An Analytic Hierarchy in Comparative Regional Study

By Steen Folke

Abstract

A new approach to regional analysis and description is tentatively outlined. It is based on previous thinking around the concept of "regional hierarchy" (first of all the ideas of Allen K. Philbrick), *and it is suggested to name it the "analytic hierarchy" approach. After a discussion of predecessors and definitions of basic terms the concept of "analytic hierarchy" is explained. To illustrate the theoretic framework the approach is applied to a comparative study of South Indian plantation areas.*

Preface

This paper is based on an unpublished M. Sc. dissertation, „Sydindiske Plantageregioner – beskrevet ved et analysehierarki" ("South Indian Plantation Regions – within the Framework of an Analytic Hierarchy"). It serves as an introduction to other parts of the dissertation, which I intend to publish later. The dissertation was the outcome of my second stay in South India, October 1963–July 1964. The purpose of this stay was to investigate some aspects of the plantation system, and the field work mainly consisted in visits to tea-, coffee-, and rubber estates in Coorg and Nilgiris districts. The presentation adopted in this paper may give the somewhat misleading impression that I started out with a full-fledged and clear-cut methodology. What actually happened can best be described as a continued interaction between theoretic ideas and factual material collected in the field. But I have found it convenient to divide the paper into two parts, one outlining the theoretic framework and the other characterizing the type of investigation that led to the formulation of this framework. – The paper appears at the same time in the "Bombay Geographical Magazine".

Introduction

The conventional approach to regional analysis and description is systematic rather than "truly" regional. The geographic content of a region is analysed itemwise, beginning with the geological structure and ending with the system of communication and trade. Obviously the great advantage of this approach is its ability to provide a systematic account of the chaotic geographic reality. A serious weakness, however, is inherent in this very advantage, namely a tendency to disrupt the complex and delicate geographic fabric of interrelations and linkages. Each systematic item is treated under a separate heading, and hence the total region is viewed more or less as a sum of mutually independent elements.

To solve this problem we need an approach which is radically different. An important contribution has recently been brought forward by *Berry* (1964), whose three-dimensional "Geographic Matrix" provides a sound basis for regional analysis. The outline of an alternative approach, which in my opinion is "truly" regional, is offered below. Its most conspicuous advantage is its simplicity. Neither mathematical models nor electronic computers are involved in its use. Its language is that of everyday geography, and thus it is suggested that the method may have applications in the popular as well as the scientific branch of regional geography.

Essentially the method consists in the application of a pre-determined "analytic hierarchy" to the areas in question. The concept of "regional hierarchy" is certainly not new to geography, and it is not claimed that there is any significant difference in principle between the concepts of "regional hierarchy" and "analytic hierarchy". The difference is rather one of applicability. Thus the "analytic hierarchy" approach should be viewed as an attempt to add to the usefulness of the "regional hierarchy" concept in regional analysis.

The Regional Hierarchy

The need for analysis at different levels in the regional hierarchy was stated in very general terms by *Ackerman* (1953) and *Isard* (1956). *James* (1952) proposed the terms "chorographic" and "topographic" for highly generalized small-scale studies and less generalized large-scale studies respectively. *Whittlesey* (1954) examined the concept of "regional hierarchy" in retrospect and suggested the existence of a four-step hierarchy of "compages" with universal validity: Locality – District – Province – Realm. A significant advance in regional theory was brought about by *Philbrick* (1957a),

who acknowledged his debt to *Robert S. Platt* in his treatment of "Principles of Areal Functional Organization in Regional Human Geography". In this important work Philbrick advocates a hierarchy concept which is substantially different from that of Whittlesey. In his own words:

"Stated as a principle, the areal structure of occupance is composed of a number of nested orders of areal functional organization arranged in a functional hierarchy. This nested functional hierarchy is characterized by alternate shifts from parallel relationship to nodal organization as the size and complexity of the units of occupance progresses from parcel to establishment, from groups of parallel establishments to the community, etc., in a progression from large to smaller scale".

It will be seen that the theory expounded by Philbrick has its own complicated terminology, partly inherited from Platt and others. As all terms are carefully discussed and defined, the result is a very concise and coherent theory. In my opinion, however, the rather cumbersome terminology limits its usefulness. The following is an attempt to "translate" and modify the theory so as to make it more *operational* in analytic and descriptive regional geography.

A very conspicuous feature in Philbrick's terminology is his effort to avoid as far as possible using the term "region", and consequently he talks of a "functional hierarchy" of "nested orders of areal functional organization" instead of simply a regional hierarchy. An important motive for employing the complicated terminology may be a desire to emphasize the functional/organizational character of the hierarchy. Nevertheless, the substitution of various compound terms for the word "region" hints that dissatisfaction with the inaccuracy of conventional regional terminology is the fundamental reason for inventing a new one. Thus a modified version of the theory – with a somewhat different aim and scope – requires definitions of the basic terms.

Basic Definitions

A recent publication, containing a review of the various concepts of "region" and its main categories, structural (or uniform or formal or homogeneous) and functional (or nodal or organizational), is "Methods of Economic Regionalization" (Geographia Polonica 4, 1964). Whereas there is wide agreement on the use of the term "functional" rather than the various alternatives, there is no similar accord on the proper name for the other category of regions. The term "structural" is preferred here, because it is felt to be *comple-*

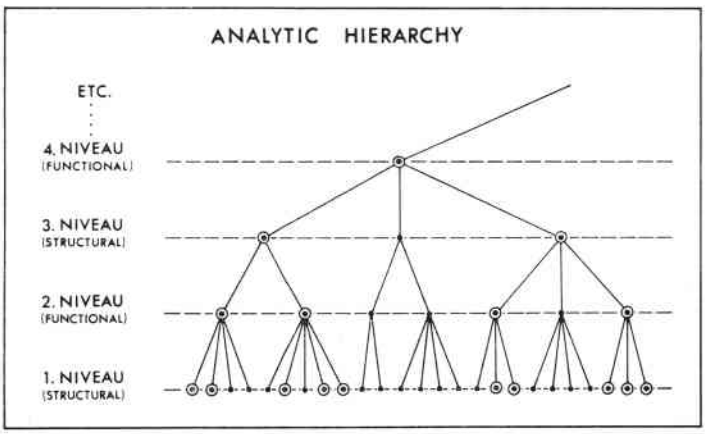

Fig. 1. An analytic hierarchy consisting of four (etc.) niveaux comprising 25, 7, 3, and 1 areal units respectively. An arbitrary sample of 10, 4, 2, and 1 areal units is indicated by rings.

Fig. 1. Et analytisk hierarki bestående af fire (etc.) niveauer, som omfatter hhv. 25, 7, 3 og 1 arealenheder. Et vilkårligt sample på 10, 4, 2 og 1 arealenheder er vist med ringe.

mentary to "functional" in the same sense that anatomy and physiology are complementary. In the present study the concept of "region" is viewed purely as an analytical tool, and hence structural and functional regions emerge as results of the application of different types of criteria. Thus:

A *region* is an area with a distinctive character identified by one or more spatially differentiating features.

A *structural* region is a region which is uniform with respect to one or more features.

A *functional* region is a region composed of areas and points which are interconnected.

While these brief definitions do not take into account a number of familiar regional problems concerning cores and boundaries, continuities and discontinuities etc., they are sufficient as a basis for analysis within the framework of an analytic hierarchy. As regards the delimitation of a region the aim throughout is to maximize at the same time the unity or cohesion within the region and the difference or disjunction from the surrounding areas.

Using the terms which are defined above, a regional hierarchy comprises structural and functional regions of different order. In principle a region may be of any size from the humblest rice field to the all-embracing sphere of influence of a primate city. *The regional hierarchy consists of a specific number of levels, each level in*

turn consisting of a number of regions of the same order. The hierarchy is characterized by alternate shifts between levels of structural and functional regions. The number of levels in the hierarchy depends upon the criteria which form the basis of the analysis.

The Analytic Hierarchy

The choice of a frame of reference must be one of the first steps in a regional study. A delimitation – at least tentative – of the areas to be studied is a necessary condition for the compilation of the relevant material. Guided by the "regional hierarchy" concept it is suggested that a pre-determined analytic hierarchy be applied to the areas in question.

The analytic hierarchy may be described as consisting of a number of "niveaux", representing different levels of generalization. Each niveau is analysed either from a structural or functional point of view, and the analytic hierarchy is characterized by alternate shifts from structural to functional niveaux (fig. 1).

While the object of the "regional hierarchy" approach is to establish a hierarchy of *meaningful regions,* the object of the "analytic hierarchy" approach is to analyse *spatial patterns* – alternately in a structural and functional sense – at different levels of generalization. *The structural and functional spatial patterns are viewed as different aspects of the same areal complex.*

The analytic hierarchy should be regarded as an approximation to the theoretic regional hierarchy, and the shift between structural and functional niveaux reflects the alternation of structural and functional regions in the regional hierarchy. However, the structural niveaux might also be analysed from a functional viewpoint and vice versa, but with less results because of the changing structural uniformity and functional unity of the regional hierarchy model. Thus it will be seen that the difference between the two concepts is only slight, but important enough in terms of their application.

The Analytic Hierarchy in Comparative Regional Analysis

The "analytic hierarchy" approach acquires special significance in the field of comparative regional studies. Comparative studies will be more penetrating if carried out simultaneously at different levels of generalization. For instance a comparative study of two 1:100.000 topographic sheets will be furthered by subsequent com-

parative studies of sub-areas and sub-sub-areas by means of larger-scale topographic sheets 1:50.000, 1:25.000, and 1:10.000. In human geography it will be more appropriate to take into account the (hierarchical) spatial organization of the areas in question and select the niveaux in the analytic hierarchy accordingly.

In a comparative study of two areas the highest niveau of analysis comprises the two areas in toto. At the next lower niveau the number of areal units is greater, and some of them may be selected for comparison while others are omitted. Descending from niveau to niveau the number increases continuously, and to cope with this a *sampling procedure* may be adopted (fig. 1), either purposive, random or random stratified. When suitable niveaux have been established and the sampling is completed, the analysis should commence from the bottom of the analytic hierarchy, i. e. at the lowest level of generalization.

The areal units thus selected may or may not be regions in the structural or functional sense, according to specified criteria. In drawing up appropriate niveaux the investigator's assumptions about the character of the regional hierarchy in the area in question are utilized. But since selection precedes analysis it is neither certain nor, indeed, necessary that the areal units emerge as regions. Here lies one great advantage of the method. To some extent the areal units are arbitrary, and their boundaries will often cut through important continuities or interconnections. This, however, is compensated at a higher niveau, where the area under study is larger and where consequently the same continuities or interconnections are not interrupted.

An Application of the Analytic Hierarchy

The author has carried out a comparative study of two South Indian areas, the plantation districts of Nilgiris and Coorg, within the framework of an analytic hierarchy. To give an illustration of the "analytic hierarchy" concept the approach followed will be outlined.

Preliminary studies showed that an analytic hierarchy consisting of four niveaux would be feasible. The corresponding areal units were: 1. The block (of a certain plantation crop). 2. The plantation. 3. The village (as an administrative area containing a number of plantations). 4. The district. The block was analysed from a structural, the plantation from a functional viewpoint. Again the village was analysed from a structural and the district from a functional

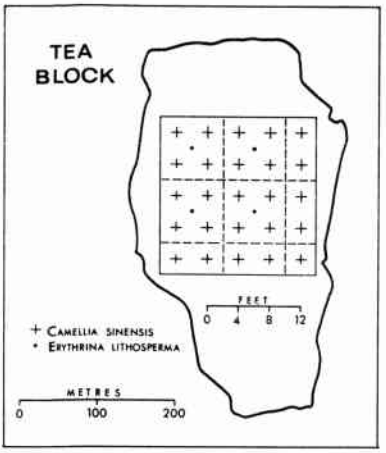

Fig. 2. First niveau (structural): A block. The external boundary of the block is shown and the enlarged inset depicts the regular planting system of tea bushes and shade trees, which covers the entire block.

Fig. 2. Første niveau (strukturelt): En afgrødeblok. Blokkens omrids er vist, og i større forstørrelse er indsat det regulære plantningssystem af tebuske og skyggetræer, som udfylder hele blokken.

point of view. The number of districts studied was two, the number of villages four, the number of plantations twenty-one, and the number of blocks large. The areal units to be studied were selected by means of purposive sampling. An element of subjectivity is a great weakness in this method, but since the entire study had to be completed within nine months, and since the samples had to cover a certain range of variation regarding a number of factors, the author was left without choice.

The analytic sequence is brought out by figures 2, 3, 4, and 5, each depicting an areal unit at one of the four niveaux in the analytic hierarchy. *Proceeding from the lowest (first) to the highest (fourth) niveau the degree of generalization is steadily increased and thus analysis at one niveau serves as an elaboration and corrective to the more generalized analysis at the following higher niveaux. This gives the procedure the character of a synthesis.*

First Niveau (structural): The Block

Fig. 2 shows a tea block, exemplifying the analysis at the first (structural) niveau. The tea plants *(Camellia sinensis)* and the shade trees *(Erythrina lithosperma)* are planted in a regular system, and the entire block may be perceived as a structural region consisting of a vast number of uniformly distributed elements, each comprising four tea plants and one shade tree. Planting systems vary considerably from block to block and from plantation to plantation, and as a corollary the cultural landscape will change in appearance.

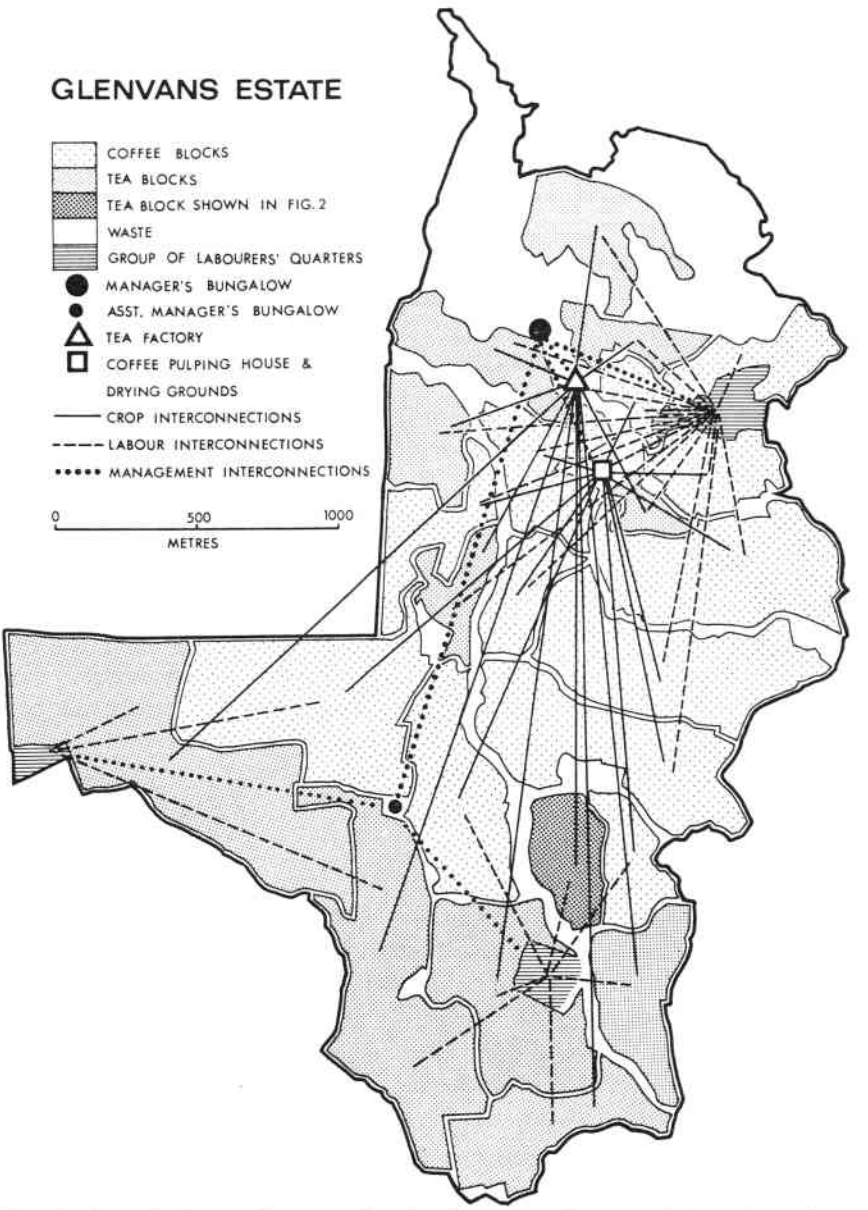

Fig. 3. Second niveau (functional): A plantation. Some buildings have been omitted and a number of blocks have been merged to ensure sufficient clearness.

Fig. 3. Andet niveau (funktionelt): En plantage. Et antal bygninger er udeladt og en række blokke slået sammen for overskuelighedens skyld.

Plant density and pattern have a significant bearing on soil erosion, which ceteris paribus will be less in a densely planted area. Contour planting is an efficient soil conservation measure on steep slopes. In determining the optimal plant density a cost-benefit type of analysis may be employed. The yield will reach its maximum at an intermediate density; if density is lower the yield will be less due to the smaller number of plants, if density is higher the yield will be less, as well, due to the competition between plants. On the other hand the cost of planting and maintenance increases steadily with increasing plant density. The degree of complication of the planting system also influences the cost factor, and this may be the reason why all conventional planting systems are square or rectangular and not for instance hexagonal.

Second Niveau (functional): The Plantation

The plantation shown in fig. 3 exemplifies the analysis at the second (functional) niveau. To make it clearer the figure has been somewhat simplified; some buildings have been omitted, and a number of blocks have been merged. The plantation is rather peculiar in combining the cultivation and production of tea and coffee. This, however, is not uncommon in the plantation district under study where altitude permits the growth of both coffee (*Coffea arabica* or *Coffea canephora)* and tea. Nevertheless, it often leads to relative neglect of one of the crops; the problems of management, organization, and division of labour in a two-crop system seem to be almost insurmountable.

Operation of the plantation involves various forms of spatial interaction. The main physical elements in this process are the blocks of coffee and tea on one hand and on the other the different types of buildings, the labourers' quarter, the management's houses and the crop-processing establishments. The blocks and buildings are connected by roads and foot paths (not shown in the figure), and it is along these the functional interconnections take place. In the daily routine the labourers walk to and from the factories and blocks carrying tools and other equipment as well as raw materials (manure, pesticides etc.). As a result of their work the daily or seasonnally harvested crop (tea resp. coffee) flows towards the processing establishments. All this is directed and supervised by the management. In principle one may distinguish between three types of spatial links, crop interconnections, labour interconnections and management interconnections (raw material interconnections

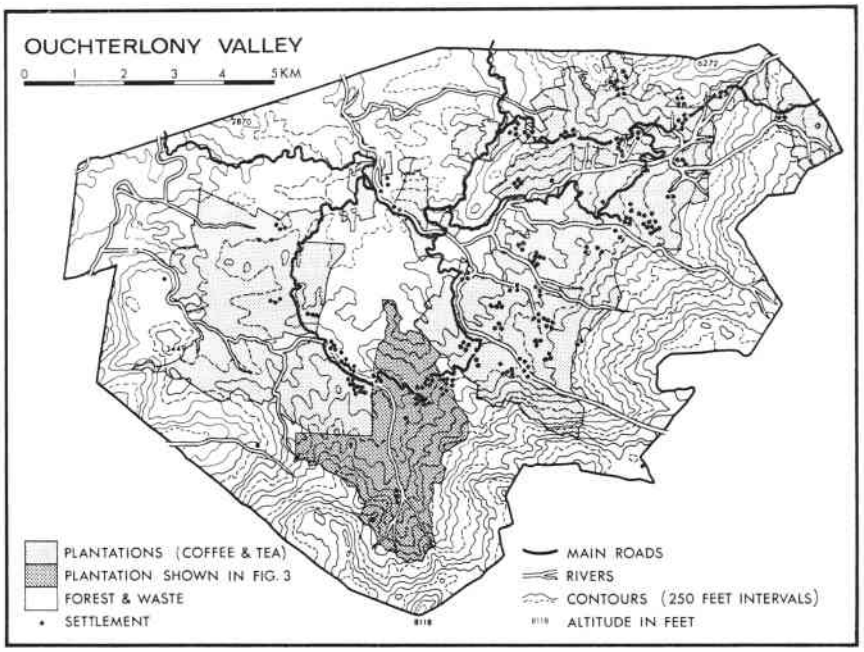

Fig. 4. Third niveau (structural): A village. The land use pattern is outlined. The plantation area is divided between a number of large and small estates, but except in one case individual plantations are not shown.

Fig. 4. Tredje niveau (strukturelt): En landsby (i administrativ forstand). Arealudnyttelsens mønster er vist. Plantagearealet er delt mellem en række store og små plantager, men bortset fra ét tilfælde er grænserne mellem de enkelte plantager ikke vist.

might be regarded as a fourth). These define the plantation as a functional region.

At this point it may be stressed that the analysis need not be confined to the internal functional relations of the areal unit, e. g. the plantation. The plantation has important external functional links, for instance with wholesale dealers in plantation equipment, with managing agents, and with tea brokers, and these links may be analysed at the relevant niveau.

Third Niveau (structural): The Village

Fig. 4 is an illustration of the analysis at the third (structural) niveau. At this niveau the analysis is concentrated on the cultural landscape, first of all the pattern of land use. The figure shows a large village (in the administrative sense), Ouchterlony Valley, covering an area of 103 km². The village is peculiar in that it has been developed entirely as a plantation area – since the arrival of the first European pioneers in 1845.

In outline the land use pattern is very simple. The village contains two broad categories, plantations and forests, and only these are shown on the map. However, the forests include some swampy areas in the lower portions and bare rocks in the upper. On the other hand the plantation areas might be subdivided into narrower land use categories. Coffee and tea are the only crops cultivated, but they are planted in a rather intricate pattern (compare fig. 3). Further, a number of recent illegal encroachments by small peasants have not been shown on the map.

With these reservations (at this level of generalization) there is an obvious relationship between relief and land use. The plantations cover the area which is transitional between the steep precipice in E, S and W and the gently undulating plateau in the centre and N. The upper areas have not been cultivated because of their shallow soil, severe erosion, and difficulty of access, while the lower areas have been left out due to their poor drainage. But the intermediate areas with their moderate slope, fairly rich forest soil, excellent drainage, and easy accessibility were considered ideal for the planting of tea and coffee. Consequently they were developed as plantations over more than a century, and now the forest covers as a residual only the areas less suitable for plantation crops (rather: areas considered less suitable by the entrepreneurs).

It may be inferred from fig. 4 that the pattern of settlement is largely a corollary of the land-use pattern. The great majority of buildings are within or close to the plantations. Again the road pattern is to a great extent determined by land use and settlement. The main roads give access to all plantations in a circular fashion and relate the village to the outer world in NW, N and NE. On the other hand the influence of relief on the road system is in great evidence. Thus analysis at the third (structural) niveau reveals a whole sequence of areal relationships.

Fourth Niveau (functional): The District

Nilgiris District, shown in fig. 5, exemplifies the analysis at the fourth (functional) niveau. The district is mountainous, comprising ridges, valleys, and plateaus and covering a total area of 2543 km². Apart from the important plantation sector it has some indigenous agriculture, a number of hydro-electric projects (some in the construction phase, some completed), a few specialized industries, and tourism as a developing asset. The district is served by a system of central places, which is shown in the figure (and which will be

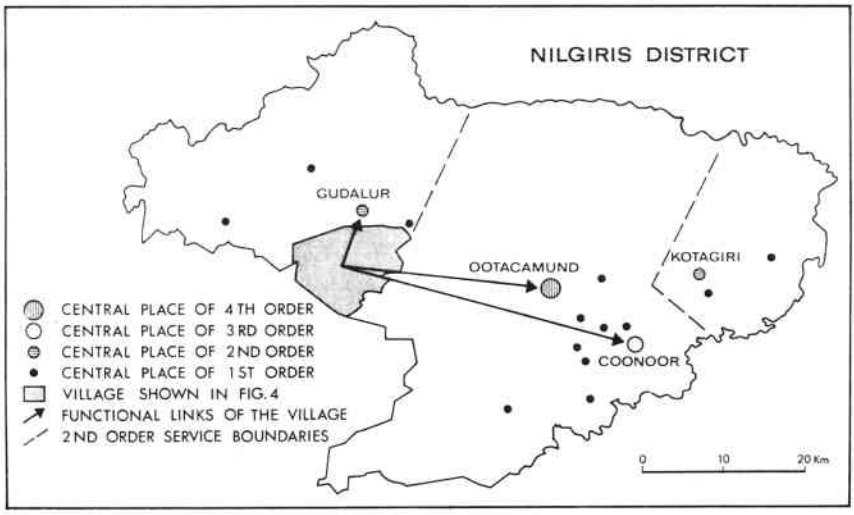

Fig. 5. Fourth niveau (functional): A district. The most important functional links between the village of plantations and the system of central places are indicated by arrows. Second order service boundaries are only approximate.

Fig. 5. Fjerde niveau (funktionelt): Et distrikt. Pilene antyder de vigtigste funktionelle forbindelser mellem landsbyens plantager og distriktets „central places". Servicegrænserne af anden orden er kun omtrentlige.

explained in detail in a later paper). Ootacamund, the district centre, and Coonoor, the runner-up, take care of the more specialized functions for the whole district. Gudalur and Kotagiri serve as second order central places for the western and eastern portions respectively. Thirteen central places of first order are scattered over the district, but with a marked concentration in the economically most active Ootacamund-Coonoor area.

The central-place hierarchy shown in fig. 5 must not be mixed up with the regional hierarchy or the analytic hierarchy. Plantations are such large undertakings as to have frequent, intimate, and direct contacts with central places of several orders. Thus a fourth niveau in the analytic hierarchy comprising a whole district with its system of central places was found to be more suitable than any delimitation involving smaller areal units.

The functional links of Ouchterlony Valley (or rather of the plantations in Ouchterlony Valley, compare fig. 4) are indicated by arrows. Gudalur with its weekly market and bazaar, post office, petrol filling stations etc. caters to daily needs, while Coonoor has among other things a number of establishments related to the plantation sector (tea auction, labour union offices, and planters' association), and Ootacamund has district offices, head banks

etc. However, the plantation system is such that it involves strong functional connections with the world outside the district, e. g. with a number of sea ports. These ports are the destinations for most of the produce, and the majority of large plantation companies and managing agents have their main offices here.

This leads to an important observation. The present study has been carried out within the framework of an analytic hierarchy comprising four niveaux, but it must be regarded as entirely arbitrary that the analysis has not been carried further. It would certainly be interesting and rewarding to establish and examine higher niveaux in the analytic hierarchy, covering still larger areas of the earth's surface. In principle this might continue to the n'th niveau covering the whole world, but in practice, of course, it will rarely be profitable to proceed thus far.

Conclusion

It is suggested that the "analytic hierarchy" approach, which has been briefly outlined, may be fruitfully employed in a number of regional studies. In comparison with the conventional "systematic" approach in regional geography it has three great advantages: *1) the subjects of analysis are structural and functional aspects of the areal complex instead of systematic items; 2) the approach takes into account the hierarchical character of the areal complex; 3) the analysis is carried out simultaneously at different levels of generalization.* The approach acquires special significance in comparative regional studies. A sampling procedure may be adopted in the selection of areal units to be compared at different niveaux in the analytic hierarchy, and the subsequent analysis will provide a comprehensive picture of the spatial composition of the areas in question.

An application of the "analytic hierarchy" approach to the study of two South Indian plantation districts has shown the type of analysis that might be carried out at different structural and functional niveaux. The analytic content, however, has been considerably influenced by the character and aim of this particular study. Economic aspects of human occupance have been heavily dominant while social and political aspects are left virtually untouched. Under other circumstances the analytic content will be entirely different, while the general framework of the analytic hierarchy may be retained. Although the time dimension may be contained in the investigation, the approach outlined here is essentially static, and a

transformation in the dynamic direction would constitute a highly significant advance. The present study has dealt with spatial aspects of the plantation system in a tropical country, and application of the "analytic hierarchy" approach to other areas and other problems may require some modifications of the conceptual framework.

Acknowledgment

The field work was made possible by the financial support of the *Government of India*, the *University of Copenhagen*, and the *East Asiatic Company*, all of whom are cordially thanked for their generosity. Concerning the theoretical part of the paper the author wishes to acknowledge his debt to a group of Copenhagen geographers, notably *Sofus Christiansen*, *Sven Illeris*, *Henrik Jeppesen*, *Per Kongstad*, *Hans Kuhlman*, and *Lisbet Lopo*. The ideas here advanced have been inspired and considerably influenced by discussions in this group; besides most of the above-mentioned have read the draft and made valuable suggestions. A special thank is due to Dr. *Bent Nordhjem* who corrected and improved the language.

RESUMÉ

Den almindelige fremgangsmåde ved regionalgeografisk analyse og beskrivelse er systematisk snarere end egentlig regional. En regions geografiske „indhold" analyseres emne for emne fra geomorfologi til samfærdsel og handel. Metoden har den store fordel, at den systematiserer den kaotiske geografiske virkelighed. Men heri ligger også dens svaghed, en tendens til at adskille de komplicerede geografiske sammenhænge. Hvert systematisk emne behandles for sig, og den totale region anskues mere eller mindre som en sum af hinanden uvedkommende elementer.

Til løsning af dette problem kræves en fremgangsmåde, som adskiller sig radikalt fra den „systematiske". Et forsøg på at angribe regionen fra en ny vinkel skitseres i det følgende. Det foreslås at lade analyse og beskrivelse foregå inden for rammerne af et forud fastlagt „analytisk hierarki" (hierarki, græsk: gruppe af genstande ordnet efter rang, grad, klasse o.s.v.). Denne fremgangsmåde er en videreudvikling af tanker, som forskellige forskere har gjort sig om et s.k. „regionalt hierarki" eller „funktionelt hierarki". Den vigtigste forudsætning er *Allen K. Philbrick's* artikel fra 1957:

„Principles of Areal Functional Organization in Regional Human Geography". Metodens største fortrin er dens simpelhed, som skulle muliggøre anvendelse i såvel videnskabelige som mere populære geografiske fremstillinger.

Den moderne regionsteori, der især er udviklet i USA, opfatter begrebet region som et analytisk hjælpemiddel. Man opererer med to hovedkategorier af regioner, strukturelle (eller formelle eller uniforme eller homogene) og funktionelle (eller nodale eller organisatoriske). Der er langtfra enighed om terminologien, men følgende kortfattede definitioner dækker regionsopfattelsen i hovedtræk:

En *region* er et område, der har et særpræg i forhold til naboområderne.

En *strukturel region* er en region, som er ensartet med hensyn til et eller flere kriterier.

En *funktionel region* er en region, hvis elementer (punkter og arealer) sammenknyttes af forbindelser.

Med denne terminologi kan et *regionalt hierarki* siges at omfatte strukturelle og funktionelle regioner af forskellig orden. En region kan i princippet være af enhver størrelse fra den mindste rismark til en verdensbys altomfattende „influensområde". Det regionale hierarki består af et bestemt antal planer, som hver består af et antal regioner af samme orden. Hierarkiet karakteriseres ved alternerende skift mellem planer af strukturelle og funktionelle regioner. Antallet af planer i hierarkiet afhænger af de kriterier, som lægges til grund for analysen.

Et af de første trin i en regionalgeografisk undersøgelse må nødvendigvis være en afgrænsning af de områder, som skal studeres. En sådan afgrænsning er simpelthen en betingelse for den grundlæggende materialeindsamling. Med udgangspunkt i teorien om det regionale hierarki foreslås det, at et forud fastlagt *analytisk hierarki* opstilles som ramme om undersøgelsen.

Det analytiske hierarki kan beskrives som opbygget af et antal „niveauer", der repræsenterer forskellig grad af *generalisation.* Hvert niveau analyseres enten fra et strukturelt eller fra et funktionelt synspunkt, og det analytiske hierarki karakteriseres ved alternerende skift fra strukturelle til funktionelle niveauer (fig. 1). Mens hensigten med det regionale hierarki er at etablere et hierarki af meningsfyldte *regioner,* er hensigten med det analytiske hierarki at undersøge *regionale mønstre* – skiftevis i strukturel og funktionel forstand – med forskellig grad af generalisation. De strukturelle og funktionelle regionale mønstre opfattes som forskellige aspekter

af det samme arealkompleks. Det analytiske hierarki er en tilnærmelse til det teoretiske regionale hierarki, og skiftet mellem strukturelle og funktionelle niveauer reflekterer skiftet mellem strukturelle og funktionelle regioner i det regionale hierarki.

Sammenlignende regionalgeografiske studier kan med særlig fordel foretages inden for rammerne af et analytisk hierarki. Sammenlignende undersøgelser vil være mere dybtgående, hvis de på samme tid udføres med forskellig grad af generalisation. F. eks. kan et sammenlignende studium af to 1:100.000 kortblade uddybes ved studier af mindre områder i større målestok, 1:50.000, 1:25.000 og 1:10.000. Inden for kulturgeografien vil det være mere hensigtsmæssigt at tage hensyn til de undersøgte områders hierarkiske organisation ved fastlæggelsen af niveauer i det analytiske hierarki.

I et sammenlignende studium af to områder omfatter analysens højeste niveau de to områder som helhed. På det næstfølgende lavere niveau er antallet af arealenheder større, og det kan blive nødvendigt at udvælge nogle til analyse og udelade andre. På de følgende lavere niveauer vokser antallet af arealenheder stadig, og for at klare dette kan man anvende en form for *sampling* (fig. 1). Når passende niveauer er opstillet og udvælgelsen fuldført, bør analysen begynde fra det nederste niveau i det analytiske hierarki, som har den mindste grad af generalisation.

De udvalgte arealenheder er ikke nødvendigvis regioner i strukturel eller funktionel forstand. Ved fastlæggelse af hensigtsmæssige niveauer udnyttes enhver forhåndsviden om det regionale hierarkis karakter i området. Men da udvælgelse går forud for analyse, er det ikke sikkert, at arealenhederne fremstår som regioner. Dette er imidlertid heller ikke nødvendigt, og her ligger en af metodens fordele. Arealenhederne er i nogen grad arbitrære, og deres grænser vil ofte skære igennem vigtige sammenhænge eller forbindelser. Men dette kompenseres på et højere niveau i det analytiske hierarki, hvor de undersøgte arealer er større, og hvor de samme forbindelser og sammenhænge følgelig ikke afbrydes.

Den ovenfor skitserede fremgangsmåde er anvendt ved en sammenlignende undersøgelse af to områder i Sydindien, plantagedistrikterne Nilgiris og Coorg. Forstudier viste, at et analytisk hierarki omfattende fire niveauer ville være hensigtsmæssigt. De tilsvarende arealenheder var: 1. Afgrødeblokken (af en bestemt plantageafgrøde). 2. Plantagen. 3. Landsbyen (som administrativt område omfattende en række plantager). 4. Distriktet. Afgrødeblokken blev analyseret fra en strukturel, plantagen fra en funktionel, landsbyen

fra en strukturel og distriktet fra en funktionel synsvinkel. Antallet af undersøgte distrikter var to, af landsbyer fire, af plantager enogtyve og af afgrødeblokke mange.

Den analytiske fremgangsmåde fremstilles af fig. 2, 3, 4 og 5, der viser én arealenhed på hvert af de fire niveauer i det analytiske hierarki. Af figurerne fremgår antydningsvis undersøgelsens karakter på de forskellige niveauer (i øvrigt henvises til den engelske tekst). Graden af generalisation øges stadig fra første til fjerde niveau, og analysen på et niveau tjener således til uddybning af og som korrektiv til den mere generaliserede analyse på de følgende niveauer.

Sammenlignet med den sædvanlige „systematiske" fremgangsmåde inden for regionalgeografien indebærer den her foreslåede metode tre afgørende fordele: *1) Analysen beskæftiger sig med arealkompleksets strukturelle og funktionelle aspekter i stedet for systematiske emner. 2) Analysen tager hensyn til arealkompleksets hierarkiske karakter. 3) Analysen gennemføres samtidig med forskellige grader af generalisation.* Fremgangsmåden kan med fordel anvendes ved en række regionalgeografiske studier, men det er tænkeligt, at anvendelse over for andre studieobjekter end de her undersøgte vil nødvendiggøre visse modifikationer af det ovenfor udviklede begrebsapparat.

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Addendum

Since this paper went to press an important theoretical study of regional systems has appeared, namely *David Grigg:* "The Logic of Regional Systems", Ann. of the Ass. of Am. Geog., 55 (3): 465–491 (Sept. 1965).