base year of the Assessment. It would be most feasible to generate these estimates for the current situation. It might also be possible, though more difficult, to generate projections of the future net economic value and regional economic impact of outdoor recreation under alternative future scenarios.

One of the primary purposes of the RPA Assessment is to estimate recreation demand, supply, and consumption trends. Estimation of these trends requires recreation demand functions. These recreation demand functions can be used to estimate net economic value of recreation (see Bergstrom and Cordell 1991). Furthermore, if national, regional, and subregional demand functions were estimated as part of the RPA Assessment, these demand functions could be used to estimate net economic value of recreation at the national, regional, and subregional levels. This use of estimated demand functions would contribute to the development and application of benefits transfer techniques.[5]

Estimates of regional economic effects require two primary pieces of data: (1) recreation expenditures per visit, and (2) total visits. If regional and subregional demand and consumption functions were estimated as part of the Assessment process, these functions would provide a means for estimating total regional or subregional visits. The Assessment could also be expanded to collect and report recreation-visit expenditure profiles for regions and subregions.

From expenditures per visit and total visits, total recreation expenditures in a region or subregion can be estimated. The economic effects of these expenditures on a regional economy can be estimated using a regional input-output model such as the Forest Service IMPLAN model. Data on regional economic effects provide a means for estimating regional multipliers, which summarize the economic impact of recreation expenditures on a regional economy. Regional and subregional multipliers could be estimated and reported in the Assessment documents. These multipliers, combined with information on total recreational expenditures, would provide insight into the economic impacts of outdoor recreation.

[5] For a good introduction and discussion of current research on benefits transfer techniques, see the special section on benefits transfer in the March 1992 issue of Water Resources Research.

V. Implications

Since the passage of the Renewable Resources Planning Act (RPA) in 1974, three RPA Assessments have been conducted. The most recent was completed in 1989. During 1992-93, RPA Assessment users were interviewed and asked to describe how they used the recreation demand and supply analyses reported in the 1989 Assessment. Interviewees were also asked to critique the Assessment and suggest needed improvements and extensions. The results of this informal survey have a number of implications for the RPA Assessment.

One general implication is that use of the recreation Assessment results appears to be fairly widespread inside and outside the USDA Forest Service. Results appear to be used most frequently in a broad, qualitative manner. For example, interviewees indicated that they use the Assessment as a source of benchmark data on recreation demand and supply trends for a variety of policy and management purposes. This use is consistent with the primary objective of the RPA Assessment, which is to support resource policymaking and management.

Interviewees offered many suggestions for increasing the applicability of the Assessment results. Since various factors constrain the scope of the Assessment, there is a need to prioritize the issues that future Assessment efforts might address. Based on interviewee responses, it is suggested that the recreation demand and supply section of future Assessments focus on the following issues: (1) national demand and supply trends, (2) regional demand and supply trends, (3) effects of quality changes on demand and supply trends, (4) development of factors for connecting among units of measure for recreation quantity, (5) effects of demographic and socioeconomic changes on demand and supply trends, and (6) net economic value and regional economic impact.

Another issue of concern for future RPA Assessments is the new interest in ecosystem management of public land. A move toward ecosystem management does not require radical changes in the economic analyses Assessment. However, the economic data presented in the Assessment be applied to resource policy and

management decisions in a much different manner. For example, the implications of the RPA Assessment on formulation of the RPA Program may be quite different.

Interviewees expressed a desire for more information on subregional or forest-level recreation demand and supply. Although subregional recreation information is very important for policymaking and management, generating such information for all subregions in the Nation is probably outside the scope of the Assessment. An alternative is for subregional analysts to take the lead in conducting subregional recreation demand and supply analyses with the technical support and assistance of the Assessment analysts.

A flow of data and analysis that incorporates more assessment work at the subregional and regional levels is illustrated in figure 12, which is a modification of figure 1. The solid horizontal arrows at the bottom of figure 12 suggest that it may be desirable for subregional and regional analysts to generate more of their own recreation demand and supply information directly (for example, data collection and analysis needed to estimate demand functions for specialized activities which occur in unique settings within a National Forest management area). Such efforts should be consistent and coordinated with the Assessment analysis and results (as indicated by the vertical dotted arrows) as well as the parallel RPA Program process shown on the right-hand side of figure 12.

In conclusion, the RPA Assessment appears to provide very useful information to many clients who would have difficulty obtaining similar information from other sources. There are many issues that future Assessments could, and perhaps should, address in the future. There is a need to set a research agenda for the Assessment which incorporates and coordinates the efforts of researchers, analysts, and decision-makers involved in policy and management at the national, regional, and subregional levels.

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Appendix I
Interviewees

I. USDA Forest Service-Washington Office

A. National Forest System

1. Recreation, Cultural, and Wilderness Management Staff

2. Land Management Planning Staff

3. Wildlife and Fisheries Staff

B. Programs and Legislation

1. Deputy Chief's Staff

2. Resource Program and Assessment Staff

C. National Forest Research

1. Deputy Chief's Staff

2. Forest Inventory, Economics, and Recreation Research Staff

D. State and Private Forestry

II. USDA Forest Service Field Offices

A. National Forest System

1. Regional Office - Region 1
   a. Land and Financial Planning Staff
   b. Wilderness, Recreation, and Cultural Resources Staff
   c. Wildlife and Fisheries Staff

2. Regional Office - Region 2
   a. Recreation, Wilderness, Cultural Affairs, and Landscape Management Staff
   b. Planning and Program Budget Staff

3. Regional Office - Region 6
   a. Planning Staff

4. Idaho Panhandle National Forest
   a. Planning Staff
   b. Recreation Staff

5. Rout National Forest
   a. Planning Staff
   b. Recreation Staff

6. Mt. Baker-Snoqualmie National Forest
   a. Planning Staff

7. Kisatchie National Forest
   a. Forest Supervisor's Office
   b. Planning, Evaluation, and Recreation Staff

B. National Forest Research

1. North Central Forest Experiment Station

2. Southeastern Forest Experiment Station

3. Rocky Mountain Forest Experiment Station

III. Other Government Agencies

A. Congressional Research Service

B. U.S. Environmental Protection Agency

C. U.S. Army Corps of Engineers

D. U.S. Department of Commerce, National Oceanic and Atmospheric Administration

E. National Park Service

F. USDA Economic Research Service

G. USDA Soil Conservation Service

IV. Private Individuals and Organizations

A. National Wildlife Federation

B. Wildlife Society

C. American Forestry Association

D. Wilderness Society

E. William Shands (private consultant)

F. Resources for the Future

G. Doug Tims (private recreation tour guide and outfitter)

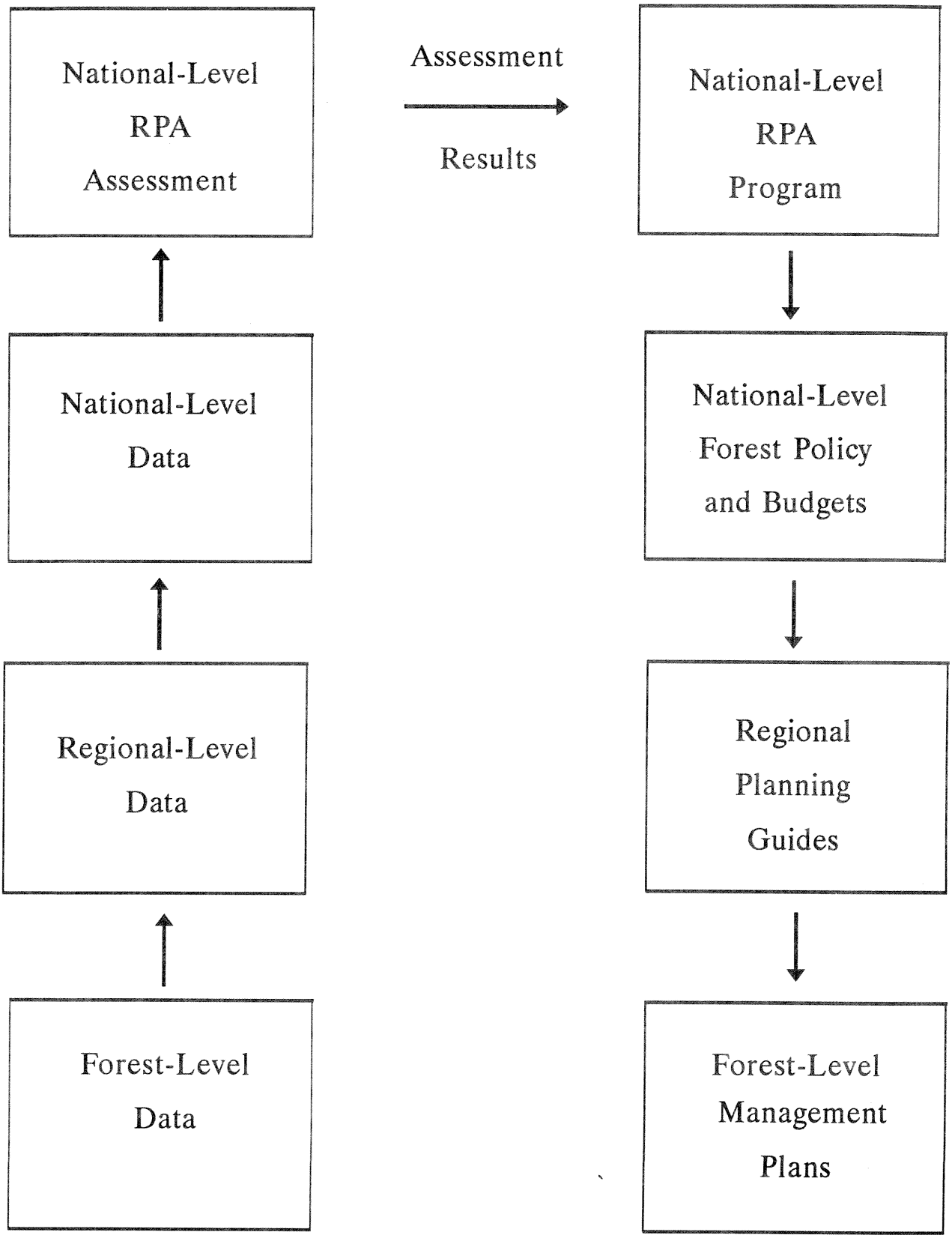

Figure 1—Flow of data and analysis results as envisioned by the RPA legislation.

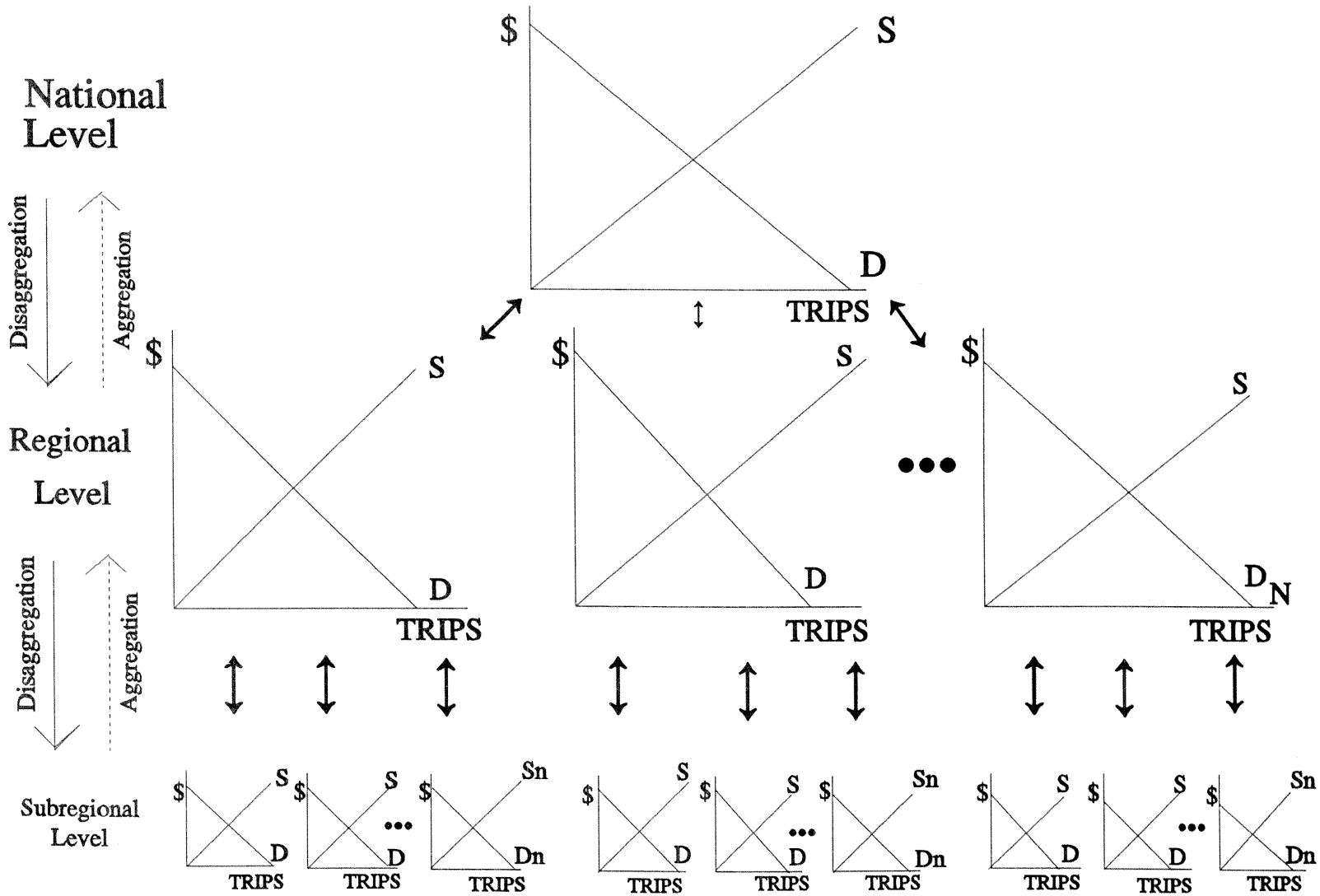

Figure 2—National, regional, and subregional recreation demand and supply functions: general relationships.

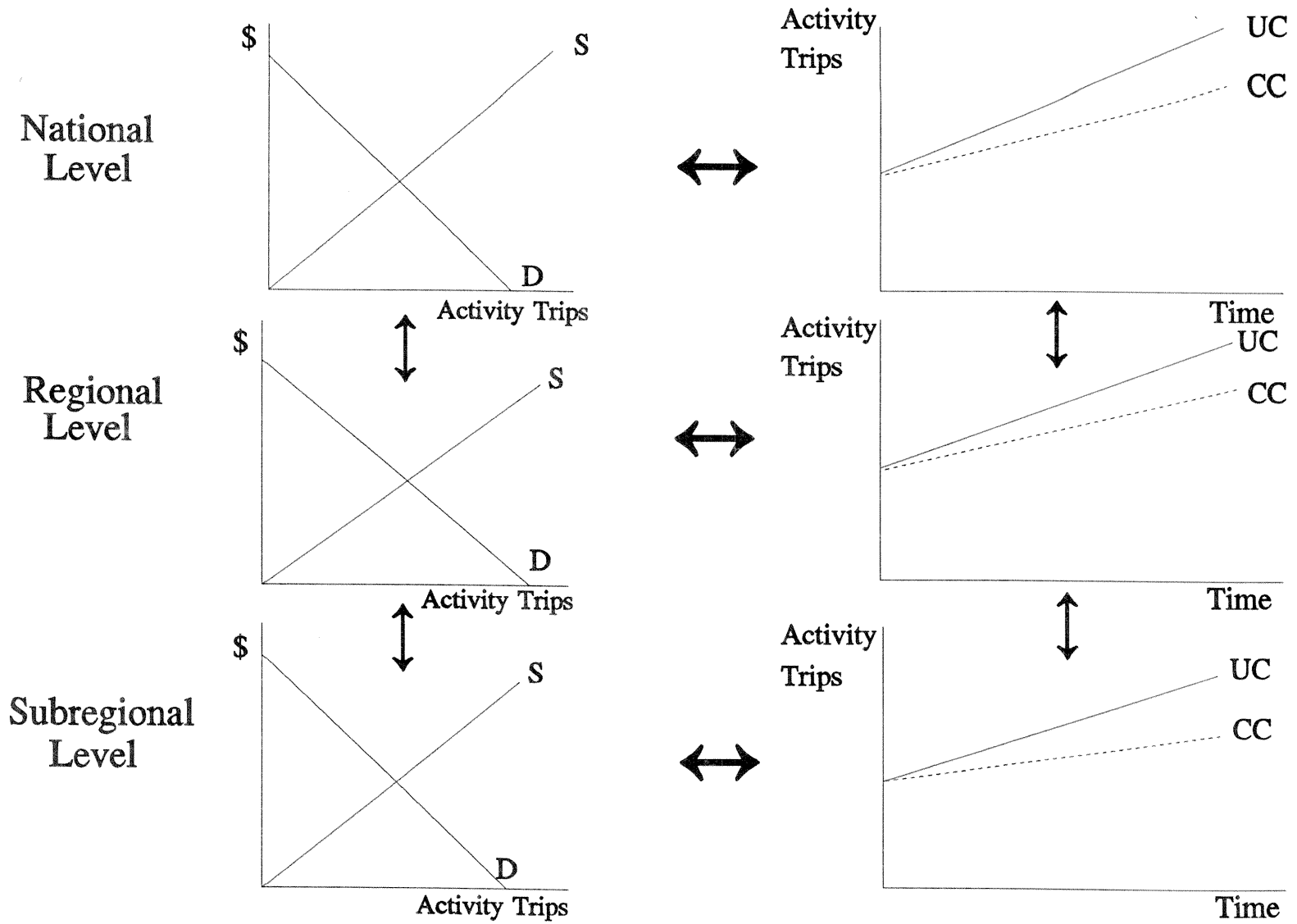

Figure 3—National, regional, and subregional consumption trend lines and gaps.

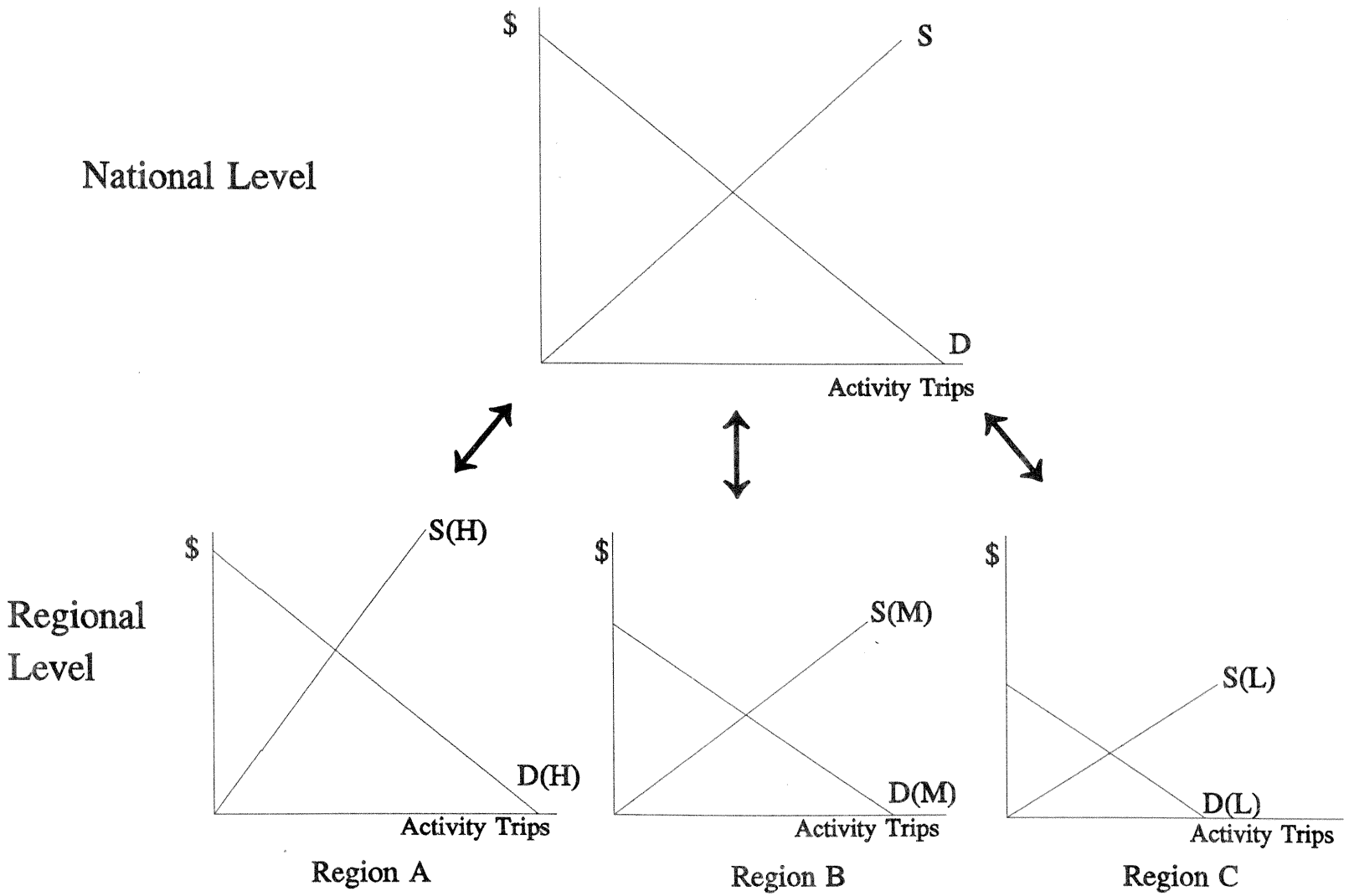

Figure 4—Effects of regional quality differences on demand and supply functions.

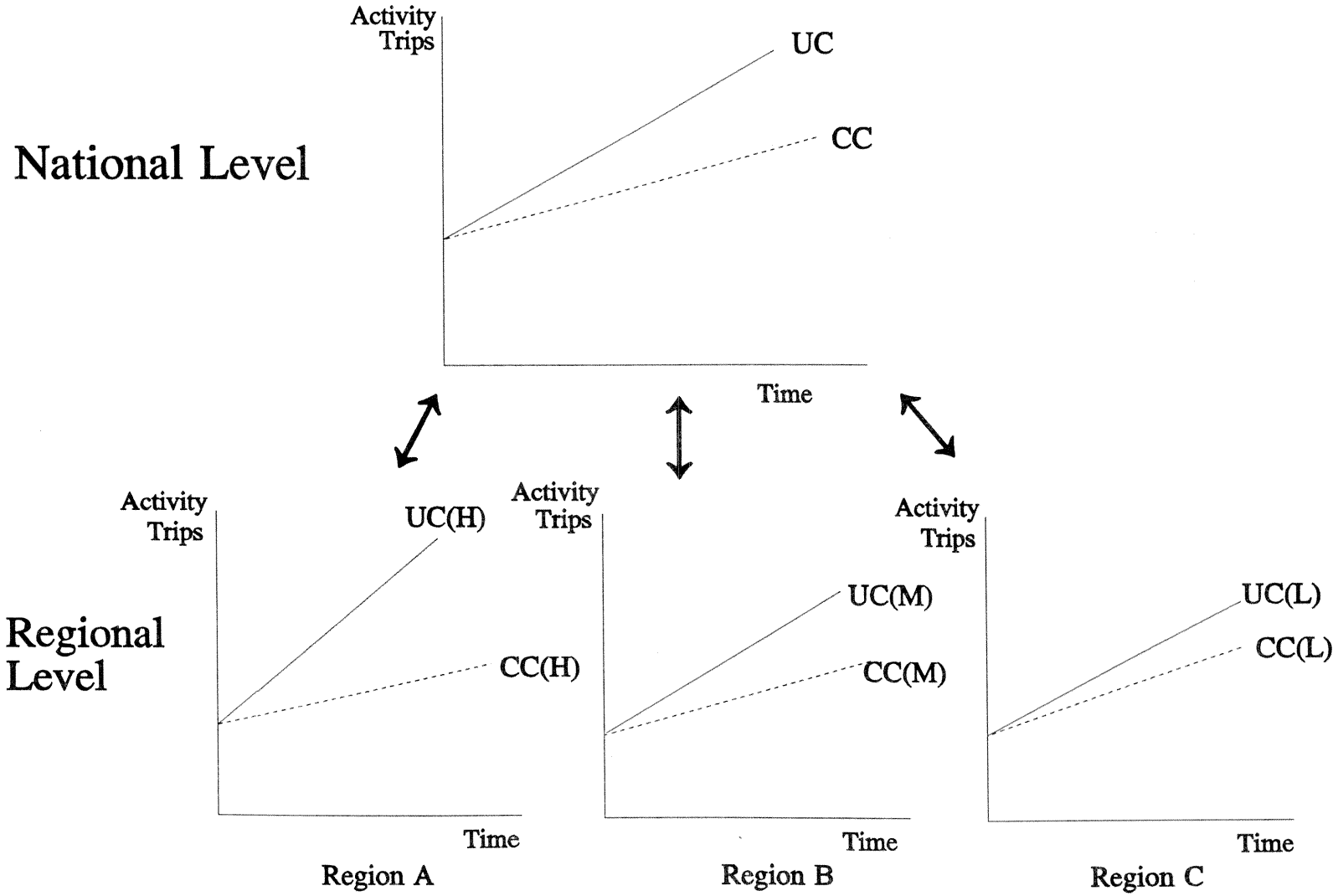

Figure 5—Effects of regional quality differences on consumption trend lines and gaps.

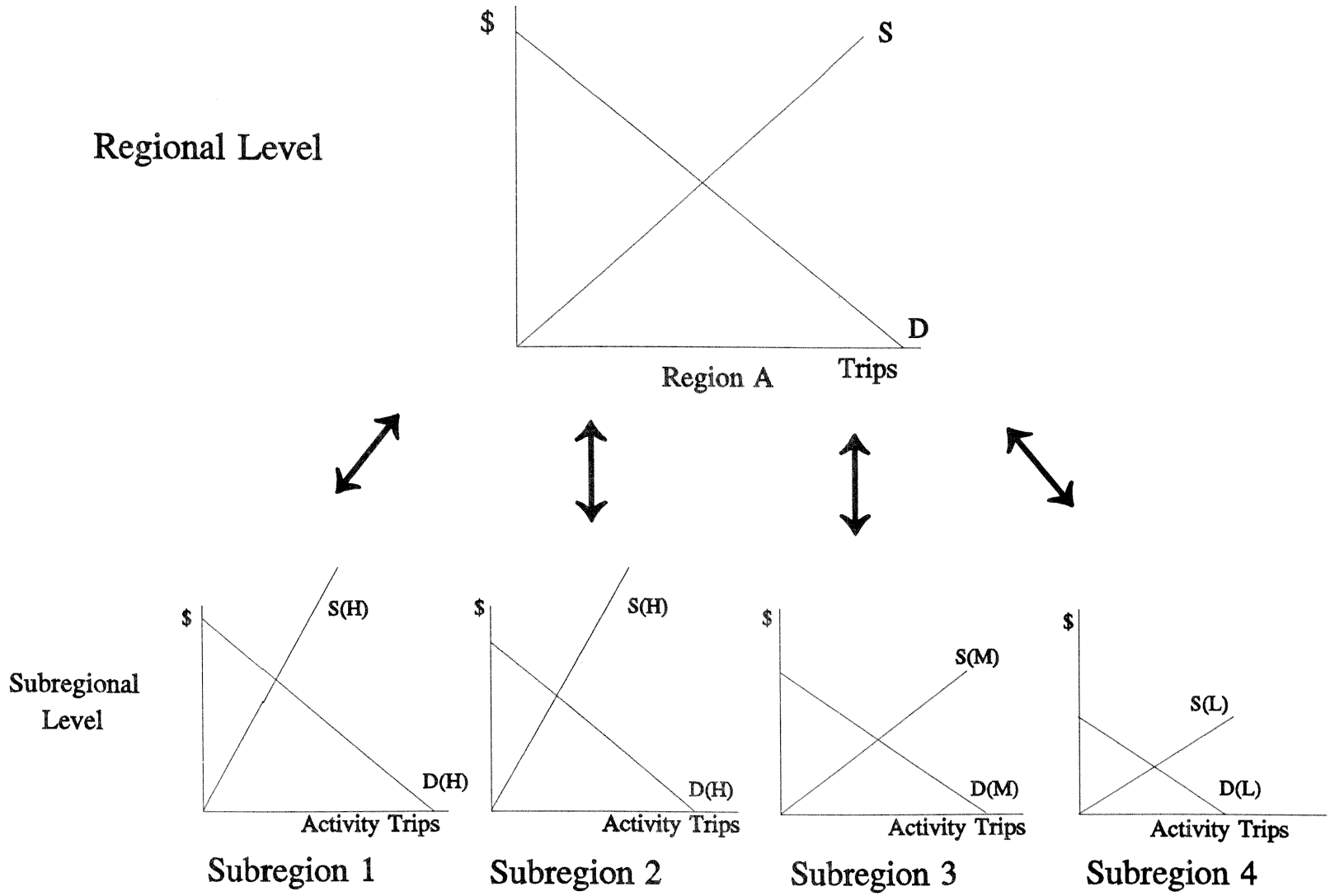

Figure 6—Effects of subregional quality differences on demand and supply functions.

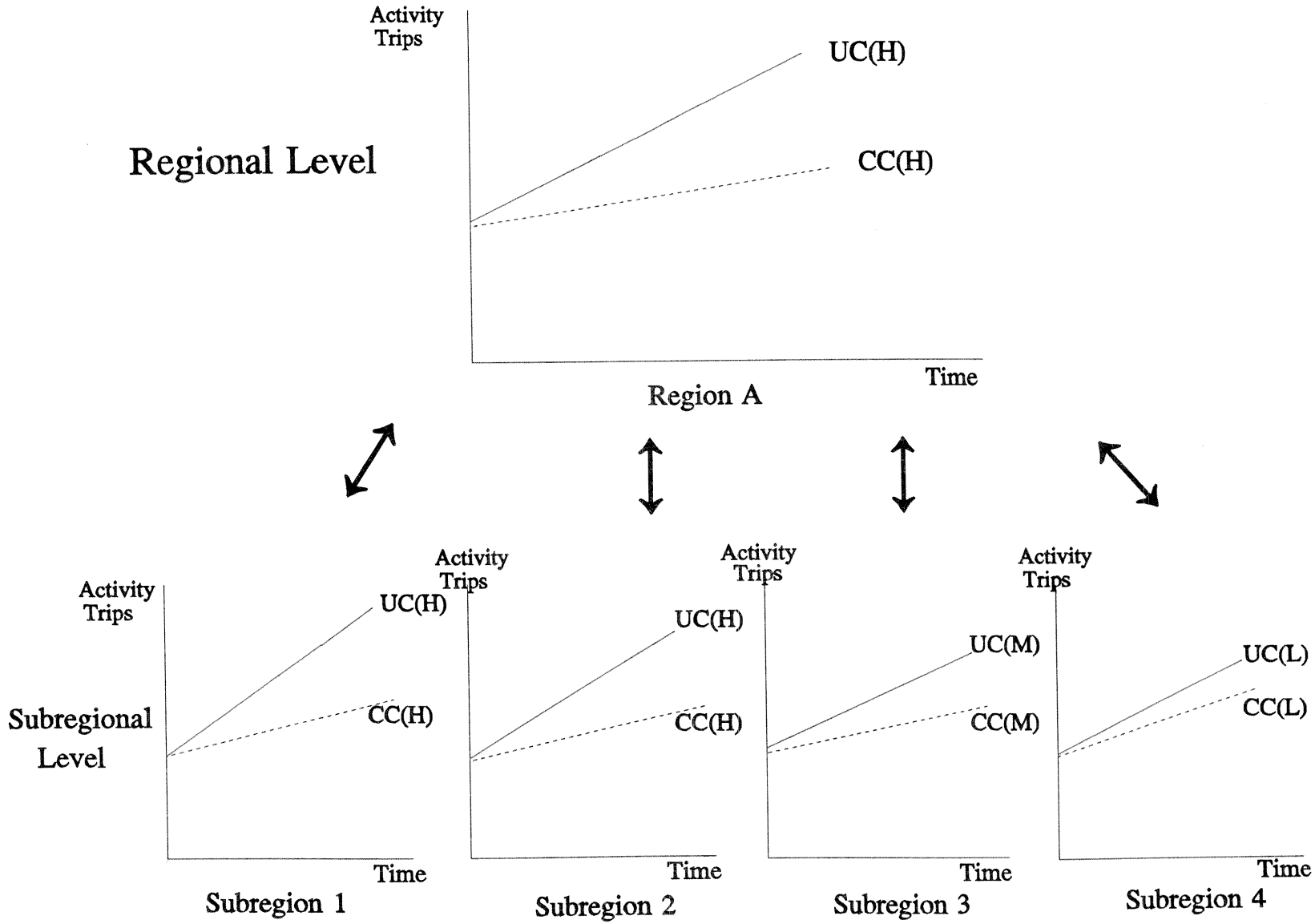

Figure 7—Effects of subregional quality differences on consumption trend lines and gaps.

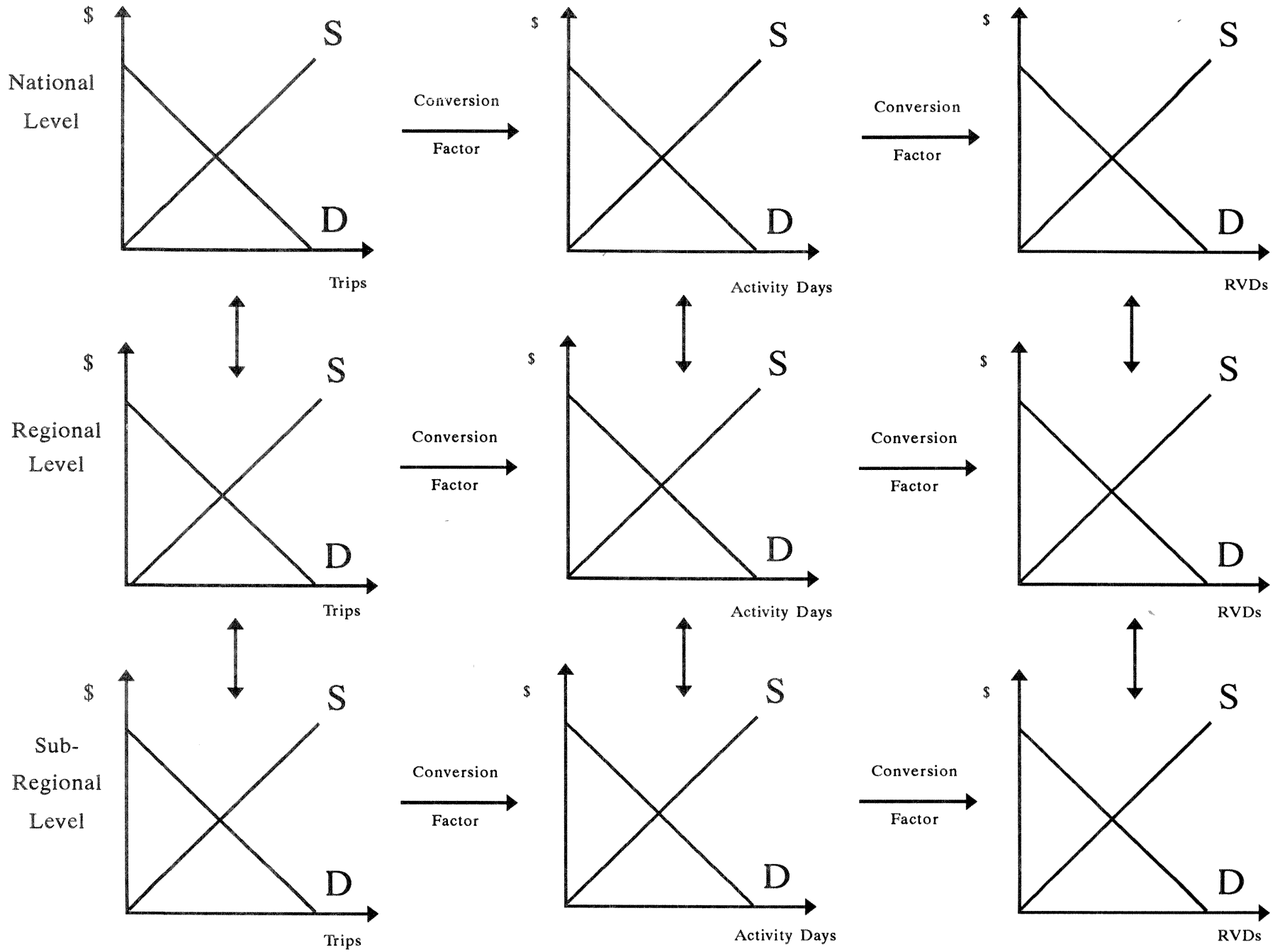

Figure 8—Conversion from activity trips to activity days or activity RVDs (demand and supply analysis).

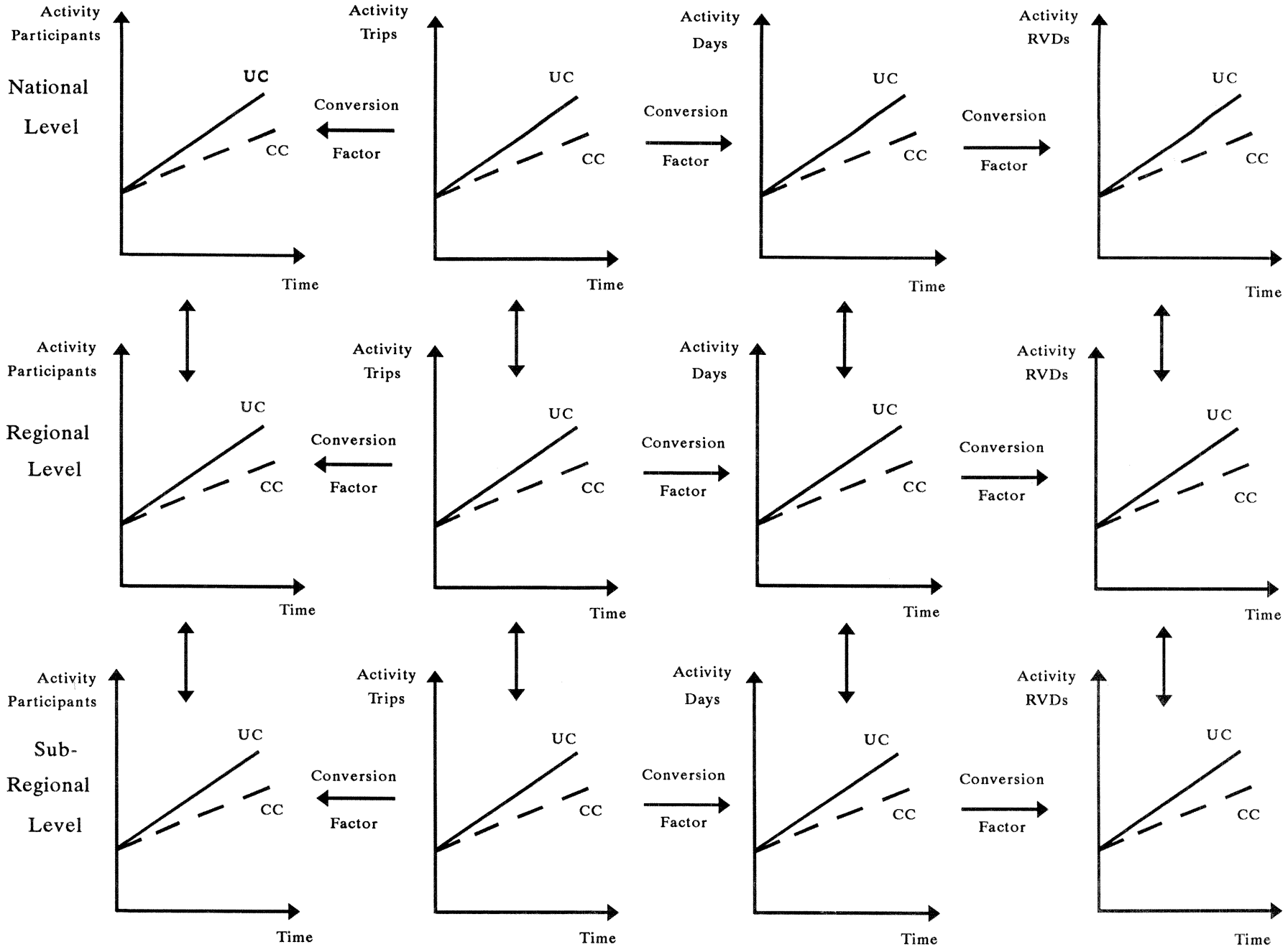

Figure 9—Conversion from activity trips to activity days, activity RVDs, or activity participants (consumption and gap analysis).

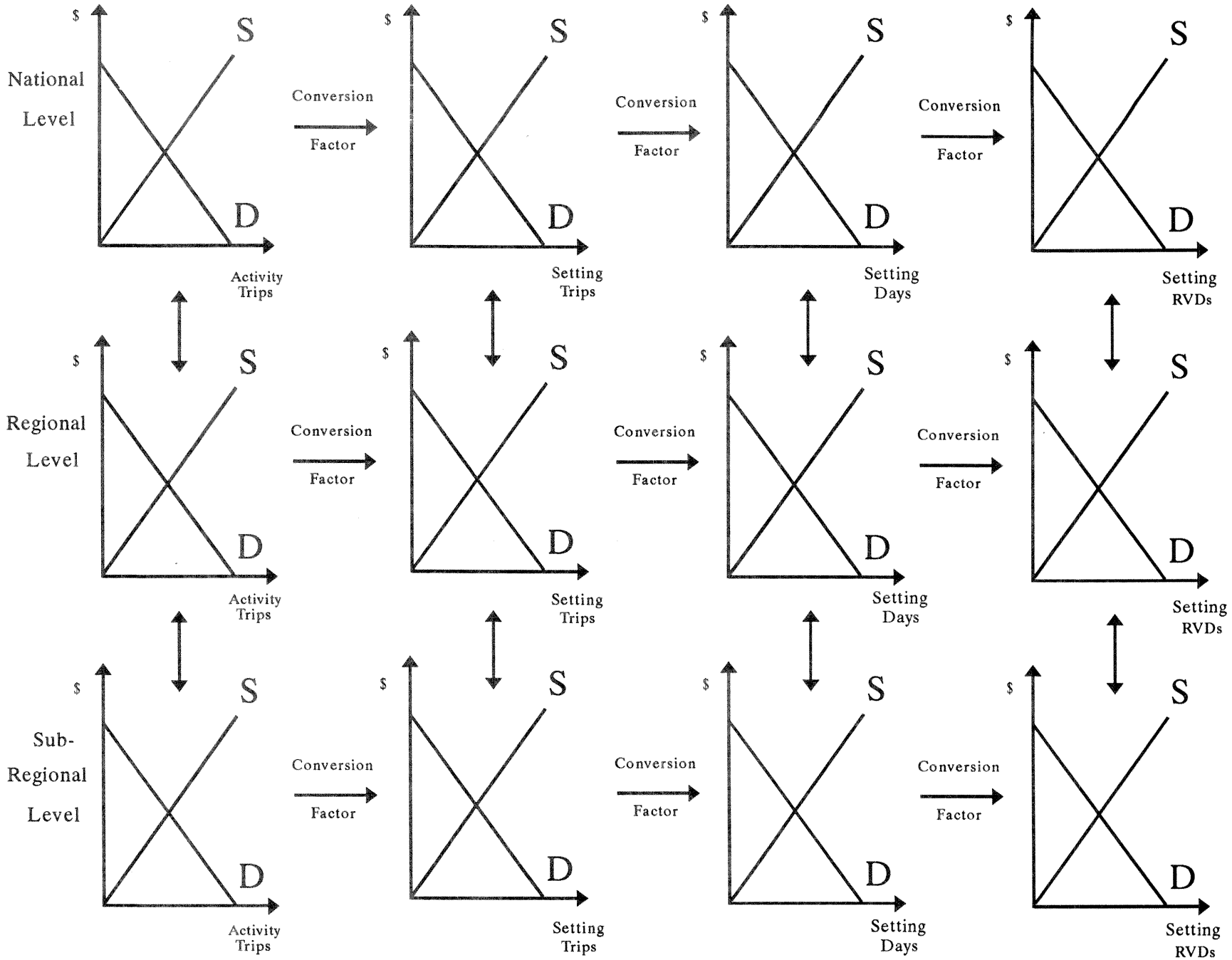

Figure 10—Conversion from activity trips to setting trips, setting days, or setting RVDs (demand and supply analysis).

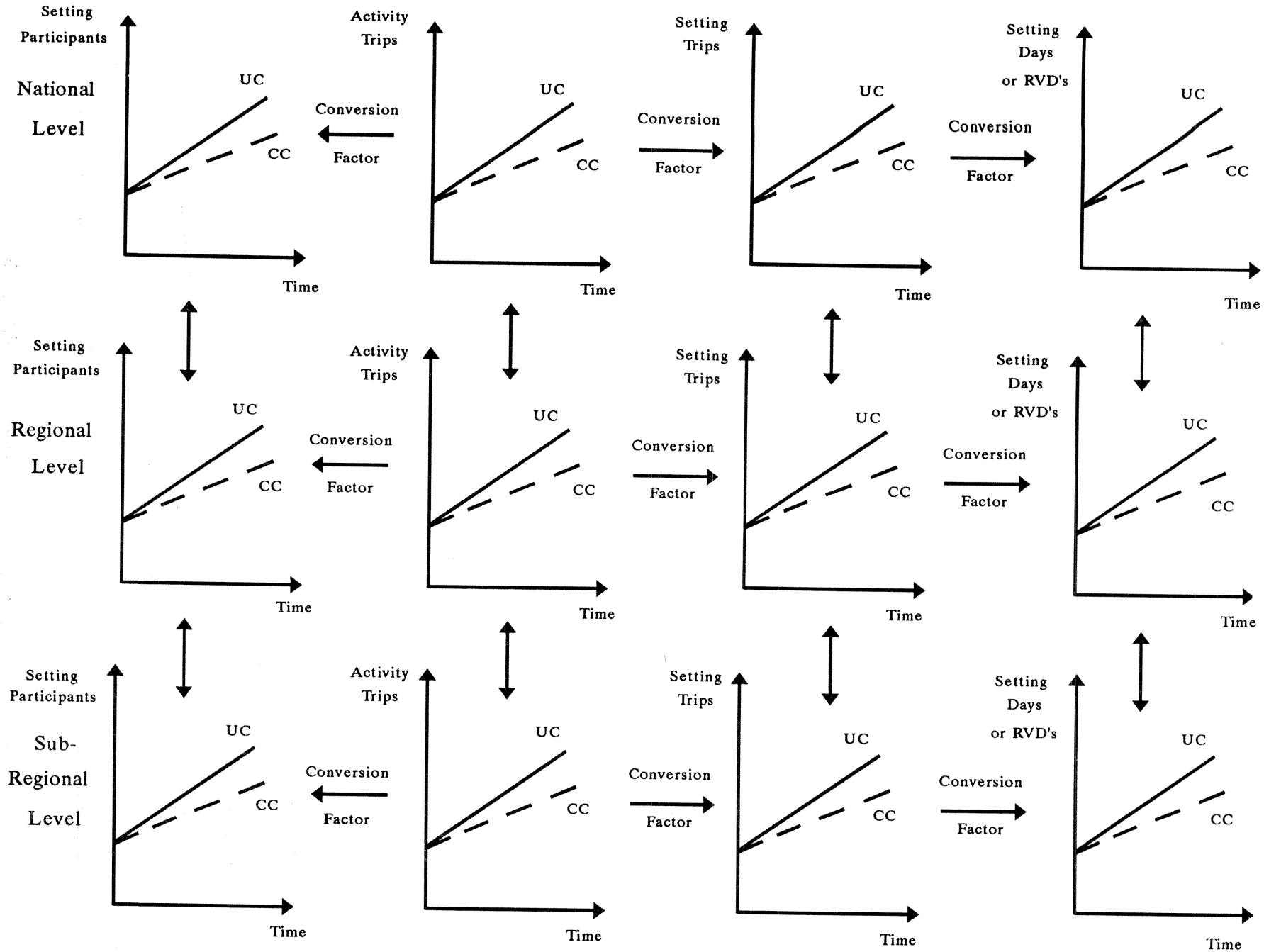

Figure 11—Conversion from activity trips to setting trips, setting days, setting RVDs, or setting participants (consumption and gap analysis).

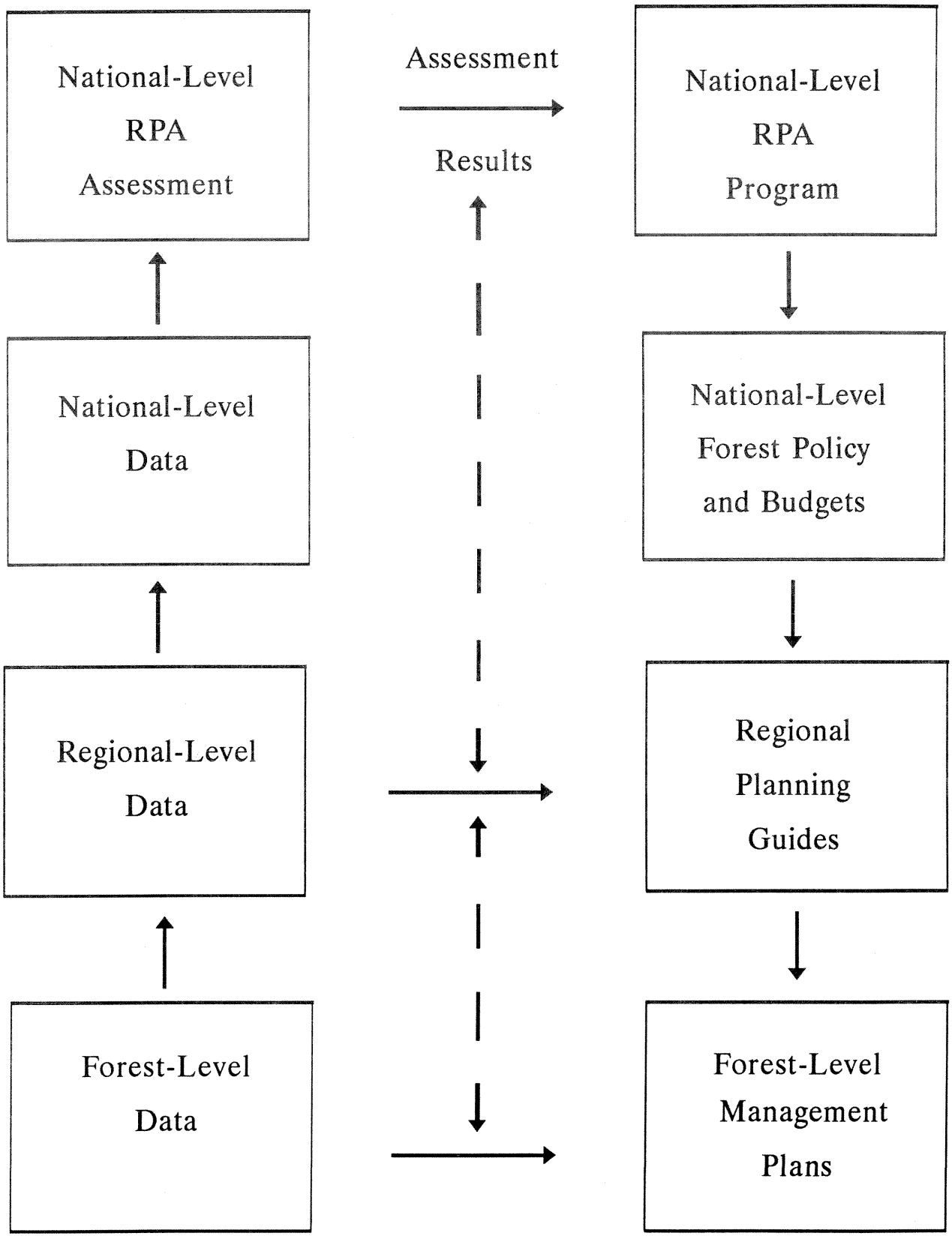

Figure 12—Modified flow of assessment data and analysis results.

Bergstrom, John C.; Cordell, H. Ken; Langner, Linda. 1994. RPA Assessment of outdoor recreation: past, current, and future directions. Gen. Tech. Rep. SE-87. Asheville, NC: U.S. Department of Agriculture, Forest Service, Southeastern Forest Experiment Station. 30 pp.

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Keywords: Demand and supply analysis, natural resource policy and management, research applications, future research needs.

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