Omnibusverkehrslinien vorhanden sind, die sich nicht nach den Zentren richten, wie z. B. im nordwestlichsten Teil des Regierungsbezirks; wir wollen diese Zone „das Gebiet ohne Zentren" nennen, worin auf Grund der geringen regionalen Nachfrage und der größten Entfernung von den Zentren jedes Kleinzentrum fast alle notwendigen Dienste leistet.

Die Wandlung des Systems der zentralen Orte beim Vergleich beider Zeiträume

Unter der Voraussetzung, daß in der Einteilung der zentralen Orte nach den praktisch gleichartigen Methoden die ermittelten Klassen von 1873 und der Gegenwart einander etwa entsprechen, wird man die verschiedenartige Wandlung der zentralörtlichen Klassengliederung erkennen. Von den zentralen Orten in der frühen Meiji-Zeit wurden viele zentralen Orte der niedrigeren Ränge bis heute deklassiert, während diejenigen der höheren Stufen großenteils eine Steigerung der Funktionsbedeutung erfuhren. Und auch diejenigen, die seit der frühen Meiji-Zeit neu entstanden, verbleiben großenteils im Rang der niedrigeren Klasse, abgesehen von der Industriestadt Habu, die seit der Einrichtung der Schiffbaufabrik aufstieg.

Bei der räumlichen Betrachtung solcher Wandlungen tritt der auffallende Unterschied zwischen beiden Gebieten hervor; in der zentralörtlichen Klassengliederung im Binnenland, wo es damals viele zentrale Orte der niedrigeren Klasse gab, wurden sie großenteils deklassiert. Dafür entstanden neue Orte der niedrigeren Klasse durch die Umstellung des Verkehrs an neuen Verkehrswegen und als Verwaltungszentren. Im Küstengebiet, wo die Städtedichte schon sehr groß war, wuchsen die Kleinzentren dagegen kaum seit ihrer Deklassierung, obwohl sich die zentralen Orte der höheren Stufe natürlich wie im Binnengebiet zu immer höherer Klasse entwickelten: z. B. in der nahen Umgebung von Hiroshima, Fukuyama und Takehara. Auch finden sich dort mehr Orte der höheren Klasse als im Festlandsgebiet. Dabei ist offenbar, daß sich die zentralen Orte des Küstengebiets, ohne ihre Stufe zu verlieren, zu Trabanten- oder Industriestädten veränderten. Im Küstengebiet wird die Neubildung zentraler Orte und ihr Wachstum entweder von der Industrialisierung oder von der Verstädterung in der Nähe der großen Städte verursacht.

Was die Wandlung der Reichweite der Stadt Hiroshima anbetrifft, so kann man sagen, daß sich ihre Reichweite administrativ sowie wirtschaftlich zwischen beiden Zeiten bemerkenswert erweitert hat.

Bei Betrachtung des Verkehrsbereichs läßt sich erkennen, daß in der Zukunft bei zunehmender Verkehrsverdichtung zum großen Zentrum sich die Zentren marginalen Typs zu Hilfszentren und die heutigen Hilfszentren zu zentralen Orten der niedrigeren Ordnung entwickeln werden, während das Wachstum der singulären Funktionen der zentralen Orte zur Erhaltung und Stärkung ihrer Eigenständigkeit beitragen dürfte.

Die Anregung zu dieser Untersuchung gaben Herr Professor Jiro Yonekura und Herr Professor Kasuke Nishimura, denen wir für ihre wissenschaftliche Beratung zu großem Dank verpflichtet sind. Herr P. Schöller half uns bei der Bearbeitung dieses Aufsatzes.

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REGIONAL AND LOCAL COMPONENTS IN LAND-USE SAMPLING: A CASE-STUDY FROM THE BRAZILIAN TRIANGULO

With 6 Figures and 2 Tables

Peter Haggett

Zusammenfassung: Regional- und Lokalkomponenten bei Landnutzungsaufnahmen: Eine Beispielstudie aus dem brasilianischen Triângulo

An Hand von Karten der Waldverteilung wurden für eine 10 000 qkm große Fläche von Mittelengland eine Reihe ausgewählter Standard-Aufnahmemethoden auf ihren Verläßlichkeitsgrad geprüft. Dieses Gebiet war deshalb gewählt worden, weil seine Walddichte der in Teilen des brasiliani-

schen Triângulo herrschenden entspricht, und außerdem, um daraus einen überprüften Schätzungswert für die durch die Auswahlaufnahme zu erwartenden Abweichung vom tatsächlichen Wert zu gewinnen.

Die Aufnahme wurde in zwei Größenordnungen durchgeführt: regional, an Blöcken von 1000 qkm und lokal, an Blöcken von 25 qkm Größe. Bei der regionalen Aufnahme ergab die Aufnahme, die 4 % der Oberfläche auf der Basis von geschichteten, aber sonst wahllos gezogenen Linien umfaßte, einen durchschnittlichen Abweichungswert von ± 1 %; bei der lokalen Aufnahme, die an Hand von transversalen, wahllos gezogenen Linien durchgeführt wurde, ergab sich ein Abweichungswert ähnlicher Größe. Es wurde daraus geschlossen, daß diese Entwürfe von ausgewählten Aufnahmen genügend genau sind, um im brasilianischen Triângulo angewendet zu werden.

1. The Sampling Problem

During field investigation of a deforested tract of the Serra da Quebra Cangalha in July 1959, the apparent relationship of the few remaining forest stands to a number of variables was noted (Haggett, (1961). However, the small extent of the survey area, some 25,000 acres, and the small number of stands studied ruled out any possibility of reliable generalization. When funds became available for a survey of these forests over a wider area of south-eastern Brazil, statistical testing of these ideas became possible but new logistical problems were posed. Inadequacy of both source material and the size of the area made a complete survey impossible and so some system of sampling seemed indicated.

The survey area (Fig. 1), the southern part of the Brazilian Triangulo, includes a substantial part of the states of Minas Gerais, São Paulo and Rio de Janeiro and covers an area of about 125,000 sq. kms. (48,000 sq. mls.) or an area about a quarter the size of France. It was selected partly because of the strong contrasts in terrain, in soils and in climate (18th International Geographical Congress, 1956) which allowed statistical comparison between a wide range of important local variables, but more particularly on grounds of its distinctive settlement history. Studies by Hueck (1958) for São Paulo and Romariz et al (1949) for southern Minas Gerais have emphasized how deforestation is linked to the history of the mining cycle in the north-east and the plantation cycle, the epoca da cafe, in the Paraíba valley. In the southern Triangulo therefore regional contrasts in settlement history and economic function as well as local contrasts in physical environment are included. However, in casting the net wide enough to test relationships with the greatest possible range of hypothetical "controlling" or "associated" factors, an area too great for complete study had to be included.

A second problem demanding attention was that of source material. While the original survey area had an excellent 1/10,000 map coverage with forest stands clearly demarcated (Serviço do Vale do Paraíba, 1954), maps of the Triangulo as a whole are rather poor. The old 1/100,000 series of the Instituto Geografico e Geologico for São Paulo did not distinguish forests at all, while the parallel but more recently surveyed 1/100,000 sheets for Minas Gerais gave only approximate boundaries and incomplete definitions

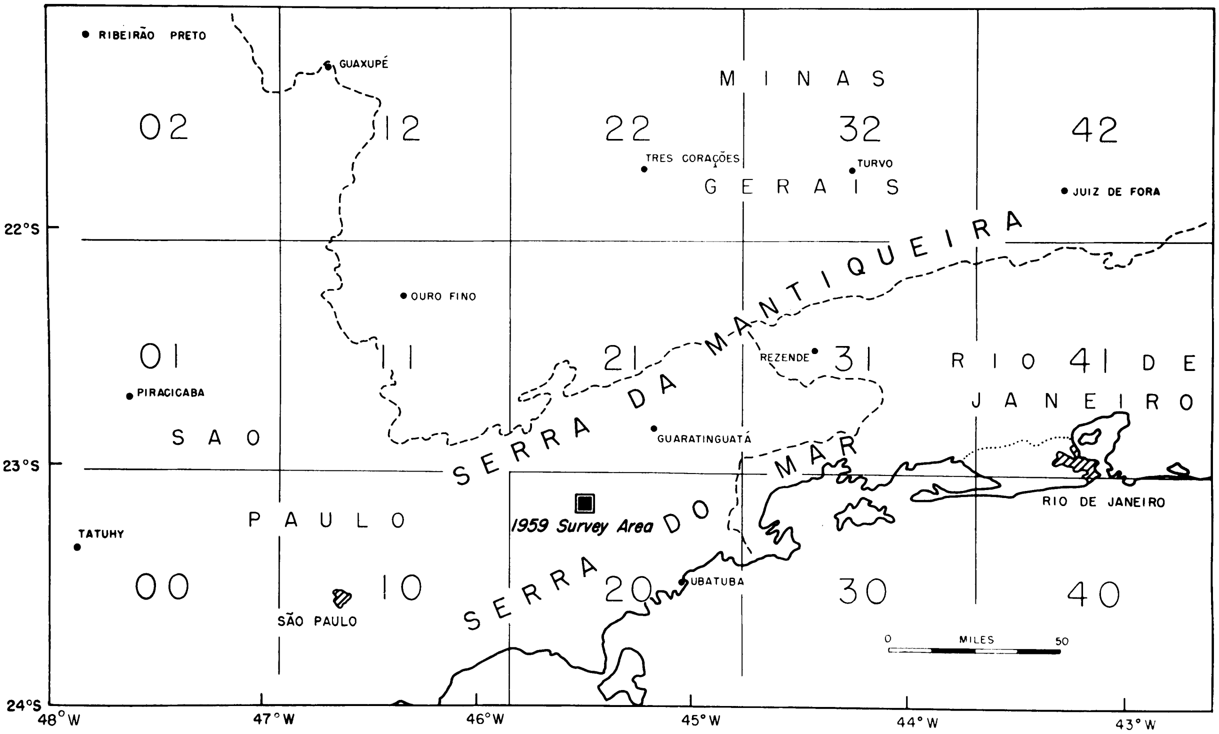

Fig. 1: Survey area, southern part of the Brazilian Triangulo. It is covered by a 100 km. grid system based on an arbitrary origin, 24°S. 48°W

to the types of remaining forests. As a result the only recent standard source locating forest types and areas in the Triangulo was air photo coverage. That used in this study was flown by the United States Army Air Force in 1948 at a mean 1/40,000 scale.

Since both problems (i. e. total area and the several thousand rectified photo-prints) indicated a need for sampling, statistical advice was sought and three standard works on the subject consulted (Cochran, 1953; Hansen, Hurwitz & Madow, 1953; Yates, 1949). These sources indicated that though sampling practice, based on statistical theory, had developed a useful set of working rules these could not be indiscriminately applied to non-normal distributions. Since the writer has established that the distribution of forest stands in heavily deforested areas approximates a gamma distribution[1]) and since most of the distributions to be encountered in the Triangulo were likely to be of this nature, it seemed worthwhile to test a number of standard sampling procedures. For as Cochran had pointed out re-examination helps to avoid the danger of "*... working rules which have been successful in one type of sampling ... being relied upon in quite different types of sampling for which they are not appropriate*" (1953, p. vii). This paper describes the methods used for testing and the results gained. The first part of the paper deals with the selection of sample areas within the Triangulo, i. e. regional sampling: the second with the computation of forest cover within each sample area, i. e. local sampling.

2. Regional Sample Design

In practical terms the problems of selecting sample areas which would prove representative of the whole Triangulo could be resolved into three questions. What sized area should form the basic sampling unit? How many of such units would be needed to give a reliable picture of relationship over the Triangulo? How should the location of units be selected?

Determination of Basic Sampling Unit. The basic sampling unit adopted in this survey was a square cell with 5 km. sides. This unit was chosen on three grounds. First, it was small enough in area (25 sq. kms. or 9.6 sq. mls.) to be contained within one 9″×9″ vertical air-photograph with a mean 1/40,000 scale. Second, it was small enough for field inspection in one day by jeep, yet, thirdly, large enough rarely to be completely forested. Inspection of the Minas Gerais 1/100,000 sheets suggested a smaller sampling cell might often be 100 per cent forested. This was dangerous in as much as differences between such heavily forested areas could not be distinguished and therefore multivariate analysis of results would not be possible. Since the separation of the many factors likely to singly or jointly influence the amount of forests demanded this type of advanced statistical analysis, this third consideration was regarded as the critical one.

A fourth less critical factor but one of practical use was that the 5 km. × 5 km. cell was a convenient divisor of 100 km. × 100 km. A cartesian grid was laid over the survey area and, following National Grid practice, each sample area was allotted an identifying co-ordinate number position (Fig. 1).

Location of Sample Areas. In selecting the location of the sample cells from the whole survey area, a random sampling system was adopted. A full discussion of the theoretical and practical advantages of random sampling against its possible alternatives is available in Hansen, et al (1953, pp. 11—54). Here it is sufficient to note that ignorance of "hidden periodicities" and of "typical conditions" ruled out both systematic and purposeful selection. Similarly, ignorance of significant regional variations in the character and occurrence of forest areas in the Triangulo ruled out the type of preliminary stratification used by Wood (1957) in his study of land-use in western Wisconsin.

In this case major 100 km. × 100 km. blocks of the Survey Area's co-ordinate system were used to divide the area into preliminary arbitrary divisions. This had theoretical advantages in ensuring even regional coverage; at the same time it made the survey area more flexible. By beginning fieldwork at the coast and working inland the survey area could be expanded or contracted (by adding or subtracting 100 km. × 100 km. blocks) as funds and time permitted.

Second, to select the appropriate method for locating the sample cells within each major 100 km. × 100 km. block, two alternative random sampling methods were successively tried out on a Test Area. The Test Area used in this survey is shown in Fig. 2. It forms a 10,000 sq. km. tract of the English/Welsh borderland, largely Shropshire and neighbouring counties. A British test area was chosen first on grounds of convenience, in that the 1/25,000 and 1/63,360 Ordnance Survey maps enabled controlled and accurate analysis of the percentage forest cover in each of its 400 constituent 5 km. × 5 km. cells. Choice within the British Isles was determined by the amount of forest cover. The Border region simulates, in both overall timbered area (approximately 6.8 per cent) and make-up of forest stands, the conditions which the literature suggests are likely to be encountered in the least forested part of the Survey area, in central Minas Gerais. There are strong grounds for expecting a percentage sample survey to be relatively most accurate around 50 % forest cover and least accurate towards the extremes of 0 % and 100 %, where the problem is "*... analogous to that of finding the total number of needles in a haystack*" (Cochran, 1953, p. 36). Since these difficult conditions are met in central Minas Gerais and since the Border control

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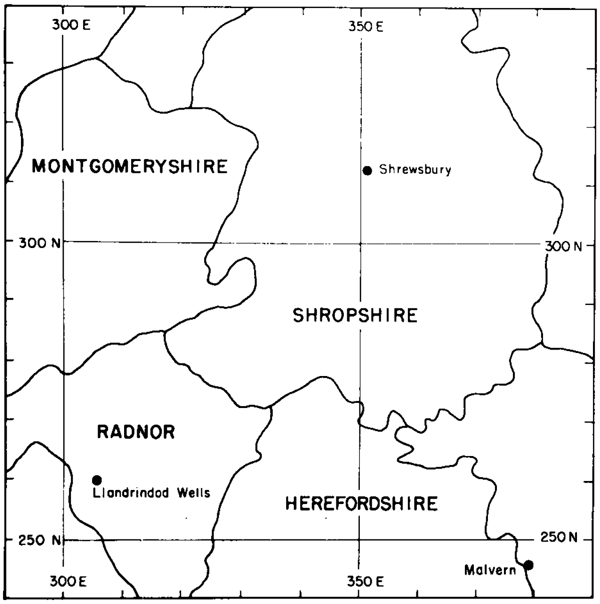
[1]) The Gamma distribution is a non-normal distribution. It is defined by Kendall & Buckland in A Dictionary of Statistical Terms (Edinburgh, 1957) as

$$dF(x) = \frac{e^{-x} x^{\lambda-1}}{\Gamma(\lambda)} dx$$

It is more strongly right-skewed than the normal logarithmic distribution and correspondingly more difficult to transform.

The appropriateness of this form for woodland distribution was established in a series of laboratory cartographic exercises on the English Midlands. This was carried out by the 1960—61 Part I class at the Geography Department, Cambridge.



05	14	03	02	01	03	03	07	05	04	06	06	02	02	06	02	14	06	04	09
08	12	02	00	00	06	07	02	08	03	04	01	00	05	00	06	10	04	02	01
03	05	02	02	01	03	05	08	05	04	05	03	00	02	06	01	02	03	03	02
00	28	16	06	08	06	04	08	03	03	05	01	00	05	04	09	07	13	08	00
00	09	25	04	08	06	01	00	03	09	02	00	03	13	07	07	06	06	10	01
02	02	06	05	18	08	06	13	01	08	02	03	05	05	01	01	15	13	02	02
02	00	03	04	06	08	07	11	01	01	03	07	04	04	39	17	06	19	14	14
03	02	02	12	09	10	06	10	02	07	04	01	04	01	28	27	05	11	08	03
02	05	02	11	08	11	04	08	06	02	03	02	04	03	07	18	15	05	03	00
12	03	02	06	03	03	01	03	06	11	04	02	06	04	10	05	07	04	04	13
04	08	05	06	07	16	09	07	10	03	09	06	14	02	11	05	08	09	13	05
04	10	02	01	00	07	07	01	24	11	06	08	02	05	04	03	24	18	08	06
02	05	00	04	00	06	07	01	09	28	04	05	05	05	11	01	50	35	05	10
02	00	07	12	04	02	04	11	10	27	07	25	04	01	09	15	08	09	02	01
11	05	04	03	04	12	23	05	06	11	25	23	06	04	07	10	07	12	07	06
10	01	04	04	01	00	13	14	16	10	09	01	05	01	11	06	12	03	04	09
01	09	08	03	03	01	05	06	12	02	05	03	02	07	06	18	14	03	02	00
08	07	13	04	01	01	04	05	04	11	03	19	20	10	04	05	26	05	03	03
09	12	09	02	02	04	05	04	04	09	27	14	01	02	08	08	14	12	21	01
02	01	04	05	05	08	13	08	10	07	06	04	01	11	11	12	13	07	03	07

Fig. 2: Test Area: the central section of the Welsh/English borderland.
The first map shows the location of the 100 km. × 100 km. area in terms of the National Grid. The second shows the percentage forest cover in each 5 km. sample cell within this area

area simulates these conditions, it is arguable that satisfactory performance of a sampling system in the Test Area ensures a minimum level of accuracy over the remaining more heavily forested blocks of the Triangulo.

A number of trial runs in the Border control area were made using the two types of sampling frames shown in Fig. 3. Each consists of 32 cells (i. e. an 8 % or 1 : 12½ sample) and in each the co-ordinates of selected cells were drawn from a table of random numbers (FISHER & YATES, 1957, p. 126). The difference between the two methods is that in the first random sampling is "free" while in the second random sampling is "stratified". Stratification consists of division of the major block into 16 minor blocks, each 25 km. × 25 km. Only first two cells drawn from each block are included in the sample and the sample cells are regularly distributed between minor blocks but fully random within each minor block.

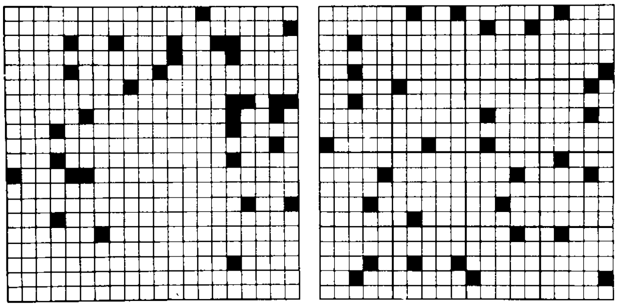


Fig. 3: Test Area: Location of the 32 sample cells.
In the first map, the location is fully random: in the second, the location is stratified random. The "strata" or "blocks" are shown by heavier lines

Three runs of each method were made in the control area, and the results are shown in Table 1. They show that the estimated sample means (x) for each run of 32 cells deviates from true mean (X) of 6.8 per cent by an appreciably greater amount in the case of the unrestricted random sample Following SCHUMACHER & CHAPMAN's (1942) argument we can say that since the squared standard deviation (S^2) for the unrestricted samples was 2.17 and that for the stratified sample was 0.81, and since the ratio of the former to the latter is $\frac{2.17}{0.81} = 2.68$, the stratified method is over twice as accurate as the free method. This means that to gain as accurate an estimate by free random sampling, the number of cells sampled would have to be raised to 85, i. e. a 21.5 % or 1 : 5 sample. A stratified random sample using the minor block divisions was therefore adopted in the Survey Areas.

Number of Sample Units. Since the 32 cells originally used in the test runs had been based on a rule of thumb guide for minimum optimum sample size (HANSEN et al, 1953, pp. 284 ff.) it was necessary to test this assumption. Inspection of the results of the three stratified runs used in Table 1 showed that when the estimated mean (x) was computed from successively greater sample sizes (Fig. 4) its accuracy increased. This increase was not evenly maintained however and after some 12 to 15 cells had been measured the three curves stabilised somewhere between 5.8 and 7.8 per cent levels, within ± 1 % of the "true" mean (X).

Comparison of the accuracies derived when the original number of cells were halved or increased by half (x_{32}, x_{16}, x_{48}) suggested that no striking increase in accuracy was obtained at higher levels. The 16 cell system (i. e. 4 % or 1 : 25 ratio sample), was there-

Table 1

Comparison of runs in the test area using alternative regional sampling designs

Unrestricted random design				Stratified random design			
$\bar{X}$	$\bar{x} - \bar{X}$		$(\bar{x} - \bar{X})^2$	$\bar{X}$	$\bar{x} - \bar{X}$		$(\bar{x} - \bar{X})^2$
	+	—			+	—	
8.1	1.3	—	1.69	6.2	—	0.6	0.36
5.5	—	1.3	1.69	6.2	—	0.6	0.36
8.0	1.2	—	1.44	7.3	0.5	—	0.25
Total	2.5	1.3	4.82	Total	0.5	1.2	0.97
	$-3d^2$	— 0.48			$-3d^2$	— 0.16	
	s^2	2.17			s^2	0.81	
	s	1.47			s	0.90	

fore adopted, as giving a remarkably accurate estimate, with its mean within ± 1 %, of regional forest cover within each major block.

3. Local Sample Design

Determination of the local forest cover within each sample cell posed the second major problem. Use of the conventional area-measuring instrument, the Compensating Polar Planimeter, proved extremely tedious when tested on the Border region: the large number of forest stands in each cell (< 40), and errors in transfer and arithmetic made the use of this method inappropriate when the scale errors on the air-photograph were taken into consideration. Three rapid methods of area determination using random methods were therefore tested on the Control area (Fig. 5).

Method A: Point Samples. Each 5 km. × 5 km. cell was allocated a co-ordinate system so that numbered points could be drawn at random from a table of random numbers. The number of points was successively doubled: from 10, through 20, 40, and 80, to 160. For each of these five intensities the number of points falling on forest stands were noted, summed and expressed as a percentage of the total number of points to give percentage forest cover.

Method B: Block Samples. Each 5 km. × 5 km. cell was divided into 64 equal blocks and each block was given an identifying number. The number of blocks drawn using a table of random numbers was successively doubled: from 1, through 2, 4, and 8, to 16. For each of these five intensities the amount of forest within each block was estimated to the nearest quar-

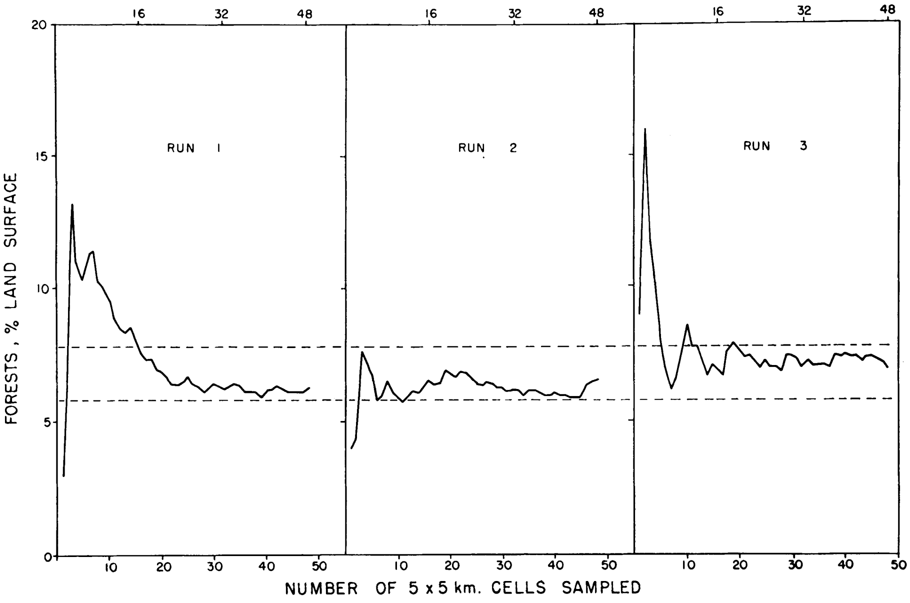


Fig. 4: Test Area: Means of the first 1, 2, 3 ... 48 cells sampled for three trial runs using the stratified random method

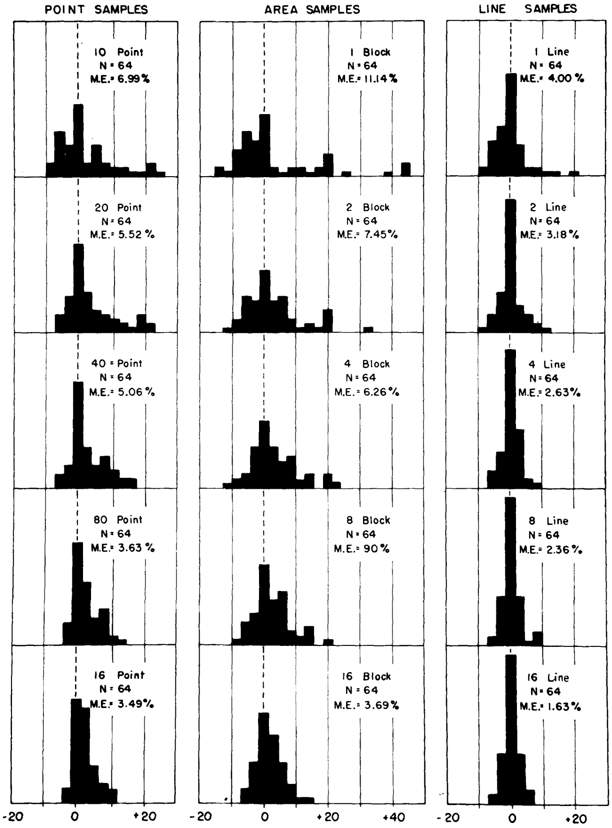


Fig. 5: Test Area: Histograms of alternative local sampling techniques.
N = Number of observations; M. E. = Mean error

ter, summed and expressed as a fraction of the total block area to give percentage forest cover.

Method C: Line Samples. Each 5 km. × 5 km. cell was crossed by a series of parallel latitudinal lines drawn by random numbers from the co-ordinate system used for Method A (above). The number of lines drawn was successively doubled: from 1, through 2, 4, and 8, to 16. For each of the five intensities the length of the line running through forest stands was measured, the total lengths summed and expressed as a percentage of the total lines to give percentage forest cover.

Figure 5 compares, through the use of a series of frequency histograms, the estimated forest cover using the three sampling methods at their five intensities with the "true" forest cover. This latter figure was derived by computing the forest area of each cell from a fine cartesian grid measuring to the nearest 0.1 %. Vertical comparison of the form of the histograms down the columns (summarized by the mean error) shows the gains in accuracy with change in sampling intensity, while horizontal comparison above the rows indicates difference in accuracy with change in method.

Since differences in method are of kind rather than quantity their significance is difficult to interpret. To overcome this difficulty and to reduce the three methods to a common yardstick, each of the 960 measurements within the 64 cells plotted in Fig. 5 was timed with a stop watch. The results are summarized in Table 2. They indicate that the mean time taken by each method increases expectedly with the five levels of intensity, I II... V, and is inversely related to the mean error.

Table 2: Time Efficiency of Local Sampling Methods
[Seconds*) / Cell]

	Sampling intensity				
Methods	I	II	III	IV	V
A: Points/Sampling	4	6	9	11	18
B: Areas/Sampling	2	4	4	7	12
C: Lines/Sampling	6	9	15	28	54

*) Rounded to nearest second.

To gain a valid measure of the usefulness of the various methods tested, accuracy as measured by the mean error (Fig. 5) and efficiency as guaged in seconds/cell (Table 2) were fused into one diagram. Fig. 6 plots the values for mean error (Y) on a logarithmic scale, against time in seconds (X) also on a logarithmic scale. For each method the values follow a recognizable trend, which is here approximated by the method of least squares to log-log regression lines superimposed on the graph. Comparison of the slope of the three lines as measured by the three regression coefficients, 0.54, 0.46 and 0.33, suggests that great increases in sampling intensity beyond thos chosen would be unlikely to bring worthwhile gains in accuracy. Comparison of the positions of the lines indicates that Method C, line sampling, yields succesively more accurate results for a given expenditure in time.

To bring the accuracy of the local sampling method to a level comparable with the regional design (< 1.0 %, mean error), the regression equation log Y = log 6.76 — 0.33 Y was used. This suggested that a mean error of 1.0 % should be obtained by increasing the sampling intensity to c. 40 lines (with a mean time of 150 seconds, i. e. $2^1/_2$ minutes).

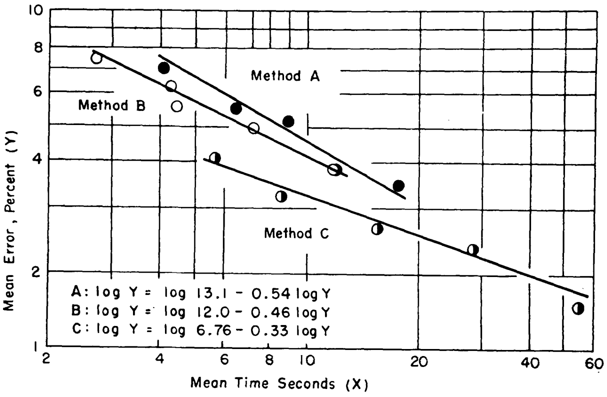


Fig. 6: Test Area: Regression analysis of the efficiency of the three basic methods at different intensities.
The scale along both co-ordinates of the graph is logarithmic

4. Conclusions

This paper has reported the results of a sampling study of forest cover in which a number of standard sampling methods were applied to a Test Area (England/Wales border) which simulated the most difficult conditions likely to be encountered in the Survey Area (the Brazilian Triangulo). On the basis of these results the following designs were adopted:

a) Regional Level: A 4%-cover survey with sixteen sample areas drawn from each 100 km. × 100 km. block on a stratified random basis. Mean error < ± 1.0 % forest cover.

b) Local Level: Forty sampling lines to be drawn transversely across each 5 km. × 5 km. sample area on a random basis. Mean error < ± 1.0 % forest cover.

Collection of data at the third level, i. e. field level, within each sample cell has not been treated in this paper. The techniques at this scale have already been firmly established in the ecological literature (Goodall, 1952) and will follow in general terms the methods used earlier by the writer in the Fortaleza basin.

By using a sample design in land-use studies, cost and field time is less than with a complete census and therefore (i) a wider area can be tackled, and (ii) a greater range of hypothetical relationships tested. The particular methods used here were adopted empirically from the wide range suggested by sampling theory; by this token, they do not lend themselves to automatic adoption in related surveys unless it can be shown that the distribution studied is similar in character to those of the forest areas studies here. On the other hand, the approach used here may, it is hoped, stimulate more refined studies where similar problems of coverage and research funds have to be balanced.

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„DURCH DIE RECHE UND FUHREN ...“

Methoden der Wüstungsforschung anno 1709

Gerhard Hard

Für die landschaftsgeschichtliche Forschung, vor allem für die Wüstungsforschung, hat neben der archivalischen Überlieferung seit einiger Zeit auch das fossile ackerbauliche Mikrorelief eine große Bedeutung gewonnen; eine ehemalige Beackerung gibt sich in vielen Fällen „durch die Raine, die meist deutliche Steilstufen im Gelände bilden, (oder) durch die Furchen, die die alten Ackerbeete getrennt haben“ (H. Mortensen und K. Scharlau 1949, S. 304), deutlich zu erkennen.

Die Benutzung der genannten Mikroformen als Indizes reicht indessen mindestens bis zum Anfang des 18. Jahrhunderts zurück. Der Zeitpunkt dieser frühen Belege ist nicht zufällig:

Nach den „landesverderblichen Kriegen“ und den Entvölkerungen des 17. Jahrhunderts waren in der Westpfalz Wald, Rottbusch (Rodbusch) und Ackerland der „vormaligen guten Zeit“ (a) auf weite Strecken kaum mehr zu unterscheiden (b). Im Zweibrückischen bemühte sich die Herrschaft, die zunächst ungehemmt ausgreifende Rodungslust ihrer Untertanen in obrigkeitlich erwünschten Grenzen zu halten; die Landschaft vor den Wirren des 17. Jahrhunderts sollte diese Grenzen im großen und ganzen vorzeichnen. Der Rekonstruktion dieser historischen Landschaft, in praxi der ehemaligen Verteilung von Feld, Rottbusch und Wald, unterzogen sich die herrschaftlichen Geometer, deren Tätigkeit sich so darstellt als ein Teil jener „landesplanerischen“ Initiative der Herrschaft, welche wir in dieser Zeit vielerorts antreffen und die J. Vogt prägnant als „réaction seigneuriale“ und „réaction forestière“ gekennzeichnet hat (c).

Den Bemühungen der Geometer um die vergangene und zukünftige Landschaft verdanken wir einen erhaltenen Rest von Archivmaterial, aus welchem wir den Landschaftszustand des beginnenden 18. (und, indirekt, auch des beginnenden 17.) Jahrhunderts sowie die landschaftsgestaltenden Tendenzen der „réaction seigneuriale“ erschließen können; außerdem aber führen uns diese umfangreichen Protokolle auch die Arbeitsweise der herrschaftlichen Beamten vor Augen: Sie benutzten sowohl archivalische Nachrichten als auch die unter Wald und Rottbusch erhaltenen Ackerspuren.