PSSC Library

ISSN 0031-7551

PHILIPPINE GEOGRAPHICAL JOURNAL

VOL. XXVII JANUARY-JUNE, 1983 NUMBERS 1 & 2

ARTICLES

PUBLISHED QUARTERLY BY

The PHILIPPINE GEOGRAPHICAL SOCIETY
And The NATIONAL COMMITTEE
ON GEOGRAPHICAL SCIENCES, NRCP
MANILA, PHILIPPINES

CamScanner

The Council of the Philippine Geographical Society

Officers for 1981-1983

DOMINADOR Z. ROSELL, *President*
DOMINGO C. SALITA, *Vice-President*
DOROTEA M. CORPUZ, *Secretary*
AURORA S. TOLENTINO, *Treasurer*
ARTEMIO E. GESMUNDO, *Director*
FELICIANO M. LAPID, *Director*
PATERNO SANTOS, *Director*

Fellows, Philippine Geographical Society (FPGS, 1980)

PROF. ARTURO P. ALCARAZ
PROF. DOMINADOR Z. ROSELL
DR. DOMINGO C. SALITA
DR. RAMON L. SAMANIEGO
No. of Life Members (Feb. '82) — 43

Honorary Members

BRIG. GEN. GUILLERMO PECACHE (1979)
DR. CELSO R. ROQUE (1979)
DR. ONOFRE D. CORPUZ (1980)

Geography Awardees

DEAN EMERITUS FLORENCIO TAMESIS (1975)
DR. FILEMON C. RODRIGUEZ (1980)
DR. GERARDO P. SICAT (1980)

The Philippine Geographical Journal

DOMINADOR Z. ROSELL, *Editor-in-Chief and Business Manager*
FELICIANO M. LAPID, *Assistant Business Manager and Editorial Consultant*
LYDIA PARAISO-ORDOÑEZ, *Managing Editor*
AURORA S. TOLENTINO, *Assistant Editor*
DOROTEA M. CORPUZ, *Assistant Editor*
MANUEL P. POLIQUIT, *Circulation Assistant*

Contributing Editors

REV. MIGUEL M. VARELA, S.J.
Representing Div. I, NRCP
DR. DOMINADOR CANLAS
Representing Div. II, NRCP
DR. ANDRES L. REYES, JR.
Representing Div. III, NRCP
PROF. BIENVENIDO T. MIRANDA
Representing Div. IV, NRCP
DR. JOSE VERA SANTOS
Representing Div. V, NRCP
DR. MELITON U. ORDILLAS
Chairman, Div. VII, NRCP
DR. TEODORO M. SANTOS
Representing Div. VIII, NRCP

——oOo——

Neither the *Society* nor the *Journal* assumes responsibility for the statements of fact or opinion by authors.

The *Philippine Geographical Journal* is published quarterly by the Philippine Geographical Society and the National Committee on Geographical Sciences (NCGS), National Research Council of the Philippines (NRCP) and is sent to all members of the Society.

Subscription Rates: Philippines, per year — — — ₱10.00
Foreign countries, per year — US$10.00

Single copy, regular issue, local — ₱2.50; foreign — US$ 2.50
special issue, local — ₱5.00; foreign — US$ 5.00

All remittances should be payable to the *Philippine Geographical Journal.*

Editorial correspondence should be addressed to The Editor-in-Chief, *Philippine Geographical Journal*, P.O. Box 2116, Manila, Philippines.

Business correspondence should be addressed to the Business Manager, *Philippine Geographical Journal*, P.O. Box 2116, Manila, Philippines.

Re-entered as second-class mail permit at the Manila Post Office on July 5, 1963.

PSSC LIBRARY

The
PHILIPPINE GEOGRAPHICAL JOURNAL
VOLUME XXVII **January-June, 1983** **NO. 1 & 2**

WHY DO A GEOGRAPHY DEGREE? THE CHOICE OF GEOGRAPHY IN HIGHER EDUCATION[1]

by

ROGER LEE

I. INTRODUCTION

One of the most unfortunate aspects of education in Britain is the information gap which remains between the intending undergraduate and the diverse range of opportunities in higher education. All too often vital decisions about higher education — decisions which may well dominate not only the career but the subsequent life-style of the student — are taken at random and without sufficient knowledge. The purpose of this publication is to try to narrow the gap, or to build a bridge across it, with respect to one degree subject — geography. The intention is not to provide yet another compilation of information (see Appendices 1-3 for details of information available) but to set out principles which may aid the systematic *use* of the information.

In 1979 (the last year for which comprehensive figures are available) over 4,000 students enrolled to read geography in the universities, polytechnics and other institutions of higher education offering a degree course in the subject. This figure is representative of experience over recent years. Each year the Universities Central Council on Admissions (UCCA) classifies degree subjects according to changes in the number of applicants to university courses. For the past few years geography has remained in that group of subjects showing "little or no change". This is not surprising because, despite far-reaching changes in the school curriculum and in the wider economic environment, geography remains a strong, core subject in school and a degree in geography opens a wide range of courses and opportunities both during and after higher education. In universities the number of geography graduates has remained similarly stable over the past few years (figs. 1 and 2) and has accounted for between 3 and 3.5 per cent of the total

[1] From Queen Mary College, University of London, Department of Geography Special Publication. Printed with request from the author. (SEE PAGE 36)

CamScanner

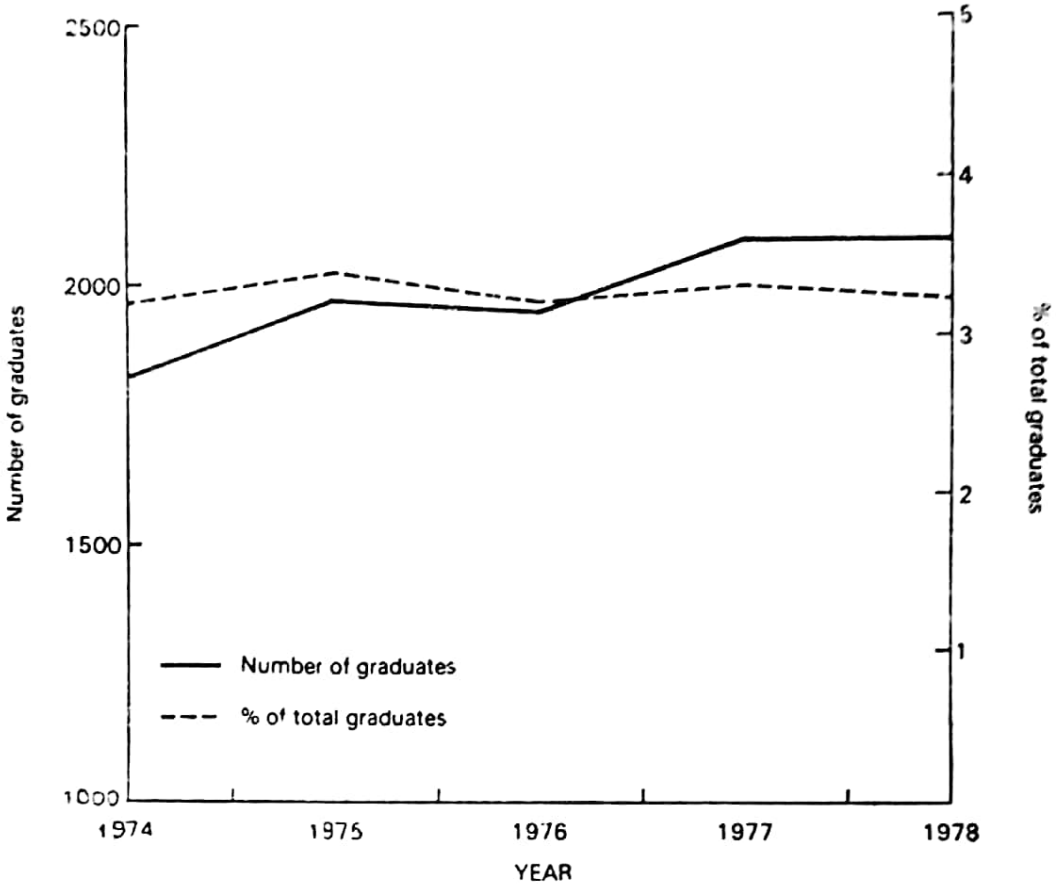

Figure 1: University graduates in geography, 1974-1979.

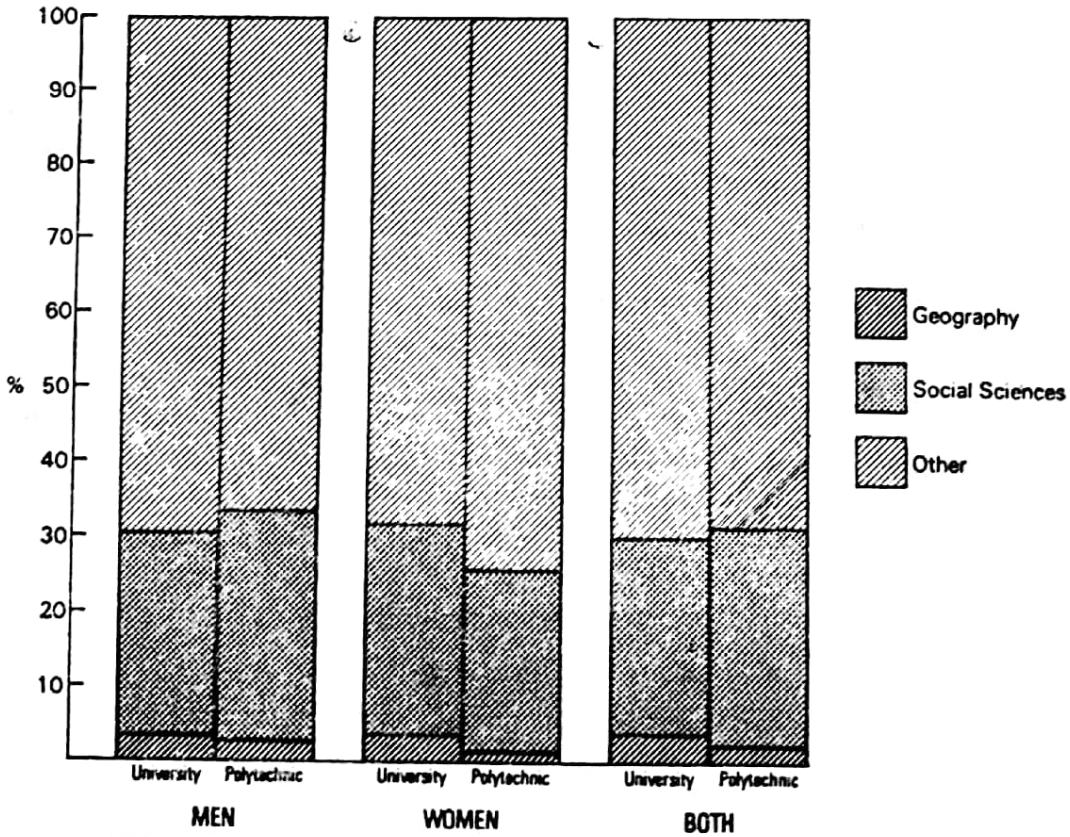

Figure 2: Graduates from universities and polytechnics.

number of university graduates. In terms of the number of its graduates geography is one of the most important degree subjects, ranking seventh for women and eleventh for men in a classification of well over 100 subjects for which information is available.

In making the transition from school to higher education there are four major decisions which need to be made by the prospective undergraduate. The first of these is, perhaps, the most fundamental and concerns the question of whether or not to embark upon a programme of higher education. A degree may or may not 'pay' in the narrow sense of enabling the graduate to earn a higher income over a life-time of employment. Certainly the full-time undergraduate must forsake several years of earning power in order to study. It may then take a considerable increment of income over and above what may have been earned without a degree to compensate for that initial loss and, indeed, for the loss of work experience. What is beyond question however is that higher education exposes the undergraduate to a unique and highly influential social and educational experience with many subsequent 'pay offs' both within and beyond the work place (see parts II_1 and II_4 below).

The second decision concerns the discipline to be chosen for study to degree level. So often this decision almost seems to be taken for granted; it is frequently a non-decision made in the absence of alternatives rather than for more positive reasons. What sort of criteria, then, should guide and constrain the initial highly personal range of preferences and interests? Why should the student choose one discipline as opposed to another? The answers suggested in part II_2 of this publication concern one particular discipline — geography — and relate to the nature of the discipline itself, its relationship to the processes and purpose of education and to the world beyond the seats of learning.

The third decision relates to the choice of institution in which to study for a degree. There are over 80 institutions offering a degree course in geography in the United Kingdom (see fig. 3) and there is a very wide range from which to choose. Part II_3 of this publication sets out a range of criteria which may aid choice. The criteria listed do not include what would be a spurious distinction between different types of institution. Rather a number of more fundamental characteristics is suggested which, if used in the ordered manner described, should produce a rationally-chosen short list to which applications may finally be made.

The fourth decision involves a consideration of the career opportunities which are available to and have been followed by geography graduates. The range of careers is very wide indeed: geography, it seems, either creates or attracts highly adaptable minds. The occasional misrepresentation of geography as a degree subject which does

CamScanner

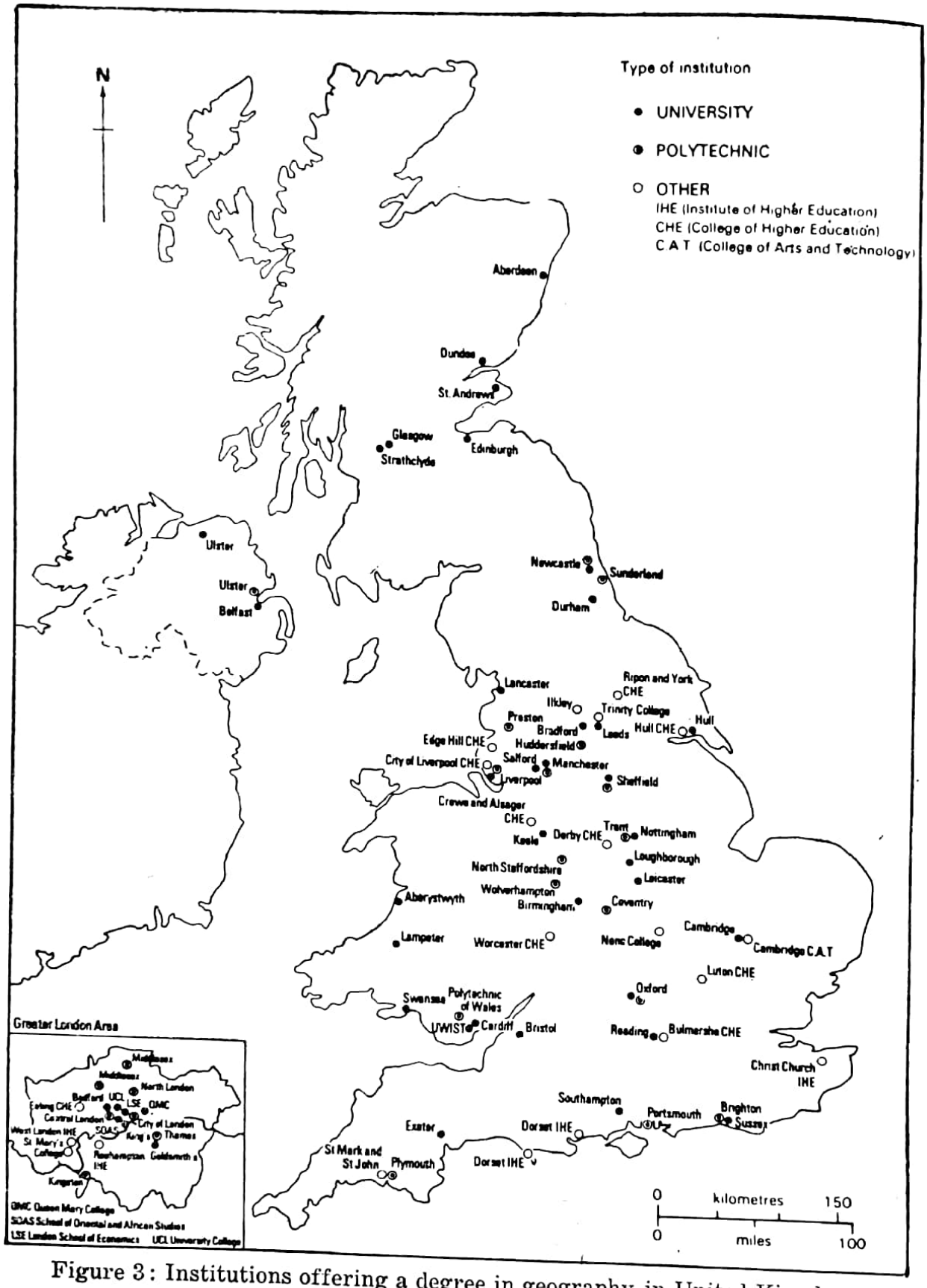

Figure 3: Institutions offering a degree in geography in United Kingdom.

not offer attractive career prospects is a myth born largely out of an ignorance of the nature of geography as a discipline and of the skills that it imparts. This brings us back to the second of our decisions — why geography? But before going on to consider that issue in some detail it is necessary briefly to discuss one over-searching question — why higher education?

II. THE FOUR DECISIONS

1. *Why higher education?*

The ability to plan a course of action or to implement an idea is one of the most fundamental of human characteristics. It helps to distinguish human beings from the rest of the animal world. The possession of this ability does not mean of course that humans can simply do what they please. We are all bound by the nature of the society in which we live, the level of its development and its lines of authority and to execute it according to a pre-determined plan means that human beings *are* capable of thinking rationally, constructively and critically about the world in which they live. Higher education is concerned essentially with the development of this capability.

At one level higher education in contemporary Britain may be seen as the means whereby individuals are trained to fill the jobs created by a socially and technically complex society. The notion that education should heighten critical awareness is regarded, from such a perspective, as at best wasteful and at worst dangerous. Higher education, the argument runs, should be a form of vocational training and should help to satisfy the demand for highly-qualified labour. This seems to be an extremely limited and limiting view. Recognizing that human society is not predetermined — is not a constant — we must also recognize that we as human beings have made society what it is. We have actually made our own world and we are also responsible for ensuring that it continues to be made. This implies that we must be capable of recognizing the problems and deficiencies in society and of setting about to remove or to reform them. It means that we must be capable of fundamental criticism in order to design alternative futures.

If as human beings we are not capable of guiding our destinies in this way then our future looks grim. Higher education is capable of both of heightening our critical awareness of the major threats to survival and of designing and promoting alternatives. Looked at in this way it is difficult to understand how such a view of higher education may be regarded either as dangerous or wasteful. It is, in fact, the only constructive way in which we can help to secure a future for ourselves and our descendants.

So higher education has a dual and contradictory role. On the one hand it should help to provide its students with the intellectual,

CamScanner

social and physical skills necessary to cope with the world as it is. On the other hand higher education should provide an awareness to facilitate both criticism and the means whereby proposals for change may be argued and described. Higher education, then, offers far more than a meal ticket. It is essentially a creative process and it is in this creative spirit that the decision to continue an education beyond 16 and, even more critically, beyond school — at whatever age — should be taken. The contradiction within higher education may, however, present itself to the individual. Made aware of the deficiencies of society does she or he simply ignore them, in the apparently self-interested business of making a living; or, alternatively, does he or she confront the deficiencies and act upon them in an apparent spirit of altruism? The point of higher education should be to make it clear that such a dichotomy of interests is, in fact, illusory. Understanding this is part of the process of education itself, whereby we learn to recognize contradictions and strive to create the conditions in which they may be overcome.

2. *Why geography?*

Just as the world and its inhabitants are complex, so too is the range of knowledge developed to begin to cope with their complexity. The number of disciplines studied to degree level in institutions of higher education reflects this complexity and the intending undergraduate is therefore faced with a bewildering array of subjects and courses from which to choose. The range of choice extends from the seemingly advanced but *relatively* simple physical sciences and their more practical applications in technology and engineering, through the more complex and hence less well developed environmental and medical sciences, to the most complex but least well developed study of humanity itself in the arts and social sciences. How might a course of study be chosen from such a range of human enquiry?

The answer must lie first in a realization of personal abilities and predilections and secondly in a rational assessment of each subject or combination of subjects. How can we assess geography in this way? The first thing to say is that the geography beloved of quiz programmes with its obsessive interest in accounts of places and environments lies far removed from the academic discipline. This is not to say that knowledge of places is not valuable in itself. Commercial advantage and colonial exploitation were greatly assisted by such knowledge and the tradition of description has aided the development of geography as an analytical discipline. Geography today is concerned to discover the ways in which environments, societies and places actually work and to suggest ways in which they may be made to work more effectively. It is, in other words, concerned with the analysis of social and environmental processes. Its deep and detailed descriptive knowledge of the

CamScanner

variability of societies and environments helps to set it apart from other analytical social and environmental sciences.

Description is an essential first step towards an understanding of process but contemporary geography is concerned less with the *description* of the geographical variability of weather, for example, than with the nature and operation of the complex physical processes that drive the atmosphere to produce weather; it is concerned less with the description of patterns of agricultural land use than with the *analysis* of economic and social processes that underpin the patterns; it has less interest in cataloguing glacial landforms than in the inference of the processes of glacial erosion and deposition that may be derived from such features; and its concern lies less with the geographical distribution of population than with the social and economic influences which affect family and community structure.

The list could go on but it is important to emphasize that geography retains its traditional concern for environment and culture. Thus, unlike economics for example, geography cannot adopt universal concepts like all-knowing and perfectly-able economic man to understand the operation of social process as the very logic of geography insists that human beings are diverse and complex. Geography cannot take a narrow, strait-jacketed view of the world but must embrace and develop ways of understanding which can cope with the complex interrelations between people, societies and nature.

Thus geography is not only analytical but is also synthetic. It is analytical in its concern for the operation of social and environmental processes and synthetic in the sense that its traditional concern for the variability of place forces it to recognize that processes cannot be investigated in isolation from the particular context in which they occur. Furthermore geography also recognizes that people in different kinds of society perceive and use natural environments in different ways. Thus, although people must always be able to use natural resources in a productive manner in order to survive, the ways in which they use resources and their recognition of which resources are of use are conditioned by the type of society in which they live. An example may help to clarify this point and show how geography is both analytical and synthetic.

A major problem in regions of dry-land agriculture is the effect of drought conditions upon the security and regularity of food production. Assuming that large-scale climatic modifications are impracticable, a solution to the problem may be found in an examination of variable effects of drought upon different soil types and the possible responses in terms of alternative agricultural practices. The soil scientist may investigate the relationship between drought and soil by using internationally-developed and accepted practices of scientific classifica-

CamScanner

tion, experimentation and analysis. The recommendations which follow may well appear, from such a scientific perspective, to be perfectly logical and clear.

Yet the problem is far more complex than this. The use of the soil by the indigenous cultivators may have evolved from deep-seated cultural and agronomic practice related in turn to social norms and to a well-understood ecological balance learned from experience. Certainly recent evidence has shown that the agriculturists' perceptions of their problem are extremely subtle. They are based upon a highly sensitive and comprehensive classification of soils related to the complex and directly relevant conditions of their own cultural and agronomic practice rather than to an international, scientifically-agreed set of principles. It is a classification based upon *use* rather than upon scientific universals.

Recommendations for changes in practice which derive simply from pure science are not good enough and will more than likely fail as the use of the soil is not a purely scientific practice and cannot be understood by highly developed but necessarily abstracted scientific principles. It is as much a cultural as an environmental process and it provides a clear example of the complex ways in which society intervenes and mediates in the relations between people and nature. It is the job of geography to unravel this complexity and in so doing constantly to emphasize the diversity of the real world and to reject simplistic interpretations based upon essentially limited scientific practice. Such diversity is not only worth recording or preserving in its own right but holds out alternatives to society in the future.

None of this is to imply that geography is not a rigorous scientific discipline. In fact quite the contrary is true as the complexity of the real world demands a severe rigour. What it does suggest is that the variable relations between people, society and nature cannot be reduced to simplistic science. As a result geography must necessarily conceive of problems in the round, must be sensitive to interconnections; must, in short, be synthetic as well as analytical.

This dual character of geography demonstrates quite clearly the weakness of the conventional distinction between vocational and non-vocational education and the advocacy of one rather than the other. Such a distinction is the product of the narrow-minded view of education described above. What the example outlined here shows is that geography is a discipline which is analytical in approach and necessarily teaches a set of analytical skills, but which is not prepared to impose a simplistic methodology upon a complex problem. As a result, it cannot claim the direct practical relevance of many applied sciences, in which the discipline may be directed at a particular range of problems, but in

a sense that is its great strength. Its concern is with the interconnections within and between the social and environmental worlds. Geography does involve training in numerical, problem-solving and literary skills but geographers are forced always to recognize the limits of their skills and to use them in critical and sensitive manner. Geography may not necessarily offer a specific set of applicable skills but it does provide a broad first training in a wide range of techniques. Specialization brings training in more closely-defined analytical methods, problem solving and the assessment of alternative courses of action.

Whatever the extent of specialization, geography inherently enables an appreciation of social and environmental complexity and dynamism. As a result it provides a flexibility to cope with change. This flexibility is likely to be invaluable over the next few decades during which changes in jobs and occupations may occur with increasing frequency. Under such circumstances a narrow, purely vocational training is likely to prove more of a handicap than an aid, whereas the flexibility of mind induced by a broadly-based training in the study of problems conceived in a complex manner will be of great benefit. Furthermore the amount of enforced non-work time is also likely to increase dramatically. The breadth of interests necessarily confronted by geography will provide a means whereby this "free" time may be used in a constructive manner. The growth of outdoor recreation, for example, is one product of the reduction in work time and has contributed towards a burgeoning interest in landscapes and landscape history. A geographical education provides a means whereby the immediate experience of landscape may be enhanced and deepened through a knowledge of its development and contemporary significance.

3. *Where geography?*

Choosing *where* to read a degree is almost as complex a decision as that involved in choosing which degree to read. There are 41 university departments teaching geography and about 20 departments in polytechnics running single-subject degree courses. In addition it is possible to read geography singly or in combination with other disciplines at many universities and polytechnics and at about 20 other institutions of higher education. Despite the substantial amount of comparative information now available (see Appendix 2) the decision on where to study is still frequently made on the basis of hearsay, a limited range of personal recommendations, chance and a selection of other non-educational reasons.

Perhaps the most effective way to make a decision would be to draw up a shortlist of alternatives based upon an ordered range of specified criteria. Faced with such a wide choice of departments and institutions many people tend to draw up a first list based primarily upon the geographical location of the institutions themselves (see fig. 3)

CamScanner

and then to select from amongst this list. Such an initial emphasis upon location may mean either that other more critical characteristics of the chosen institutions are ignored — which could lead to subsequent disaffection — or that many institutions (and hence courses) are simply dismissed and left unconsidered. An alternative approach would be to adopt a hierarchical system of criteria (table 1) so that the broadest possible spectrum of departments is included initially on the basis of the more important criteria and the not unimportant consideration of their location used as a means of drawing up a final shortlist to which applications may subsequently be made.

Table 1 is largely self-explanatory but a number of comments on its use may be helpful. First, the criteria listed within it are ordered in broadly decreasing order of academic importance. However the ranking of criteria is, of course, a highly personal matter and the table is not intended to imply that the range of criteria listed at the top should necessarily outweigh those at the bottom. Rather the intention is to increase the awareness of alternative criteria that should be considered by the prospective applicant so that the number of lost or ignored opportunities is reduced to a minimum.

TABLE 1

A hierarchy of criteria for assessing departments of geography

Criteria	*Sources of Information*
I. Quality of the Department	
Status of degree (internal, external CNAA); (see fig. 4)	1 4
Size of department (students, staff and staff/student ratio); (see table 2, figs. 5 and 6)	1 2 4
Departmental activities, seminars, etc.	1 2 3 6
Departmental involvement in research, research projects	2 6
Publication by members of staff	1 2 5 6
Departmental publications: Occasional Papers series, etc.	2 6
Size and range of research school (see fig. 7)	1 2 4 6
Careers advice and graduate experience	3 6
Existence and activities of student geographical society	2 3 6
Organization of open days/interviews	6
Involvement of department with local area	2 3 6
Opinions of undergraduates	3 6

II.	*Courses**					
	Range of courses in geography	1	2		4	
	Range of courses in other disciplines	1	2		4	
	Degree of compulsion/freedom of choice	1	2	3	4	6
	Extent of specialization possible	1	2	3	4	6
	Evidence of a well-structured progression of courses	1	2	3	4	6
	Possibility of sandwich courses	1	2			6
	Opinions of undergraduates			3		6
III.	*Teaching Methods*					
	Number of staff-student contact hours			3		6
	Range of teaching methods (lectures, seminars, tutorials, formal, informal)		2	3		6
	Advising, monitoring and tutorial system	1	2	3		6
	Size of teaching groups					6
	Practical classes and fieldwork	1	2			6
	Opinions of undergraduates			3		6
IV.	*Examinations and Examination Methods*					
	Range of methods (conventional written papers, course work, continuous assessment, project work, oral assessment, etc.)	1		3		6
	Contribution of each year to final result	1				6
	Criteria for pass/fail	1				6
	Criteria for honours degree	1				6
	Criteria for entry to 2nd, 3rd (and 4th) years	1				6
	Opinions of undergraduates			3		6
V.	*Institutional Framework*					
	Type of institution (university, polytechnic, other; collegiate or unitary)	1			4	
	Institutional structuring of courses	1	2			
	Size of institution	1			4	
VI.	*Teaching Facilities*					
	Lecture rooms, laboratories and equipment	1	2	3		6
	Access to computing facilities	1	2	3		6
	Libraries	1		3		6
	Field Centres		2		5	6
	Space for informal/social meetings	1	2	3		6
	Opinions of undergraduates			3		6
VII.	*Entry Requirements*					
	Normal 'A' level grades required for entry	1				6
	Attitude of department to failure to achieve grades requested					6
	Ratio of number of applicants to first year entry				4	6
	Attitude of department to ranking on UCCA form					6

CamScanner

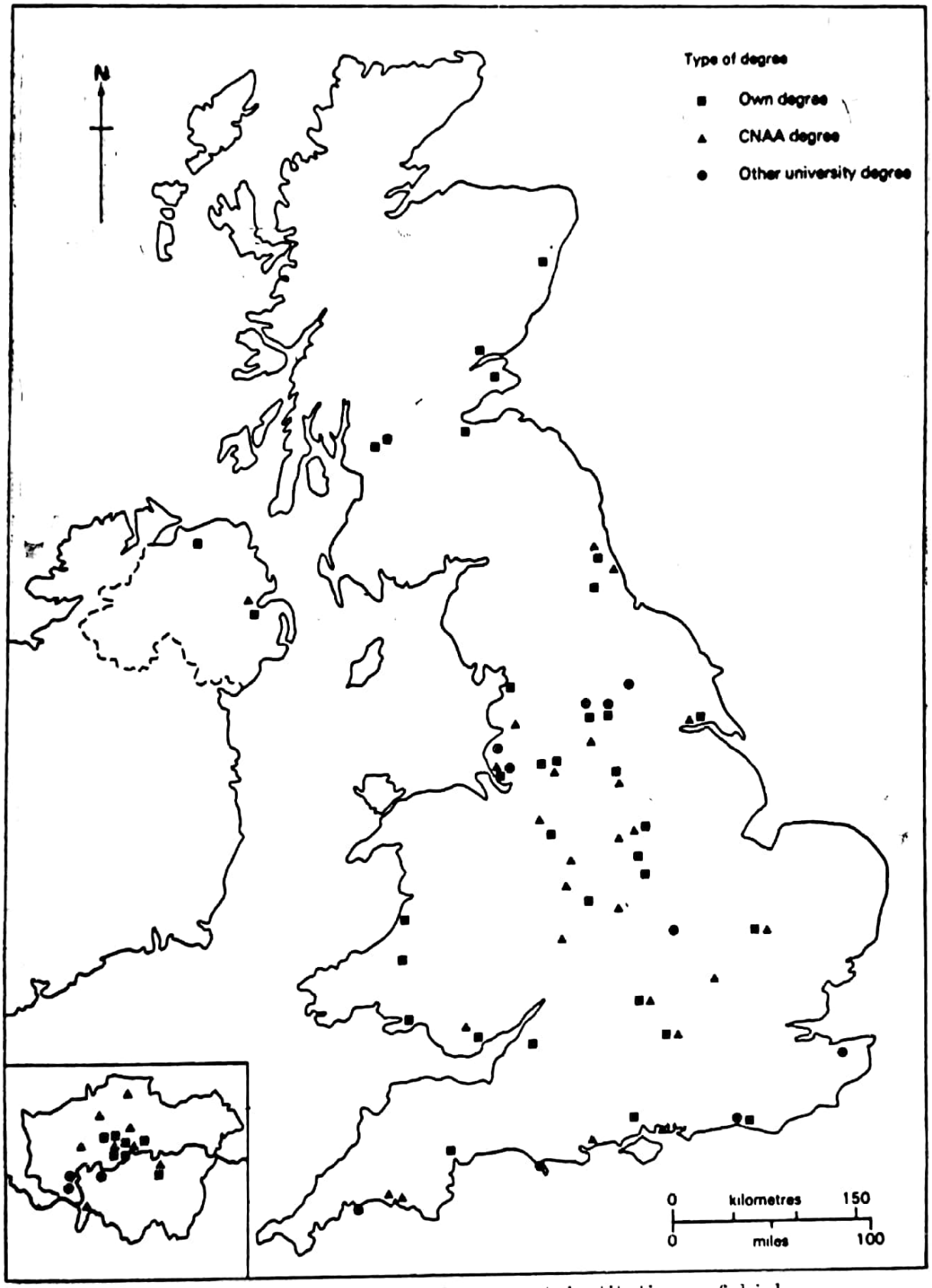

Figure 4: Status of geography degrees at institutions of higher education.

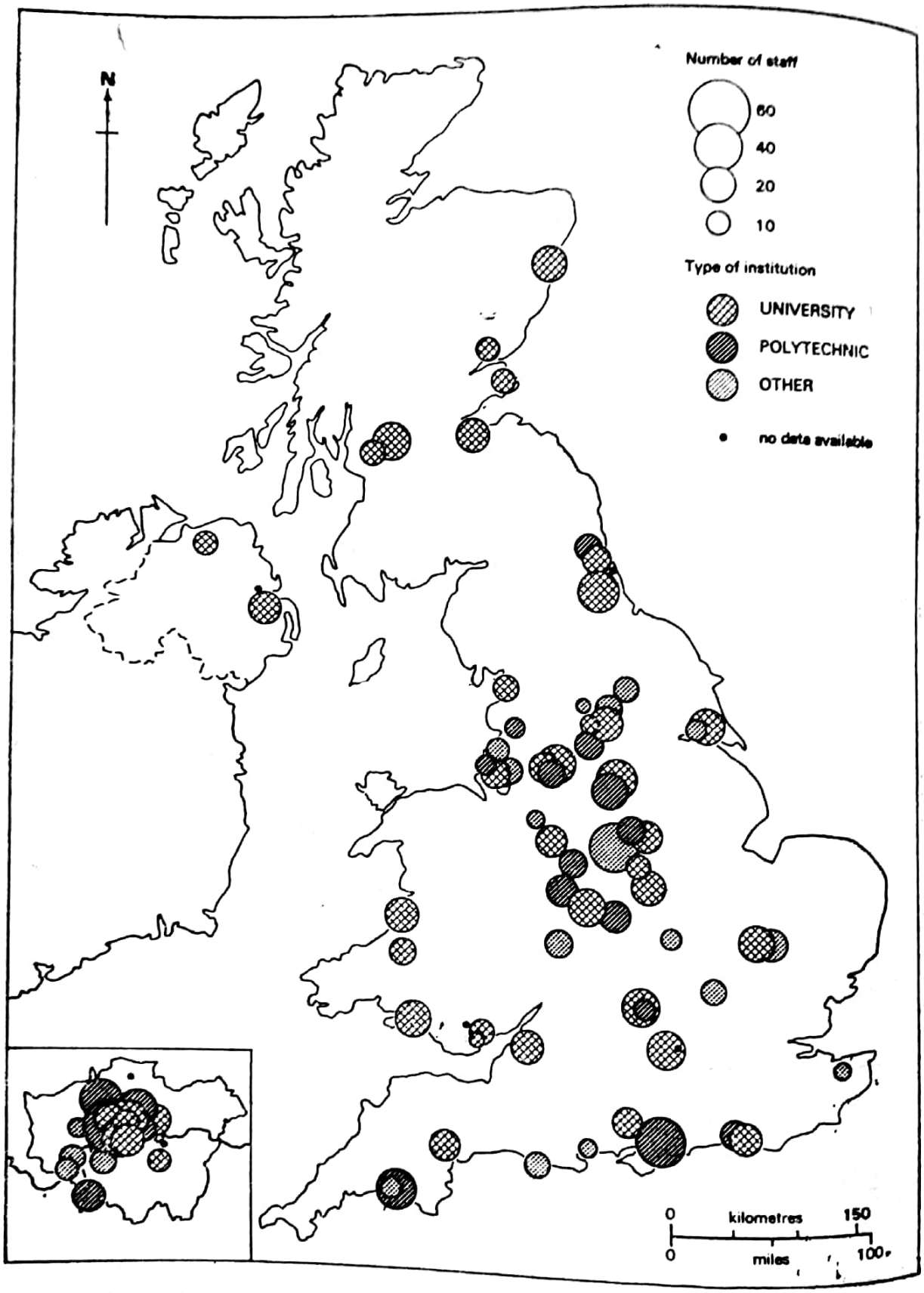

Figure 5: Size of departments offering a degree in geography.

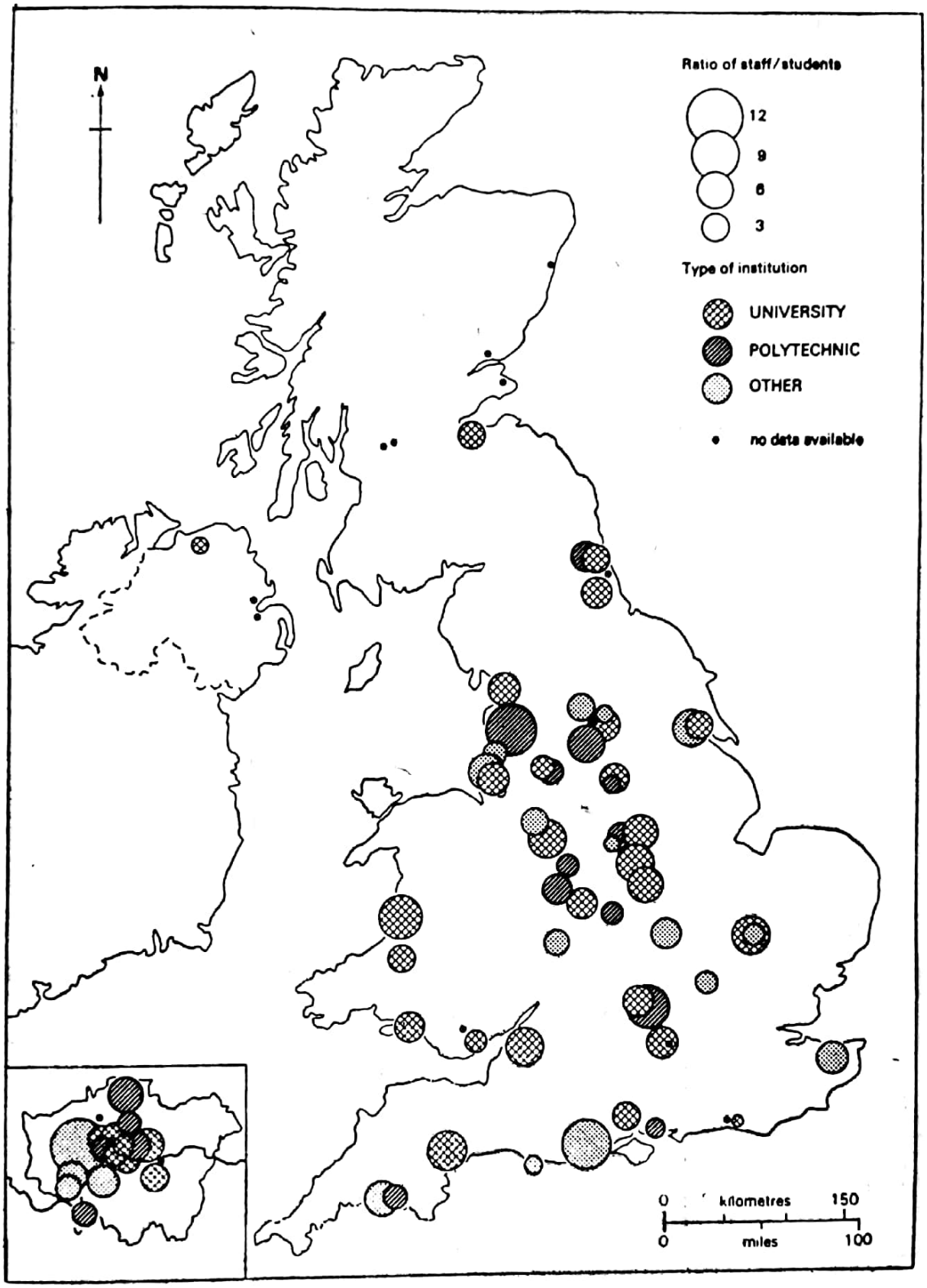

Figure 6: Staff/intake ratios in department of geography, 1979.

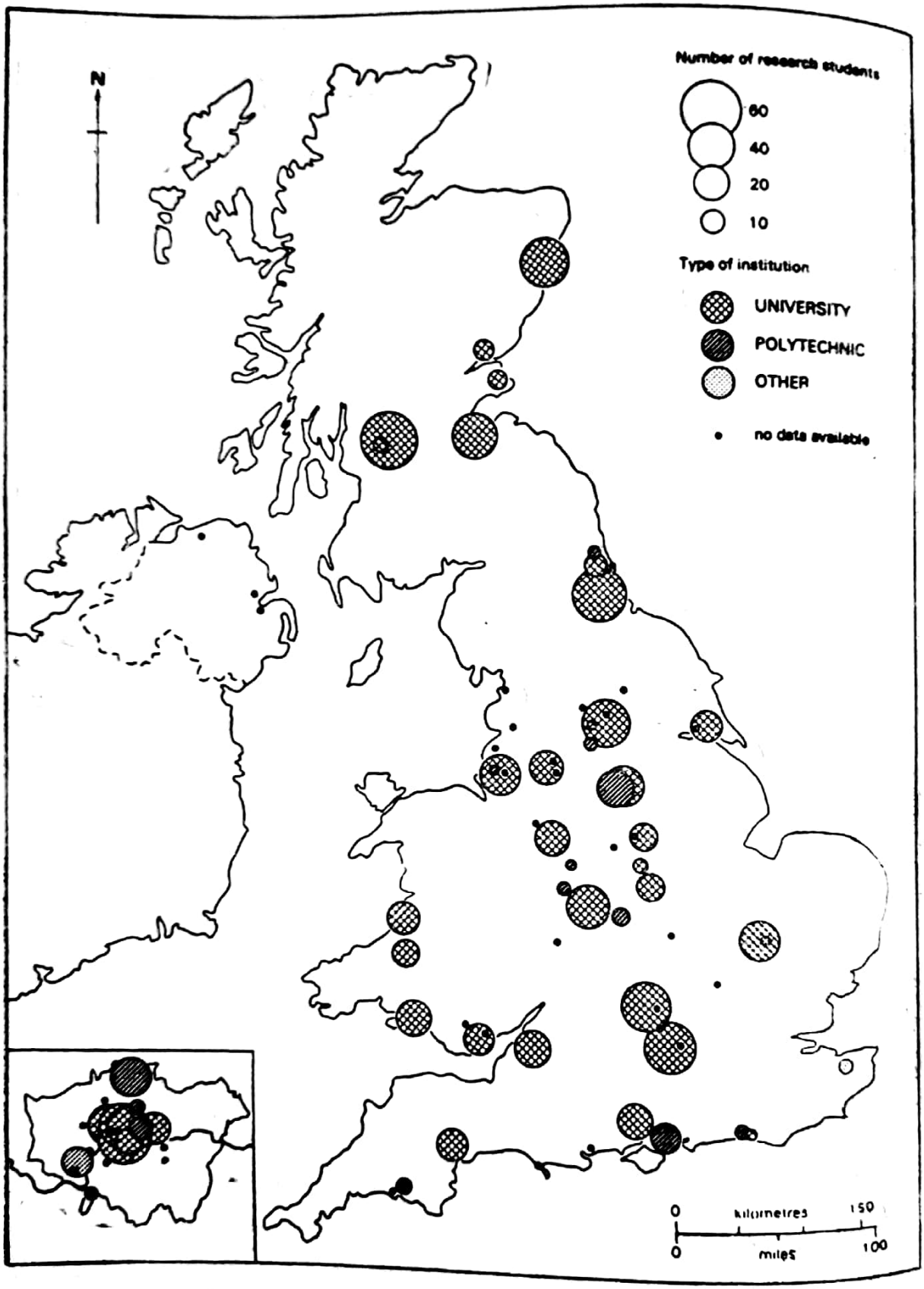

Figure 7: Size of research schools in department of geography, 1979.

In the case of the flexibility of course choice, for example, (section II of table 1) there are, at one extreme, institutions in which a three or four year degree course is highly structured with little scope for individuals to opt for courses of their choice until a limited amount of flexibility is introduced in the final year. Before choosing to apply to such an institution it would be necessary first to consider whether this kind of rigidity is acceptable and secondly to decide whether it offers the opportunity to study the range of courses of particular personal interest. At the other extreme are institutions which recognize that course choice is as much an educational experience as the courses themselves and which, in consequence, allow complete freedom of course choice both within and beyond geography. In such institutions the undergraduate builds a personal degree course based upon individual interests and aspirations.

The same kind of considerations would apply to an assessment of teaching methods (section III of table 1). These may vary from a highly-formalized approach based largely upon lectures to an informal structure dominated by small-group teaching and a high level of student input. Once again personal preference must prevail in the choice to be made but the point is to be aware both of the significance of the effects of teaching methods upon the personal process of learning and understanding and of the great variety that exists from department to department. Whichever method is preferred it is critical to assess the effectiveness of the system for monitoring the progress of the undergraduate. Examination methods (section IV of table 1) also vary greatly between institutions. Again it is important for the prospective applicant to find out whether the system prevailing at each institution under consideration is dominated by formal written examinations at one extreme or course work and continuous assessment at the other and to match the system to personal preferences and abilities.

A third point to bear in mind when using table 1 is that whilst much of the information is, as indicated, readily available in published sources some may be acquired only by personal research. Simple research in the *Commonwealth Universities Yearbook,* for example, would provide the names of individual members of staff in each institution and these might be matched with their research interests as revealed in their publications. In a similar fashion it may be possible to measure the productivity of departments in terms of the authorship of books and articles.

Information of this sort is not impossible to find but it is difficult to acquire from any source other than the departments or institutions themselves. This is where open days and interviews are so important for they may be used by the applicant as a means of interviewing the institution as much as the latter uses the interview to assess the applicant. The interview or open day can provide subjective but critical

CamScanner

information about the sort of people, both students and teachers, in the department. The conduct of the open day can provide an insight into how well organized a department may be and into its degree of involvement with its undergraduates and research students. Provided that the interviewee asks the right questions, interviews and open days may also provide a range of information which would otherwise not be available.

To make best use of the opportunity offered by an interview or open day the applicant should find out as much about the institution as possible before attending for interview. This is far more important than so-called interview technique for the most important thing to achieve in an interview is to project a lively, interested and informed attitude towards the department and course on offer. The interviewee should, of course, be able to demonstrate a knowledge of, and interest in, the discipline for which application has been made and should be aware of the major teaching and research interests of the department in question. This is why preparation is vital. Background knowledge may also help to deflect aggressive questioning by the interviewer as well as giving a clear indication of a well organized applicant. Certainly the interviewee should not be ruffled by an aggressive interviewing technique, should readily admit to ignorance whenever appropriate and should ask for the clarification of questions when necessary. All of this is made much easier with the self-confidence which stems from thorough preparation.

Of course it may be inconvenient or wasteful of possible choices to use an application merely to discover that the chosen place is not suitable. Many of the answers to questions which may be obtained only from the department or institution itself could be acquired by writing, telephoning or arranging an informal visit before application is made (see Appendix 2b for addresses). Schools and careers officers themselves could help in this process of research by feeding the experience of applicants and undergraduates into a data bank. Such a source of information would need to be kept up to date and regularly checked for misleading personal impressions. It would, however, be very helpful in providing information about the attitude of departments to their ranking on the UCCA application form, the flexibility or otherwise of the offers made to applicants, or the meaning to be attached to a particular offer (does an offer of two Es imply a good student or a department desperate for applicants?) and so on. Again, personal research before applications are made should try to provide answers to these questions so that they may be fully incorporated into the final application. UCCA itself produces its own guide for applicants to universities and details are provided in Appendix 2c.

Given the enormous range of information that needs to be acquired and used when applying to read for a degree course it may be helpful to follow a plan of action in setting about the task of obtaining and

structuring the data ultimately to be fed into an application. Such a plan may be organized in the following way:

1. Consult publications giving comparative information about departments/institutions offering the subject(s) chosen for study (see Appendix 2).
2. On the basis of criteria selected in an appropriate sequence from table 1 (or a personal set of criteria) make an initial list of departments/institutions to which an application may be possible.
3. Obtain prospectuses/brochures from all departments/institutions in this initial list; these may be available in schools.
4. Reconsider the initial list of "possibles" in the light of this further information. A classification of "good", "satisfactory" and "poor" might be used for each criterion at each department.
5. With reference to table 1 (or a personal set of criteria) itemize the information on the revised list of departments/institutions which is still not available and contact these departments to gather this information.
6. Using the full amount of information available make out a short list of departments/institutions to which applications will be made.
7. Apply to this short list using a rank ordering of preferences in line with the criteria used to select the short list.
8. Attend open days/interviews and use these occasions to further extend the knowledge of departments/institutions.
9. Accept offers from those departments/institutions that come closest to fulfilling your own requirements.

The use of such a plan of action and of a set of criteria like that listed in table 1 will not necessarily produce the perfect match between student and department, but it should enable a closer fit than might otherwise have been possible. It may also help to reduce wasteful mistakes and wasted applications as well as opening eyes to possibilities that may have been left unconsidered. It should, in any case, help to make the applicant better prepared for the selection procedure and for the subsequent experience of higher education.

It may also be of assistance if an applicant fails to meet the A-level entry requirements set by departments which have made conditional offers. In such a case and provided that the minimum university entry requirements have been met the candidate for entry to a university is automatically fed into clearing scheme by UCCA. However UCCA is unable to advise on the availability of places in universities and the applicant is expected to be able to indicate to which departments and institutions he or she would prefer an application to be sent in the

CamScanner

clearing process. The most effective way of acquiring details of unfilled places at this late stage is to telephone prospective departments but prior knowledge of them will greatly facilitate this procedure. Of course the earlier an application is made under the clearing scheme the more likely it is that a place on an appropriate course may be secured.

Late applications to polytechnics and other institutions of higher education may be made directly to the institutions concerned until the early part of October for entry the same year. Again prior knowledge of the institutions and course on offer may ease and quicken an application and increase the chances of admission. The Higher Education Advisory Centre (see Appendix 4 for address), in conjunction with *The Observer* newspaper, offers a clearing scheme for late applicants to polytechnics, universities and other institutions of higher education.

4. *What use is a geography degree?*

It should be apparent already that the essential characteristics of geography as an academic discipline provide for a wide range of opportunities upon completion of the degree. Many doors are opened — at least in part — and very few, outside the directly vocational courses of training, are closed. However it is unfortunately true that well-founded information and advice about the usefulness of a degree in geography for a career is in short supply and is often downright misleading. This section attempts to provide some realistic advice and suggestions based on what geographers have actually done in the past and are doing at present. What they may do in the future is a matter for conjecture but it is clear that, if the experience of the past and present is any indication, they will continue to penetrate an ever widening field of employment opportunities.

Setting out on a career is rather like stepping into one of a number of interconnected boxes. Before starting work the individual can see only dimly into a small number of these boxes (or jobs) and has no idea of their internal size (the range of opportunities presented) or the number of connections with other boxes (the subsequent opportunities which may arise). Starting work involves entering one of these boxes and, once the individual is in a job, new career opportunities present themselves (now boxes become apparent) which could not possibly have been known before work was begun. These new opportunities may or may not be taken up, but the point to emphasize is that thinking about careers does not stop with the first job acquired by the individual. Rather new opportunities develop as the job itself develops and it is up to the individual actively to accept or reject these opportunities.

It is true that geography is, in some senses, less directly vocational than most of the ten degree subjects accounting for a higher number of male graduates — mathematics, law, physics, medicine, engineering (electrical, civil and mechanical), chemistry, economics,

history — and the same is true of law, psychology and medicine — three of the six degree subjects with more women graduates than geography. As a result the number, but certainly not the range, of opportunities for geographers *as* geographers is less than it would be for say lawyers, medics or engineers. But the number of "geographical" careers — those careers using the specific skills acquired from a degree in geography and used to solve geographical problems — is less limited than is often assumed and their range is impressive (see examples in table 3). Leaving aside research and teaching, the Royal Geographical Society estimates that about 10 per cent of all geography graduates take employment or further training directly related to geography although other estimates put the figure at more than 16 per cent. Adding in teaching and research would push these proportions to around 30 per cent.

In fact geographers are involved in an ever widening range of employment. Some years ago a geographer, fresh from university, went to work for a firm of brewers and was given the job of choosing locations for several new pubs. His automatic response was to draw a series of maps of what he considered to be the relevant variables affecting site selection and the choice was quickly and profitably made. His employers were so impressed with these unsuspected power of analysis that he was promoted immediately and sent on courses where his 'powers' could be developed. And yet, of course, he was applying a very simple geographical technique. This example and the career case histories summarized in table 4 show in a very direct way the potential of a geographical training in the labour market, a potential that can be exploited by geographers as they continue to break ground in careers. The reasons for this potential (both realized and latent) may be found, as we have seen already, in the nature of geography as an intellectual discipline. Founded increasingly upon a basis of theory, geography retains its traditional emphasis upon the complex interrelationships between phenomena and is characterized increasingly by internal specialization.

These developments have occurred for purely academic reasons but they are exploited by the economy and this is reflected in the growing number of firms specifying a degree in geography as a particularly desirable qualification. In addition, an even larger number of firms include geography amongst a range of degree subjects in which they are interested. Perhaps more significant than either of these observations is the fact that recruitment literature often starts by describing opportunities for specialists and ends up with a section on 'graduates of any discipline' for marketing, sales, production, and finance. In fact this last category is probably the largest in terms of both the number

CamScanner

TABLE 3

Some "geographical" careers

(excludes teacher training, further research or academic training)

Planning and planning research. This normally entails professional training, especially for local and regional planning. Professional body: —Royal Town Planning Institute.

Local	e.g.	local authorities; private practice
Regional	e.g.	Metropolitan Counties; National Parks
National	e.g.	central government departments (especially Department of Environment); Scottish Development Department
European	e.g.	EEC; OECD; European Cultural Foundation
International	e.g.	UN; World Bank

Landscaping architecture. Requires further professional training Professional body: — Institute of Landscape Architects. Opportunities in local and central government, private practice, large-scale industry.

Private and public research. Entails at least a good first degree, if not post-graduate research experience. Opportunities exist in:

Central government departments, Hydraulics Research Institute, Institute of Hydrology, water authorities, Meteorological Office, Transport and Road Research Laboratory, Building Research Station, Nature Conservancy, National Agricultural Advisory Service, Countryside Commission, National Trust, Council for the Preservation of Rural England, Economist Intelligence Unit Ltd., Milk Marketing Board, Office of Population Censuses and Surveys, British Museum.

N.B. Some of these organizations also offer non-research posts.

Surveying, cartography and photogrammetry. Normally requires at least 'A' level mathematics, a specialized first degree and/or a post-graduate qualification.

Surveying	e.g.	Directorate of Overseas Surveys, Ordinance Survey, private practice
Cartography	e.g.	George Philip, Clarendon Press
Photogrammetry	e.g.	Hunting Surveys and Consultants Ltd., Fairey Surveys Ltd.
Specialized map-making	e.g.	Soil surveys of England and Wales and of Scotland

CamScanner

TABLE 4

Career case histories of geography graduates

Ms. A	Entered with A-level geography and biology; graduated with a lower second; became a geophysical assistant with a petroleum exploration company; now a manager in same company.
Mr. B	Entered with A-level geography, art and mathematics; specialized in social and economic geography and graduated with a lower second; took a postgraduate teaching diploma and worked for several years as a team-teacher in a new town school; now an executive with Marks and Spencer.
Ms. C	Entered with A-level geography, English and French; secretary to Geographical Society, organized expedition to Mexico; graduated with a lower second; after research in Civil Service joined BBC local radio; now compares a national news programme.
Ms. D	Entered with A-level geography, French and English literature; specialized in socially orientated courses; graduated with a lower second; went on VSO to Laos and Cambodia and returned to take a qualification in social work; now working in Northern Ireland.
Ms. E	Entered university as a mature student and graduated with a first; appointed to a university lectureship for two years and then became a marketing executive with the hotels division of British Rail.
Mr. F	Entered with A-level geography, economics, geology and history; specialized in geomorphology; third year included a College expedition to Greenland; graduated with a first; now doing polar research from a Cambridge base.
Mr. G	Entered with A-level geography and mathematics; graduated with a lower second; after a series of jobs in industry and the Civil Service became a rural surveyor working for a firm of auctioneers and surveyors.
Mr. H	Entered with A-level geography, history and English; specialized in economic and social geography; President of Geographical Society in third year; graduated with a third, became advertising manager for a property magazine and then a motoring journalist.
Ms. J	Entered with A-level geography, history and mathematics; specialized in social and applied geography and pursued an active career in student politics; graduated with an upper second and was appointed to establish a group to liaise between finance and planning within a local authority.

CamScanner

of vacancies and the variety of jobs that it offers. Because of the range of skills that it imparts, a geography degree is a particularly useful qualification for such jobs.

The case histories demonstrate these points (table 4). The wide range of academic and career experience represented by these graduates of the Department of Geography at Queen Mary College and the frequency with which a change in career direction has taken place are very noticeable. In all cases these changes are the result of serious decisions and their fundamental career implications indicate the extent to which individual geographers seem suited to the frequent changes of labour-skill demanded by the contemporary economy. Many predict that it will become increasingly common for individuals to have to change their careers three or four times throughout their working lives. It is already true that state manpower policies now emphasize the relationships between education and the labour requirements of the economy and the need to facilitate occupational mobility rather than to cushion the effects of the changing demand for labour. The old distinction between vocational and non-vocational courses — not applicable to geography in any case — is clearly shown to be damaging and limiting in this particular context.

So what kind of jobs do geographers do? Almost 50 per cent of geography graduates from universities and polytechnics in the United Kingdom go directly into employment on graduation whilst less than 15 per cent proceed to teacher training and about 10 per cent go on to further academic study (figs. 8 and 9). Of the geography graduates entering directly into employment, 64 per cent go into industry and commerce (fig. 10). This figure of 64 per cent for geographers compares with a figure of 56 per cent for all graduates taken together and clearly indicates the 'relevance' of geography to wealth creation. Perhaps the most telling statistic relating to the entry of geographers into industry and commerce is that concerning women geography graduates. Discrimination remains a major problem for women in the labour market but it appears to be far less of a problem for women geography graduates than for other women graduates. The proportion of women geography graduates going into industry and commerce from universities in the United Kingdom is almost twice that for all women graduates taken together.

Such a statistic says much about the relevance of geography as a qualification for the world beyond the ivory tower. The scientific basis of a training in geography and the ability of the geographer to look at a problem in the round combine to make the geography graduate a

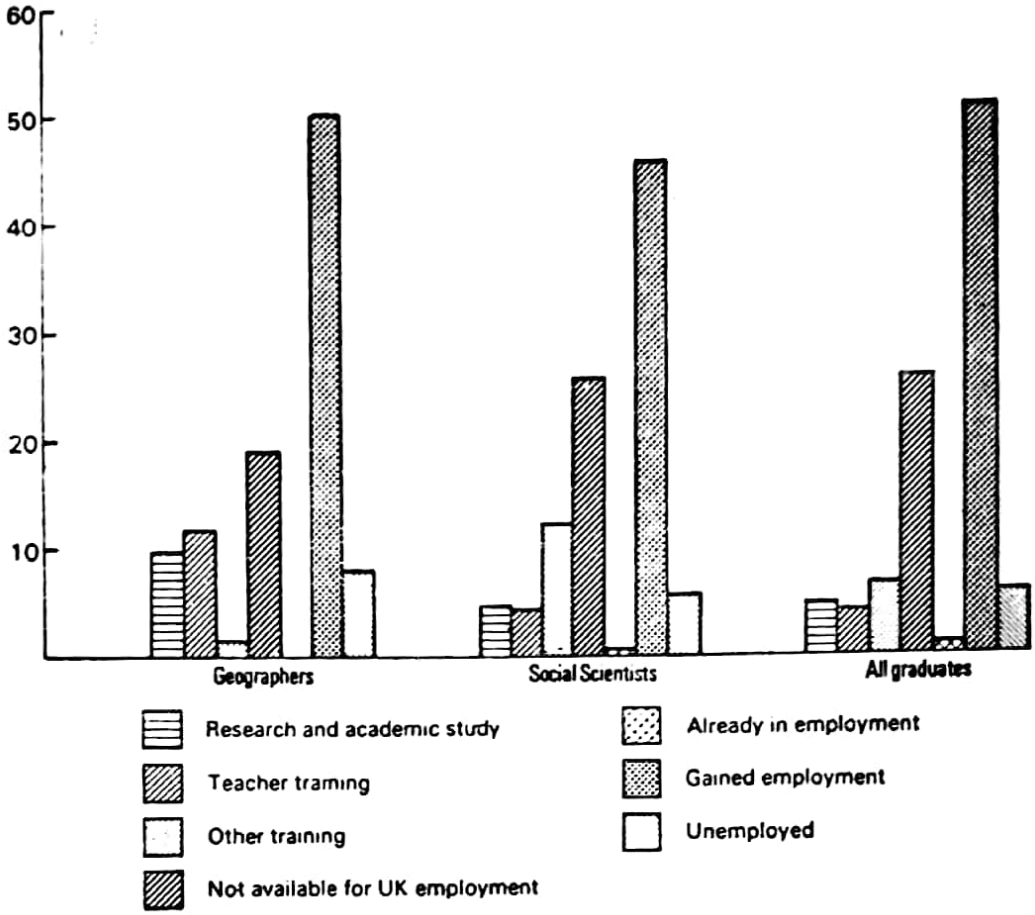

Figure 8: First destination of university graduates, 1979.

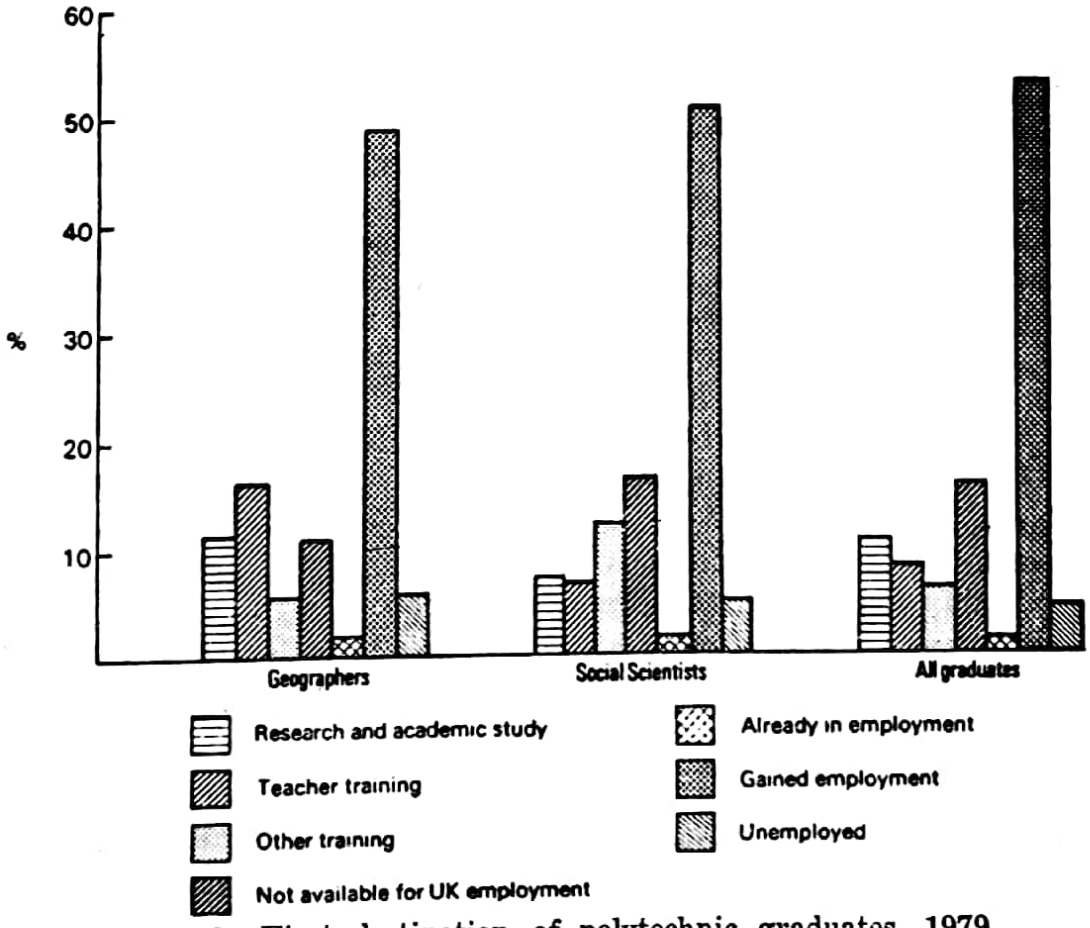

Figure 9: First destination of polytechnic graduates, 1979.

CamScanner

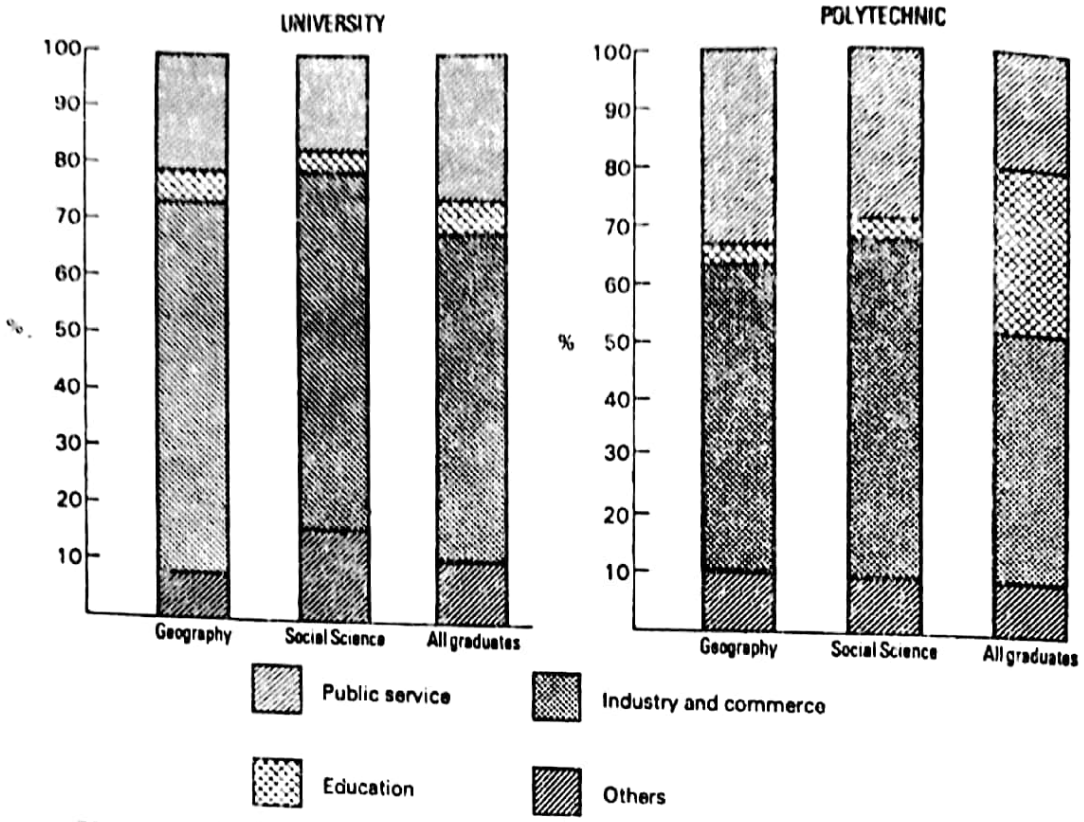

Figure 10: Categories of employer: university and polytechnic graduates, 1979.

potentially potent force in the process of wealth creation. The geographer is both skilled and inherently flexible and such qualifications are likely to prove increasingly valuable both to the individual who possesses them and to society at large as the economy responds to the third industrial revolution of high electronic technology and cybernetics. In addition, the critical awareness of fundamental issues instilled by a degree in geography endows the graduate with a highly creative capacity of great potential benefit to both the individual and society.

III. SOURCES OF FURTHER INFORMATION

Although this publication has been primarily concerned with one particular discipline it has been written in such a way as to make it possible for intending students of other disciplines in higher education to modify and adopt it for their own purpose.

A most helpful starting point in trying to decide whether or not to enter higher education and, if so, which subject or subjects to study is the annual handbook: —

Degree course offers — winning your place at university, polytechnic and other institutions of higher education, available from Careers Consultants Ltd. (for address see Appendix 4).

Appendix 1: Why geography?

a) Some further idea of the nature of geography as an academic discipline and of recent developments within it may be gained from the following:

Brown, E.H.	(1980)	*Geography yesterday and tomorrow* Oxford University Press
Cooke, R.U. and B.T. Robson	(1976)	Geography in the United Kingdom 1972-76 *Geographical Journal* 142, 3-22
Doornkamp, J.C. and K. Warren	(1980)	Geography in the United Kingdom 1976-80 *Geographical Journal* 146, 1, 94-110
Lawton, R.	(1978)	Changes in university geography *Geography* 63, 1-13
Lee, R. (d)	(1977)	*Change and tradition: geography's new frontiers* Special Publication No. 1 Department of Geography, Queen Mary College, University of London

b) An assessment of examination methods in university geography departments is made by

King, R.	(1975)	Examinations in university geography departments examined *Area* 7, 4, 237-246

c) One of the major functions of the Geographical Association (see Appendix 4 for address) is to provide a focus of interest for teachers and students of geography at all levels in the educational system. Its quarterly journal *Geography* not only makes accessible the results of recent research and trends in geography but provides a regular source of information on developments in the curriculum, the syllabus and examinations.

Appendix 2: Where geography?

a) Range of courses available

The most comprehensive sources of comparative information are the *Degree Course Guides* published every two years by the Careers Research and Advisory Centre (CRAC, see Appendix 4 for address). There is a special volume on *Geography* and other related guides include *Architecture, Landscape Architecture and Planning, Geological and Environmental Sciences, Social Sciences.*

CamScanner

The *Higher Education Advisory Centre* (see Appendix 4 for address) provides free, computer-based information and advice to students on courses at institutions of higher education.

The Committee of Vice Chancellors and Principals of Universities of the United Kingdom publish an annual *Compendium of University entrance requirements for first degree courses in the United Kingdom*, available from the publisher, Lund Humphries (see Appendix 4 for address).

For degrees administered by the Council for National Academic Awards (CNAA, see Appendix 4 for address) the CNAA produce annual *Directory of first degree and diploma of higher education courses.*

The Committee of Directors of Polytechnics produces an annual *Polytechnic Course Handbook* listing full-time and sandwich courses which is available from the publishers, Lund Humphries.

Degree and non-degree courses in other institutions of higher education are detailed in the National Association of Teachers in Further and Higher Education annual *Handbook of degree and advanced courses in Institutes and Colleges of Higher Education, Colleges of Education, Polytechnics and University Departments of Education* published by, and available from, Lund Humphries.

Lists of the names of members of staff in each university department of geography are provided in the annual *Commonwealth Universities Yearbook,* published by the Association of Commonwealth Universities (see Appendix 4 for address).

b) Detailed departmental information

Requests for prospectuses and other information relating to individual departments should be made direct to the Admissions Officer (Geography) at the following institutions.

Universities

Aberdeen	Department of Geography, University of Aberdeen, Aberdeen. AB9 1FX
Aberystwyth	Department of Geography, University of Aberystwyth, Llandinam Building, Penglais, Aberystwyth, Dyfed. SY23 3DB
Belfast	Department of Geography, The Queen's University of Belfast, Belfast. BT7 1NN
Birmingham	Department of Geography, University of Birmingham, P.O. Box 363, Birmingham. B15 2TT
Bradford	Geography Section, School of Social Sciences, The University, Bradford. BD7 1DP

Bristol	Department of Geography, University of Bristol, Bristol. BS8 1TH
Cambridge	Department of Geography, University of Cambridge, Downing Place, Cambridge. CB2 3EN
Cardiff	University College Cardiff. P.O. Box 78, Cardiff. CF1 1XL
Cardiff	Maritime Studies, University of Wales Institute of Science and Technology, Cathays Park, Cardiff. CF1 3NU
Dundee	Faculty of Arts and Social Sciences (for MA); Faculty of Science (for BSC); The University, Dundee. DD1 4HN
Durham	Department of Geography, University of Durham, Science Laboratories, South Road, Durham. DH1 3LE
East Anglia	School of Development Studies, University of East Anglia, University Village, Norwich. NR4 7TJ
Edinburgh	Department of Geography, University of Edinburgh, High School Yards, Edinburgh. EH1 1NR
Exeter	Department of Geography, University of Exeter, Amory Building, Rennes Drive, Exeter. EX4 4RJ
Glasgow	Department of Geography, University of Glasgow, Glasgow. G12 8QQ
Hull	Department of Geography, University of Hull, Hull. HU6 7RX
Keele	Department of Geography, University of Keele, Keele, Staffordshire. ST5 5BG
Lampeter	Department of Geography, St. David's University College, Lampeter, Dyfed. SA48 7ED
Lancaster	Department of Geography, University of Lancaster, University House, Lancaster. LA1 4YW
Leeds	Department of Geography, The University, Leeds. LS2 9JT
Leicester	Department of Geography, The University, Leicester. LEI 7RH
Liverpool	Department of Geography, University of Liverpool, P.O. Box 147, Liverpool. L69 3BX
University of London Bedford College	Department of Geography, Bedford College, Regent's Park, London. NW1 4NS
Goldsmiths' College	Department of Geography, Goldsmiths' College, Lewisham Way, London. SE14 6NW

CamScanner

King's College	Department of Geography, King's College, Strand, London. WC2R 2LS
London School of Economics	Department of Geography, London School of Economics. Houghton Street, London. WC2A 2AE
Queen Mary College	Department of Geography, Queen Mary College, Mile End Road, London. E1 4NS
School of Oriental and African Studies	Department of Geography, School of Oriental and African Studies, Malet Street, London. WC1E 7HP
University College	Department of Geography, University College, Gower Street, London. WC1 6BT
Loughborough	Department of Geography, Loughborough University of Technology, Loughborough, Leicestershire. LE11 3TU
Manchester	School of Geography, University of Manchester, Manchester. M13 9PL
Newcastle upon Tyne	Department of Geography, University of Newcastle upon Tyne, Newcastle upon Tyne. NE1 7RU
Nottingham	Department of Geography, University of Nottingham, University Park, Nottingham. NG7 2RD
Oxford	School of Geography, Mansfield Road, Oxford. OX1 3TB
Reading	Department of Geography, The University, Whiteknights, Reading. RG6 2AH
St. Andrews	Department of Geography, The University, St. Andrews, Fife. KY16 9AL
Salford	Department of Geography, University of Salford, Salford. M5 4WT
Sheffield	Department of Geography, The University, Sheffield. S10 2TN
Southampton	Department of Geography, The University, Highfield, Southampton. SO9 5NH
Strathclyde	Department of Geography, University of Stratchclyde, George Street, Glasgow. G1 1XV
Sussex	Sussex House, University of Sussex, Falmer, Brighton. BN1 9QQ
Swansea	Department of Geography, University College of Swansea, Singleton Park, Swansea. SA2 8PP
Ulster	Department of Geography, New University of Ulster, Coleraine, Northern Ireland. BT52 1SA

CamScanner

Polytechnics

Brighton Polytechnic, Moulsecoomb, Brighton. BN2 4GJ
City of London Polytechnic, 31 Jewry Street, London. EC3N 2EY
Coventry (Lanchester) Polytechnic, Coventry CV1 5FB
The Polytechnic, Queensgate, Huddersfield. HD1 3DH
Kingston Polytechnic, Penrhyn Road, Kingston upon Tames. KT1 2EE
Liverpool Polytechnic, Tithebarn Street, Liverpool. L2 2ER
Manchester Polytechnic, All Saints, Manchester. M15 6BH
Middlesex Polytechnic, The Burroughs, Hendon. NW4 4BT or Humanities Resources Centre, Middlesex Polytechnic, White Hart Lane, London. N17 8HR
Newcastle upon Tyne Polytechnic, Ellison Place, Newcastle upon Tyne. NE1 8ST
North Staffordshire Polytechnic, Beaconside, Stafford. ST18 0AD
Oxford Polytechnic, Headington, Oxford. OX3 0BP
Plymouth Polytechnic, Drake Circus, Plymouth. PL4 8AA
Polytechnic of Central London, 32-38 Wells Street, London. W1P 3FG
The Polytechnic of North London, Holloway Road, London. N7 8DB
Polytechnic of Wales, Llantwit Road, Treforest, Pontypridd, Glamorgan. CF37 1DL
Portsmouth Polytechnic, Museum Road, Portsmouth. PO1 2QQ
Prestone Polytechnic, Corporation Street, Preston, Lancashire. PR1 2TQ
Sheffield City Polytechnic, Wentworth Woodhouse, Rotherham, South Yorkshire. S62 7TJ
Sunderland Polytechnic, Forster Building, Chester Road, Sunderland. SR1 3SD
Thames Polytechnic, Wellington Street, London. SE18 6PF
Trent Polytechnic, Clifton, Nottingham. NG11 8NS
Ulster Polytechnic, Newtownabbey, County Antrim. BT37 0QB
The Polytechnic, Wolverhampton. WV1 1LY

Other institutions of higher education

Bulmershe College of Higher Education, Woodlands Avenue, Earley, Reading. RG6 1HY
Cambridgeshire College of Arts and Technology, Collier Road, Cambridge. CB1 2AJ
Christ Church College of Higher Education, Canterbury, Kent. CT1 1QU
City of Liverpool College of Higher Education, Prescot, Merseyside. L39 4QP
Crewe and Alsager College of Higher Education, Crewe. CW1 1DU
Derby Lonsdale College of Higher Education, Derby. DE3 1GB
Dorset Institute of Higher Education (Bournemouth), Wallisdown Road, Wallisdown, Poole. BH12 5BB
Dorset Institute of Higher Education (Weymouth), Cranford Avenue, Weymouth, Dorset. D24 7LQ
Ealing College of Higher Education, St. Mary's Road, London. W5 5RF

CamScanner

Edge Hill College of Higher Education, St. Helen's Road, Ormskirk, Lancashire. L39 4QP
Hull College of Higher Education, Queen's Gardens, Hull. HU1 3DH
Ilkley College, Wells Road, Ilkley. LS29 9RD
Luton College of Higher Education, Park Square, Luton. LU1 3JU
Nene College, Moulton Park, Northampton. NN2 7AL
College of Ripon and York St. John, Lord Mayor's Walk, York. YO3 7EX
Roehampton Institute of Higher Education, Roehampton Lane, London. SW15 5PJ
College of St. Mark and St. John, Derriford Road, Plymouth. PL6 8BH
St. Mary's College, Strawberry Hill, Twickenham, Middlesex. TW1 4SX
Trinity and All Saints' Colleges, Brownberries Lane, Horsforth, Leeds. LS18 5HD
West London Institute of Higher Education, Gordon House, 300 St. Margaret's Road, Twickenham, Middlesex. TW1 1PT
Worcester College of Higher Education, Henwick Grove, Worcester. WR2 6AJ

c) Applications

Essential information about applying to university is contained in the handbook, published annually by the Universities Central Council on Admissions (UCCA), *How to apply for admission to a University* (see Appendix 4 for address of UCCA).

Appendix 3: What use is a geography degree?

a) Recent articles on the range of careers followed by geographers

Balchin, W.G.V.	(1978)	*Careers for graduate geographers* Royal Geographical Society
Bleasdale, S.	(1977)	After the graduation ceremony: some thoughts on geography graduate careers *Journal of Geography in Higher Education* 1, 2, 71-77
Coswell, P.V.	(1980)	The employment of university geography graduates *Teaching Geography* 5, 3, 136-141
Hornbeck, D.	(1977)	A strategy for career preparation *Journal of Geography* 76, 4, 151-152
Lawton, R.	(1980)	Career opportunities for geographers *Geography* 65, 236-244
Lee, R.	(1977)	How geographers earn their keep *Geographical Magazine* April, 49, 7, 458-461

b) General careers advice for geographers

Belton, B. and A. McKenzie	(1975)	*Opportunities for geographers* Standing Conference of Universities' Appointments Services
Brown, S. and A. Avant	(1974)	*Careers for graduates: Number 23 Geography* University of London Careers Advisory Service
Career and Occupational Information Centre (COIC)		*Careers using geography* Manpower Services Commission
COIC (annual)		*Opportunities for geographers* Manpower Services Commission
Careers Research and Advisory Centre (CRAC)	(1973)	*Beyond a degree* Student edition
Central Services Unit (annual)		*Opportunities for geographers*

c) Specific careers

i) Industry

Howe, M.	(1969)	Geographers as consultants *Geographical Magazine,* 42, 2 160-161
Mann, P.	(1969)	On careers in oil, *Geographical Magazine,* 41, 4, 325
Rawes, E.A.	(1969)	On careers for geographers in industry *Geographical Magazine,* 41, 6, 485-486

ii) Government

Civil Service Commission	(annual)	*Civil Service posts for graduates*
Civil Service Commission	(annual)	*The scientific Civil Service*
Green, F.H.W.	(1970)	Geographers in government *Geographical Magazine,* 42, 4, 321-322

iii) Planning

Hall, P	(1969)	On opportunities in planning *Geographical Magazine,* 41, 5, 405-406
Landscape Institute	(nd)	*Landscape Architecture as a career*
Royal Town Planning Institute	(1977)	*Town and country planning as a career* 3rd edition
Royal Town Planning Institute	(1975)	*General information on membership*

CamScanner

iv) Surveying

Royal Institute of Chartered Surveyors	(nd)	*The graduate as a chartered surveyor*

v) Cartography

Anson, R.W.	(nd)	*Careers in cartography* British Cartographic Society
Fullard, H.	(1969)	On considering cartography *Geographical Magazine,* 41, 10, 780

vi) Teaching

Abbott, J.	(1968)	On becoming a geography teacher *Geographical Magazine,* 41, 2 165-166
Department of Education and Science (DES)	(1973)	*The education system of England and Wales* HMSO
DES	(1977)	*Careers in education: becoming a teacher HMSO*
DES	(1977)	*Careers in education for graduates* HMSO
DES	(1976-7)	*Careers in teaching* HMSO
Times Educational Supplement		*Guide to courses in Education*

vii) Media

Hill, R.M. de Courcy	(1969)	On taking up television *Geographical Magazine,* 42, 2, 160-161
Williams, J.	(1968)	On becoming a publisher *Geographical Magazine,* 40, 6, 485-486

viii) Research

Association of Commonwealth Universities	(annual)	*Schedule of post-graduate courses in United Kingdom universities*
CRAC	(annual)	*Graduate studies*
Natural Environment Research Council	(annual)	*Postgraduate training in the natural and environmental sciences*
Social Science Research Council	(annual)	*Postgraduate training in social sciences*

d) Annual guides to the range of graduate apportunities

Business and Career Publications Ltd.	*Directory of opportunities for Graduates*
CRAC	*Graduate employment and training*
New Opportunities Press Ltd.	*GO: Directory of graduate opportunities*

Appendix 4: Addresses

Association of Commonwealth Universities, John Foster House, 36 Gordon Square, London. WC1H 0PF

Business and Career Publications Ltd., Haymarket Publishing Group, 76 Dean Street, London. W1A 1BU

Careers Consultants Ltd., 12-14 Hill Rise, Richmond Hill, Richmond, Surrey. TW10 6UA

Careers Research and Advisory Centre, Hobsons Press (Cambridge) Ltd., Bateman Street, Cambridge. CB2 1LZ

Central Services Unit for Careers and Appointments Services. Crawford House, Precinct Centre, Oxford Road, Manchester. M31 9EP

Civil Service Commission, Alenson Link, Basingstoke, Hampshire. RG21 1JB

Committee of Directors of Polytechnics, 309 Regent Street, London. W1R 7PE

Council for National Academic Awards (CNAA), 344-345 Gray's Inn Road, London. WC1X 8BP

Department of Education and Science, Elizabeth House, York Road, London. SE1 7PH

Geographical Association, 343 Fulwood Road, Sheffield. S10 3BP

Higher Education Advisory Centre, Middlesex Polytechnic, 114 Chase Side, London. N14 5PN

Landscape Institute, Nash House, Carlton House Terrace, London. SE1

Lund Humphries (Publishers), The Country Press, Drummond Road, Bradford. BD8 8DH or 24a Titchfield Street, London. WC2H 9NH

National Association of Teachers in Further and Higher Education, Hamilton House, Mabledon Place, London. WC1H 9BH

Natural Environment Research Council, University Support Section, Polaris House, North Star Avenue, Swindon, Wiltshire. SN2 1EU

New Opportunity Press Ltd., Yeoman House, 76 St. James's Lane, London. N10 3RP

Royal Geographical Society, 1 Kensington Gore, London. SW7 2AR

Royal Scottish Geographical Society, 10 Randolph Crescent, Edinburgh. EH3 7TU

Royal Town Planning Institute, 26 Portland Place, London. W1N 4BE

Royal Institution of Chartered Surveyors, 12 Great George Street, London. SW1

Social Science Research Council, Postgraduate Training Division, 1 Temple Avenue, London. EC4Y 0BD

Times Educational Supplement, 200 Gray's Inn Road, London. WC1 8EZ

Universities Central Council on Admission (UCCA), P.O. Box 28, Cheltenham, Gloucestershire. GL50 1HY

For addresses of individual departments and institutions teaching geography to degree level see Appendix 2.

THE AUTHOR

Roger Lee studied geography at the University of Nottingham and has taught economic and social geography at Queen Mary College, London since 1967. He is the co-author with B.W. Hodder of *Economic Geography* published by Methuen in 1974 and co-edited *Economy and Society in the EEC* (Saxon House, 1976) with P.E. Ogden. He is currently working on studies of local councillors in major British cities and of contemporary integration in western Europe.

ABSTRACT

This paper presents a guide to the choice of geography courses in British institutions of higher education and to graduate careers. Procedures for decision making with respect to the choice of course, choice of institution and choice of subsequent career are set out and lists of sources of information are included in appendices. Emphasis is placed upon the gathering and, more particularly, the use of information available to aid decision making.

ACKNOWLEDGEMENTS

The editor and editorial board of the Occasional Papers at Queen Mary College provided many helpful comments on the manuscript. Murray Gray first suggested that I might care to write the paper and I am not sure that I should really thank him for that. Stephen Hill of the University of London Careers Advisory Service was patience and helpfulness personified in dealing with my meddlesome queries. The Cartographic Unit at Queen Mary College — Lynne Cooper-Grundy, Mark Lewis, Richard West and Ray Crundwell (photography) — designed the cover and took infinite care over the production of the diagrams — a care made more necessary by the author's cavalier approach to their preparation. Carol Gray typed a first draft and Teresa Cooper produced the final immaculate typescript by deciphering not one but six hands. The Department of Geography at Queen Mary College continues to provide a most stimulating and sympathetic environment in which to work. I am *most* grateful for that.

This article is reprinted from Why do geography degree? The choice of geography in higher education by Roger Lee. Special Publication No. 2, Department of Geography, Queen Mary College, London. Copies of the original are available at price of £2.00 from

The Secretary
Department of Geography
Queen Mary College
University of London
Mile End Road
London, E1 4NS
England

CamScanner

MAP COMMUNICATION IN SOCIAL SCIENCE STUDY[1]

by

PROF. DOMINADOR Z. ROSELL[2]

INTRODUCTION

Human Society generally progresses with two feet so to speak — communication and transportation. The first is communication which usually begins within the family. Witness the fact that when a child wants to call the attention of her mother she cries aloud — the mother tries to find out what she wants.

She is either wet or hungry — these are the first stages of communication between the child and the mother. Finding that she is wet, the mother changes the diaper but if the baby continues to cry she may be hungry — and mothers knows well what to do.

Wesley[3] stated that in maps — he who learns to read their visible features — they speak various languages — can comprehend not only the obvious aspects of direction, distance and location, but also the less obvious story of man's relation with the earth.

THE LANGUAGE OF MAPS

In order to read the message which maps convey, one must learn the language in which they are written. This, we wish *to impart to you thru this seminar-workshop on Map Reading and Map Making.*

"The teacher of reading recognizes the difficulties which confront the beginners. The abstract symbols of letters and words reveal their meaning only when the pupil can identify them and relate to his own experience."

Specialists in reading have observed repeatedly that many students have serious reading difficulties; for various reasons they do not learn to read easily.

---

[1] Lecture delivered during the Seminar-Workshop II on Map Reading and Map Making at the NAST Hall, P. Gil St., Cor. Taft Avenue, Manila, October 27-29, 1982.

[2] President, Philippine Geographical Society.

[3] Wesley, Edgard Bruce. 1949. Teaching Social Studies Thru Maps — A Manual to accompany the Wesley Social Studies Series — Our America.

CamScanner

"Teachers generally are aware of the abstract and complex nature of reading. They realize the special training, numerous exercises, and infinite persistence are necessary in order to master the art of reading — the conversion of hieroglyphics of type to correct and meaningful images and ideas."

While there are some difficulties for the young in the reading of a printed page, this is relatively a simple process as contrasted with that of reading of maps.

Teachers who are aware of the complexities of a written paragraph frequently assume that a map, one of the most condensed forms of communication ever devised, is self-revealing; that the pupil needs only a glance to grasp its message.

"One of the prerequisites to the successful use of maps is the acceptance of the idea that they require study — prolonged, detailed and thoughtful."

"A well-known teacher frequently tells his students that learning requires three qualities: intelligence, humility and persistence. Certainly these three qualities are needed in the study of maps."

1. *Intelligence* is necessary in order to see the relationship between the type of map and the data to be conveyed, to grasp the questions which should be asked, and to perceive the answers which the map provides.

2. *Humility* in the teacher is necessary in order to avoid the assumption that the pupil is already equipped to utilize the map. Humility in the pupil will lead him to study the legends, the symbols, and other aids to the proper interpretation of a particular map.

3. *Persistence* is necessary in order to keep the attention focused upon each feature and aspect long enough to gain their full impact. Persistence should be reflected in repetitive uses, for each successive study of a well-made map will reveal new information, new concepts and new relations.

The teacher and pupils who wish to gain from maps their full story must put forth repeated efforts. *He who would learn from maps must first learn to read maps.* While they are vivid and accurate aids to learning, they are not self-operating or self-revealing."

FUNCTIONS OF MAPS

"Maps serve a variety of functions. They are a means of recording information for permanence, for clarification, for comparison, and *communication.* Many maps and graphs are made to bring into sharp focus relevant facts and pattern."

"A sales manager of a beer manufacturing company wants a *pin map* showing the extent of his distributive organization; a superintendent

of school wants a map of his school district indicating the location of the schools and relative positions of the home from which the pupils and students come from."

"The principal function of school maps is to reveal geographic, economic, climatic, political and historical and other data for the sake of the pupil. Generally, maps present condensed information of areas too large to be viewed or comprehend directly; consequently, they are not only aids to learning; they are the only means by which many factors can be presented for learning."

These functions of the map can be summarized as follows:

1. *Location* — when properly made, maps generally show cities, towns, barrios, rivers, mountains, valleys, bays, oceans, plains, roads, railroads, highways, schools, churches, etc. The location is shown with respect to political boundaries and many such other phenomena. Thus the answers *to the questions what is* and *where is?*

2. *Arrangement* — Closely related to location is the pattern, place, shape, or arrangement of the various phenomena. Thus a map of the island of Luzon shows that Manila is at the eastern coast of Manila Bay and at the mouth of the Pasig River. And that the provinces near Manila are Laguna and Cavite to the south, Bulacan to the north, and Rizal to the east.

3. *Area* — Maps show relative sizes of provinces. A map may show clearly, for example, that Batangas Province is larger than Cavite Province and Bulacan Province is smaller than Nueva Ecija Province.

4. *Relationship* — Maps show numerous relationships beyond those of location, shape and area. The location of Manila shows its relationship to Manila Bay and the Pasig River. The City of Baguio on the mountain region has a cool climate even during the dry season of the year because of its elevation. Every detailed map presents phenomena which reveal a great number of relationships. Of course not all of these are apparent to the untrained eye; in fact only the trained person can see and appreciate fully these functions of a map. When one is already an expert in the use of maps — say, a road map — he can easily figure out how long it may take to go to Baguio by car while looking at the road map from Manila to Baguio.

5. *Other Uses* — There are many other uses of maps. When you study the soils of a province you should have a soil map.

A climate map shows you the types of climate of the country. (One of our lecturers will show how to make a climate map of the Philippines). There are maps that show density of population of provinces, maps that show regions devoted to the growing of sugar cane, tobacco, rice, abaca, bananas, etc.

CamScanner

BASIC PROBLEMS OF MAP MAKING

Maps serve their functions by making use of a variety of devices, techniques, and symbols. The most frequently used techniques should be recognized, learned and appreciated. The following are the basic ones which are found in many maps:

1. *Direction.* — "A map is plotted on a grid which is composed of a parallel horizontal lines (latitude) and meridians (longitude) that are seen on the globe and by which we can accurately locate every tiny place on earth. These lines serve another purpose: They show us true directions. The meridians are true north-south lines."

2. *Distance.* — Distance on the map can be indicated in three ways: (1) by statement in words such as "one inch to a hundred miles" or "one centimeter to one kilometer." (2) by a line graph into convenient fraction representing so many miles (3) or by a fraction such as 1/100 or 1/50,000, etc.

In this fractional scale the numerator represents the distance on the map and the denominator represents the number of the same unit of actual distance on the earth. This is known as the scale of the map.

3. *Area* — Area is of course, the result of multiplying dimensions of length and width. Area of a country or province can be compared if they are both on the same map or on different maps of the same scale.

Colors:

The use of colors by map-makers has enabled them to show a great variety of features, events, and data. By means of color schemes information such as altitude, political divisions, climatic belts, population density, racial groups, and such other data may be presented on the maps.

Symbols:

These are usually the conventional signs and legends designed by the many map makers and are usually followed. However, realistic symbols have severe limitations in actual use. Conventional symbols or legend must be explained carefully for easier understanding.

For example — a wavy line represents a river, a cross line, a waterfall and a hachure a mountain.

(NOTE: Some other facts about map reading and map making will be explained to you by other lecturers following this.)

CamScanner

GEOGRAPHIC EDUCATION IN RELATION TO MAP MAKING AND MAP READING[1]

by

DOMINGO C. SALITA[2]

It is universally recognized that education is a continuous process of growth. It is geared toward the attainment of desirable habits, skills, abilities, attitudes, and knowledge that will make one a useful and a better citizen. Modern education is concerned with the understanding of man's environment so that he can contribute in improving the quality of life. He must have a good knowledge of the world, its physical features, climate, natural resources, and its people including their social institutions and government.

The field of study that deals with the physical and human environment is geographic education. Geography is a study of the earth and its relation to the various activities of man. The historic concept that geography is a description of the earth is no longer adequate to meet the modern concept of geographic education. It is not a mere enumeration of rivers, mountains, lakes, cities and capital towns. Webster defines geography as the science of the earth and its life especially the description of the land, sea and air, and the distribution of plants and animals including man and his industries with reference to the mutual relations of these diverse elements. Geography in its broader concept is the study of the earth and its relation to the solar system, to society, to nature, to government and to the works of man.

From this definition it can be seen that there are two streams of thoughts in geographic study. One deals with the physical aspects of the earth such as weather and climate, land forms and the natural resources. The other which is known as the social aspect deals with the study of population, human settlements and the features resulting from production and transportation. For this reason Geography is both a natural science and a social science subject. It provides the common territory for the natural scientists and the social scientists to interact and exchange information, knowledge and experience.

How does geographic education relates to the study of maps? Maps are the most important tools of the geographers. The word map is derived from the Latin *mappa,* napkin, sheet or cloth. A map is a

[1] Presented during the seminar on Map Making and Map Reading sponsored by PGS, NCGS and PSSC, held on October 27-29, 1982, Manila.

[2] Retired Professor of Geology and Geography and former Dean, College of Arts and Sciences, University of the Philippines.

graphic representation of the earth or a portion thereof drawn according to scale on a horizontal surface. The science of map making which is a specialized branch of Geography is known as Cartography.

Centuries before the Christian era, the Babylonians drew maps on clay tablets dating about 2300 B.C. Men in ancient times made efforts to communicate with each other about their environment by scratching their routes of travel, locating sources of water supply and hazards on the ground. The Greeks were credited for having established the science of map making or cartography. They are the leaders in searching for arable land thru exploration and navigation which led to the development of geographic knowledge and map making.

The truest map of the earth is the globe because it is spherical and nearly the shape of the earth. Strictly speaking, the globe is not a map as it is not drawn on a flat surface. Since the surface of the earth is spheroidal, the process of placing it in whole or in part on a flat surface is map projection. A map projection is an orderly system of parallels and meridians drawn on a flat surface. These parallels and meridians represent the earth's geographic grid.

Several kinds of map projections are being used but three general types are identified. These types are geometric, perspective and globe-skin. Each type has certain advantages but there is always a distortion either in shape, area or direction.

Geometric projection includes the cylindrical and the conic projection. In a cylindrical projection, the map is made by wrapping a cylinder of paper around the globe, transferring the earth's features into a cylinder, and unrolling the cylinder to show the earth on a rectangular sheet. This map is good for navigation because it shows true direction. On the other hand, if we cap the earth with a cone, project upon the cone, then split it open and lay it flat, a conical projection is the result. Conic projections show only a small distortion of shape and area.

Perspective projection is produced when the earth is viewed from a distance. Only one half of the globe is projected upon a tangent plane. The result is called an azimuthal projection.

The third type is called globe-skin which is made by taking a replica of half of the earth and flattening it, like that of half an orange. A variation of this method is the equal area interrupted map which is very much used in geographic study. This map gives a reliable picture of the areas of the land and the sea.

There are two types of features shown in the map, namely: the natural features and the man-made features. The natural features include the continents, islands, plains, plateaus, oceans, mountains, lakes, rivers, vegetation, climate, and the like. The man-made features include the political boundaries, roads, railroads, towns, human settlements, infrastructures, and other cultural works. Maps enable us to see the pattern

CamScanner

of landforms and the imprints of man. In brief, maps help us to see the earth as if it were in space aided by a powerful telescope. Maps help the reader to find the location of places by means of grid lines. A tourist for instance can easily locate places by the use of maps. Without maps, it will be very difficult to travel from one country to another.

To understand how to read a map, three things are essential, namely: (1) kind of a map (2) scale of the map and (3) the legends and symbols of the map.

Legends and symbols are devices that are used in the map to explain the features represented. With the use of legends and symbols the reader may be able to understand what the map intends to convey. These are therefore called "short cuts" in map reading.

The scale is another important element of the map. It shows a definite ratio between the linear distance on the map to the corresponding distance on the ground. Three types of scales are used; namely: graphic scale, fractional scale and verbal scale. The graphic scale consist of a line divided into units or segments. Each unit or segment on the map may represent so many miles or kilometers on the ground.

In the fractional scale the ratio is expressed in the form of a fraction such as 1/1000. This means that one unit on the map is equal to 1000 similar units on the ground. A 10 centimeter measurement on the map for example is equal to 10,000 centimeters or 100 meters on the ground.

In the verbal scale the ratio is expressed in words as an "inch to the mile". This means that one inch of measurement on the map is equal to one mile on the ground.

Kinds of Maps. — Several kinds of maps are used depending upon the purpose for which the map is drawn. The more common ones are: physical map, political map, forest map, population map, climatic map, weather map, mineral map, soil map, and topographic map. There are other maps for special purposes such as military map, industrial map, railroad and road maps, fishery map and oceanic route map. In a topographic map, the elevation is represented by brown contour lines, the water bodies by blue color, the vegetation in green and black represents the cultural works of man.

In closing, it can be said that an educated man should have a knowledge of geography and how to read and interpret maps. Knowledge of maps is a key to understanding the earth and to have a clear vista of the land and the sea beyond the horizon. Geographic education therefore, can not be complete without understanding the art and the science of map making and map reading. The teaching of geography which includes map reading is necessary in the elementary, secondary and tertiary levels of education in order to develop enlightened, constructive, and useful citizens of our country.

CamScanner

MAPS AND MAP PRODUCTION

by

MARIO MANANSALA[1]

INTRODUCTION

A map, in its simplest form, is a conventionalized picture of a portion of the earth's surface. The word "picture" however, is used in a wider sense. The map represents what is known about that portion of the earth, rather than what can be seen from any altitude. Maps commonly exhibit features that are in themselves not visible, such as political boundaries, parallels and meridians, names of towns or cities and elevations.

Map making may therefore be defined as the science and art of expressing in graphical forms, our knowledge of the earth's surface and its varied features. It combines the achievements of the astronomer and mathematician with those of the explorer, the geographer and the surveyor, and finally the artistry of the cartographer and the lithographer.

It is remarkable, but the history of maps is older than history itself, assuming that history started with written records. The making of maps antedates the art of writing. This is evidenced by the fact that primitive people have the ability to draw sketches or diagrams on sand or stones, even if they have not reached the stage of writing.

Because of time constraints, I will not go extensively into the history of the maps and map making. It must, however, be mentioned that the oldest known map now on exhibition in a museum in Harvard University is a clay tablet excavated from the ruins of a city in ancient Babylon, about 2500 B.C. The ancient Greeks — Herodotus, Pythagoras, Aristotle, all these gave contributions to ancient mapping. And, of course, the Egyptians — Erathosthenes, Posidonius and Claudius Ptolemy — significantly advanced the art of mapping of the then known world.

THE IMPORTANCE OF MAPS

A map is merely a means to an end. It is primarily intended to assist man in coping with his environment. It serves as a useful medium for making geographic products (or knowledge) available and for stimulating new fields of research.

---

[1] Chief Planning Officer, Bureau of Coast and Geodetic Survey, Ministry of National Defense.

A knowledge of the horizontal and vertical location of places and the configuration of the earth's surface are essential factors in carrying on the vital activities of a nation. Indeed, in any major infrastructure for economic development, before the first stake is set on the ground, maps and charts have first to be procured or produced for feasibility studies and for project planning. Extensive resource development projects such as highway construction, railroads, airports, the harnessing of rivers for water power and irrigation, the development and construction of piers and wharves, all these require up-to-date maps and charts. In the interest of shipping and the safety of life at sea, mariners and navigators require charts that possess not only the necessary accuracy in delineation and facility for use, but also those that are in keeping with the development of a nation's ports, its commerce, and the ever-changing natural conditions.

KINDS OF MAPS

In map production, several vital features must be carefully considered. These are (1) the scale; (2) the system of projection or what is known as the framework of coordinates upon which the map is drawn; (3) the content of map, as expressed by symbols, for example roads, cities, mountains and other features, (4) the lettering, (5) the title, border, and other elements of the make-up.

With reference to the scale and content, maps maybe classified as follows:

1. General Maps
   - (a) Topographic maps drawn on a large scale, and presenting general information.
   - (b) Chorographic maps, representing large regions, countries, or continents on a small scale (atlases).
   - (c) World maps
2. Special Maps
   - (a) Political maps
   - (b) City maps
   - (c) Communication maps, showing railway lines, road system, etc.
   - (d) Scientific maps
   - (e) Economic and statistical maps
   - (f) Charts used for navigation and flying
   - (g) Cadastral maps, drawn on large scale to show land ownership.

The problem of map projection is an specially intricate and interesting subject. The problem is readily appreciated when we imagine

the difficulty of laying down on a flat plane or paper a portion of a curve or spheroidal surface. The surface of a globe cannot be flattened without some kind of distortion, such as stretching or tearing. If only a small part of the globe or earth is represented on a map, say 100 sq. kilometers, the distortion will be minimal; but on larger areas such as countries or continents, a major problem comes up. The theory of map projection aims to solve the problems of showing on a plane a portion of the spheroidal earth surface. A map projection then can be defined as an orderly system of parallels and meridians on which the map is drawn. It is the basic framework for the making of map.

There are many ways in which projection systems can be constructed, but they are not equally good — some are good for one purpose, and some for another. However, there is no one projection that is the best for every map.

Based on characteristic desired projections maybe classified into:

1. Equal-area or equivalent — projections are those in which the region has the same area on the map as on a globe of the same scale.

2. Conformal, or orthomorphic projections: those on which any small area has the same shape as on the globe, right angles remain right angles, and the relation between the length of parallels and meridians is the same as on the globe. Conformal projections are good in showing directions. Their principal use is in navigation. It is obvious by now that no projection can be at the same time equal-area and orthomorphic; only a globe has these properties and a globe cannot be flattened with distortion. There is no perfect projection.

Among the more common projections are the polycomic, the conic-equal-area (Albers), Goode, Lambert Conformal, Gnomonic, Azimuthal, Mercator, etc. The Mercator projection is specially useful because almost all charts used in maritime navigation are based on this projection.

MAP PRODUCTION

The process of map production essentially involves three (3) broad phases:

1. The surveyor or engineer goes out into the field and measures the land, takes observations and gathers data.

2. The cartographer and mathematicians processes and analyses the data and compile the map manuscript.

3. The lithographer puts the manuscript into plates and runs as many copies as are needed for the use of the public.

The Field Surveys. — Any map worthy of its name must be based on actual field surveys. This necessitates field data observation and collection. To start with, the engineer observes control points, both

CamScanner

horizontal and vertical. These points are the very foundation of the map system. They have to be measured very accurately, for on their correct interrelationship will depend the accuracy and dependability of the map. For these measurements, precision instruments such as theodolites, Invar tapes, and electronic distance measuring instruments are used. For mapping the terrain, a very useful instrument used was the plane table and alidade. This was standard equipment for topographic mapping not so long ago. However, the science of photogrammetry and aerial photography has immeasurably speeded topographic mapping to such an extent that the plane table has been rendered obsolete.

In addition to control stations and topography, observations and measurements of magnetic declination, tidal phenomena, road networks, bridges, railroads, buildings and a host of other information are also taken and recorded.

The Map Compilation — Cartography. — The field data and observations are now brought to the office where it passes through a veritable treadmill of processing, analyses, adjustment, computation and checking. Finally, compilation work starts using the predetermined map projection, through stereo-plotting in photogrammetric mapping up to cartographic symbolization, geographic place names and nomenclature. The map is now complete, but it still must pass through the third stage before it is ready to be issued.

Reproduction — Photolitography. — The map manuscript now goes to the Reproduction stage — where combining the science of chemistry, and photography the map is finally etched on metal plates and prepared for printing. Rotary presses turn out several thousand copies of the finished map which are then cut and trimmed and perhaps even folded for convenient handling and storage.

This in brief is map-making. It is a hard exacting task. The long hours of patient and tiresome work in the field, the deep and careful analyses in the office and the artistry of the cartographer now finds reward in the contemplation of a finished map of the nation with verdant fields, lush countryside and meandering brooks. With a well conceived adequately planned map, and accurately prepared — a trained geographer can almost hear the brook murmuring as it follows its placid course to the sea.

CamScanner

MAPPING ACTIVITIES IN THE NATIONAL CENSUS AND STATISTICS OFFICE

by

FELIX D. ANTONIO[1]

THE NATIONAL CENSUS AND STATISTICS OFFICE

Prior to the change to its present name, the National Census and Statistics Office was formerly known as Bureau of the Census and Statistics. The Bureau of the Census and Statistics came into official existence by virtue of Commonwealth Act No. 591, dated August 1940. CA 591 created the Bureau of the Census and Statistics primarily to consolidate statistical activities of the government under the executive direction and supervision of the President of the Philippines. Thus, the powers, functions and other duties of other government offices which have to do with statistics, including the implementation of civil registration in the country were transferred to the Bureau of the Census and Statistics. The personnel, equipment, unexpended appropriations, records, documents, supplies and property of these offices were otherwise taken over by the Bureau of the Census and Statistics.

The Bureau of the Census and Statistics was reconstituted as a new agency into what it is known today as National Census and Statistics Office on March 20, 1974, under Presidential Decree No. 418. It is under the administrative supervision of the National Economic and Development Authority. Under the Integrated Reorganization Plan (IRP), the NCSO has the same reorganizational structure prescribed for the Bureau of the Census and Statistics.

The transfer of the new reconstituted office to NEDA did much to further improve the Philippine Statistical system. Among the multifaceted activities of the NCSO is the production, collection and dissemination of statistical data which are useful to economic planners and necessary in the formulation and implementation of government policies. It is also responsible in administering the Civil Registry Law and maintains an efficient system of civil registration pursuant to Act 3753 on the establishment of the Civil Registrar.

The NCSO is headed by Dr. Tito A. Mijares, Executive Director and Civil Registrar-General of the Philippines, and assisted by Dr. Marcelo M. Orense, Assistant Executive Director.

---

[1] Chief Cartographer, National Census and Statistics Office.

CamScanner

THE CARTOGRAPHY DIVISION

The Cartography Division is one of the 28 divisions of the NCSO, responsible for the preparation or construction, updating and maintenance of a complete system of maps of all the administrative areas of the country for use in the periodic statistical surveys and censuses of the National Census and Statistics Office. It complies and keeps up-to-date geographical listings, code numbers and other important data on the various political divisions and subdivisions of the country for statistical purposes and for administrative and tabulation controls of surveys and censuses.

The Cartography Division is also charged with the designing and preparation of the various statistical charts/maps needed for the various NCSO's publications. It also prepares other graphic materials such as posters, cover designs, exhibits, signboards, letterings, etc., needed by other Divisions in the NCSO Central Office, the field offices and authorized requests from other government agencies.

The Cartography Division plans, coordinates and monitors the mapping and map tracing and map reproduction activities of all the NCSO field offices. Finally, it coordinates with other agencies of the government regarding geographical classification, surveying and mapping activities.

Current Set-up. — Three (3) sections make up the Cartography Division and these are: *Cartographic Research and Development Section; Cartographic Verification and Records Section;* and *Graphical Development Section.*

The *Cartographic Research and Development Section* is responsible mainly for the construction, updating and reproduction of the various maps needed by the Office. The *Cartographic Verification and Records Section* handles the compilation, maintenance and keeping up-to-date listings, geographic codes, areas, and other geographic/statistical data of the country's political divisions and subdivisions. The *Graphical Development Section* designs and prepares the charts, statistical maps, etc., for the various NCSO publication and prepares other graphic materials for other activities of the Central and field offices of the NCSO.

Personnel Complement. — There are *48* itemized or regular positions in this Division. However, most of the regular employees transferred to other offices which offer higher salaries and better fringe benefits. As of October 15, 1982, there are only *11* appointed regular employees and 37 vacant positions. The regular workforce was augmented with casual employees which averaged *30* monthly during the year.

KINDS OF MAPS PREPARED IN THE NCSO

The National Census and Statistics Office is collecting varied statistical data about our country through its regular census and surveys.

During census and surveys maps constructed by its Cartography Division are used to control enumeration areas in order to minimize, if not eliminate, double or missed enumeration. The following is a list of the different kinds of maps, number, size and scale prepared by the NCSO:

KINDS	NUMBER	SIZE	SCALE
1. Regional	13 ..	Different sizes	.. 1:500,000
2. Provincial	74 ..	- do -	.. 1:250,000
3. City	60 ..	18" x 21"	.. 1:50,000
4. Municipal	1,486 ..	- do -	.. - do -
5. Municipal District ..	21 ..	- do -	.. - do -
6. Barangay	40,000 ..	21" x 24½"	.. Range from 1:2,000 to 1:8,000
7. Integrated Survey of Households (ISH) .	1,834 ..	21" x 26"	.. - do -

MAP CONTENTS AND PURPOSE

The Philippines is divided into regions; the regions into provinces and cities; the provinces into municipalities and municipal districts; and the municipalities and municipal districts into barangays. For each of the above political divisions and subdivisions, the NCSO constructs maps for use in its regular statistical surveys and censuses.

Regional Maps. — These maps show the provinces that comprise the region which are under the jurisdiction of a Regional Census Officer (RCO). They also show important features like roads, mountains, rivers, creeks, seas, etc. The scale is relatively small and are used primarily by NCSO Field Officers for control purposes during surveys and censuses.

Provincial Maps. — The provincial maps contain all the municipalities or cities that comprise the province, and are used by the Provincial Census Officers (PCO) and other higher level supervisors. Shown on the maps are the roads, mountains, hills and other important or prominent features. They are prepared in small scale and are used for control purposes.

City, Municipal and Municipal District Maps. — These maps are mainly used by Municipal Census Officers (MCO) and Municipal Census Assistants (MCA) during census field operations which show the locations of barangay boundaries, roads, and other important features under their respective areas. These maps are done in small scale and used mostly for control purposes by the MCOs and MCAs.

Barangay Maps. — The enumerators and canvassers are issued barangay maps as their guide during census and survey operations. These maps show the location of natural and man-made features inside

the barangay. They show also the boundary limits, and names of adjacent barangays as well as houses and other structures. They are drawn in large scale, and are used by the enumerators and canvassers showing their respective areas of responsibility. Usually, where the barangay is large but not all its areas are inhabited, only the portion of the barangay where people live is drawn. However on one corner is drawn an index map of the whole barangay where the houses are present in relation to the other areas of the barangay. The names of adjacent barangays are also indicated.

Integrated Survey of Household Maps (ISH). — These maps are the same as the barangay maps. However, in some cases, they differ from the regular barangay map in that the ISH sample area does not require all the houses inside the barangay to be enumerated. In this case the area where the houses to be enumerated are located is the part to be shown only as ISH sample barangay map.

STATISTICAL MAPS

After the periodic censuses, some graphic presentations have to be prepared to depict some important statistical characteristics of every area in the country for easier understanding and interpretation by users of the data gathered. These graphical presentations consists of statistical charts and maps. The list below are some kinds of statistical maps prepared by the Office:

1. Population Density by Province and by Municipality: 1980	On-going project	8½" x 11"	....	No scale
2. Total Number of Occupied Dwelling Units in the Philippines by Province	Publication	- do -	..	- do -
3. Literacy in the Philippines	- do -	- do -	..	- do -
4. Total Population of the Philippines by Province (showing 3 censal Years)	- do -	- do -	..	- do -

STATISTICAL MAPS CONTENTS

Population Density. — This is a map of the country wherein the population density per square kilometer is graphically presented by means of symbols and population data groupings on the particular province where the data apply.

Occupied Dwelling Units in the Philippines. — This is a map of the country where symbols representing a pre-determined number of dwelling units are superimposed on the province where the data apply. For example .... if one symbol represent 5,000 houses and a province has 10,000 houses, then 2 symbols would be superimposed on the province.

Literacy in the Philippines. This is a map of the country wherein the data on the number and percentage of literate and illiterate population are depicted by means of symbols like circles. The diameter of the circle represents number of population in the province. In turn, each circle is divided into two parts. One part represents the percentage of literate and the other part for the illiterate part of the population at any given time and location in the country.

Total Population of the Philippines by Province: (in 3 consecutive censal years). — This map shows the total number of population of each province by three censal years. The data are depicted by means of three columns, each column representing the population during each censal year superimposed on the area/location on the map where the data apply.

CONSTRUCTION OF MAPS

Map making in the National Census and Statistics Office began in 1957 when our Geography Division was yet under the National Economic Council (NEC). It started from scratch, so to speak. Not a single map was available. Our Unit at that time known as "Mapping and Census Preparation Unit, CP 106", started with eight employees including the Project Leader. The Commission on Elections (COMELEC) then had copies of barrio sketch maps which our Unit borrowed and our personnel copied or traced on tracing papers. Due to limited budget and inadequate personnel to do the work, our Unit enlisted the help of various college professors from different Universities in Manila by requiring their students to draw the barrio maps as their homework in their drawing subjects. During succeeding years, our Unit continued to acquire maps from all sources which included Army Map Service (AMS), Bureau of Public Works Maps, Highways, etc., and also barrio maps. Accumulation of barrio maps was done by requesting the barrio captains from all over the land to sketch their barrio maps and sent to us for final sketching.

The NCSO has long felt the need for the acquisition of accurate maps with barangay boundaries for use as reference in constructing scaled maps especially, the barangay maps. Scaled barangay maps with accurate boundaries and natural and man-made features indicated would be more helpful in many ways in enumeration work. Lately, by the help of our field personnel we were able to secure copies of Cadastral Barangay Index maps prepared by the Bureau of Lands.

CamScanner

A proposed mapping project using the data from Bureau of Lands cadastral map is presently being prepared for the approval of our Executive Director. The operations to be followed in the production of our scaled barangay maps based on the Bureau of Lands cadastral and other maps for use during censuses and surveys can be stated as follows:

1. Pull out from the files and compile the 1980 NCSO population census maps, AMS maps, cadastral maps and other available reliable base maps.
2. Determine the extent of area in a barangay where houses are present, using as reference the 1980 NCSO population census maps.
3. Refer and cross-check the above maps for man-made and natural features to be included in the final maps.
4. Enlarge once by Xerox machine cadastral map, disregarding all unnecessary features found on the map.
5. Reflect on enlarged Xerox map other important features required which appear in the 1980 population census map and/or AMS map by means of coordinate points.
6. Enlarge by Xerox machine the portion of the map where houses are present to a size big enough to show the house symbols.
7. Reduce the cadastral map showing the whole barangay to an appropriate size for an index map to be placed and traced on one corner of the paper. (This will show the relative position of the area where there are houses to that of the whole barangay. This index map however is not needed when the paper can accommodate the entire barangay including the house symbols.)
8. Verification and correction of the map contents before final inking.
9. Inking and lettering with mechanical lettering instruments the barangay map on tracing paper or mylar film.
10. Final verification and checking of inked barangay maps.
11. Correction of mistakes, if any, of verified barangay maps.
12. Reproduction of barangay maps.
13. Sending printed copies of barangay maps to RCOs/PCOS for field verification, reference, etc.

The above operations are only good for the 6,000 cadastral maps so far acquired by our Office. As of December 30, 1980 there are about 40,000 barangays existing in the country so that the number of cadastral maps collected is only 15% of the total number of barangays. The unsurveyed portion of our country is still very large that determining the barangay boundaries and other features poses another problem which cry out for immediate solution and action.

ON READING AND MAKING CLIMATIC MAPS[1]

by

FELICIANO M. LAPID[2]

INTRODUCTION

Before we attempt to read the words or symbols found in a map showing climatic variation in a country-wide region, it would be wise to define and differentiate the words *weather* and *climate* which are often misunderstood or used interchangeably. Weather is the term used to describe the conditions of the atmosphere at any given time, usually on a day-to-day basis. Climate, on the other hand, is the average condition of weather over a series of years which includes also, among others, the extremes and variability of the weather elements, such as the heaviest and highest rainfall, the highest and lowest temperature, or the maximum wind velocity. In other words, we talk of today's weather or that of yesterday; but if we consider the average atmospheric conditions of last year or of the last decade, then climate is our topic.

WEATHER FORECAST

Weathermen provide weather forecast on a 24-hour period. The same forecast is disseminated by mass media for maximum coverage — and understanding. In the weatherman's lingo, *fine weather* means there are few clouds and no rain. *Fair weather* means the presence of clouds which may produce scattered rain in patches but the greater portion of the day is sunny or without rain. *Rainy weather* is one where rain occurs during a greater portion of the day. *Stormy weather* has rain accompanied by strong winds. Inspite of all these, the atmosphere has a normal tendency to revert to a fine weather condition after any air disturbance.

CAUSES OF RAINFALL

Rain falls from clouds. Clouds are formed by the ascent of air which carry water vapor. Water vapor in the higher altitude is condensed into cloud droplets and these must coalesce or merge together to

[1] An outline form of this paper was read during the Seminar-Workshop II on Map Reading and Map Making at the NAST Hall, Pedro Gil St., Cor. Taft Avenue, Manila on October 27-29, 1982.

[2] Director, Philippine Geographical Society.

form raindrops. The presence of condensation nuclei are necessary for cloud droplet formation. Condensation nuclei may be in the form of combustion products, dust particles, or salt particles. The growth of coalesced cloud droplets is hastened by the continued presence of vertical air currents in the clouds. To produce thick rain-bearing clouds, there must be large scale vertical air currents which continuously transport water vapor from the earth's surface upward high into the cold atmosphere. Large scale vertical air currents are caused by certain weather disturbances.

WEATHER DISTURBANCES COMMON IN THE PHILIPPINES

Tropical Cyclones. — In meteorology a cyclone is an atmospheric pressure system characterized by relatively low pressure at its center, and moves by counterclockwise wind direction in the northern hemisphere, but clockwise in the southern. Tropical cyclones are classified into depressions, storms and typhoons according to wind velocity; thus: depressions — less than 63 kilometers per hour (kph); storms — 63 to 117 kph; and typhoons — 118 kph or more.

Tropical cyclones are the most destructive weather disturbances in the country with voluminous rains and strong winds. The so-called typhoon season begins in May and last until January; the height of the season is during July to September. An annual average of 19.1 tropical cyclones is recorded by PAGASA.[3] These weather disturbances usually originate in the Pacific Ocean between the Philippines and the Marianas-Caroline Islands, and move west-northwest at 16 kph (average), intensifying upon entry into the Philippine Area of Responsibility (PAR).

The greatest amount of rainfall observed in a typhoon was recorded in Baguio City in 1907, with 1,194 mm. of rain in two days. Moreover, a greater amount of rainfall 1,215 mm. was recorded in a shorter period of 24 hours (2:00 am — Oct. 17 to 2:00 am Oct. 18, 1967) also in Baguio City.

Easterly Waves. — An Easterly Wave is a wave embedded in the wind system in the tropics called the trade winds. In the absence of any disturbance, the trades may be regarded as a great river of air moving from east to west at an average speed of 6-19 kilometers per hour depending on the season. Like in any moving fluid, waves are bound to set in, and once formed the east-west flow is disturbed. The wave form moves from east to west at about 19 to 21 kilometers per hour.

Easterly waves may vary in intensity from weak waves which bring in an increase in cloudiness only and without precipitation, to intense waves which may be enough to produce large amounts of rainfall. Under favorable conditions, intense waves may develop into tropical

[3] Philippine Atmospheric Geophysical and Astronomical Services Administration.

cyclones. In fact, most typhoons originate from Easterly waves. Easterly waves occur during the typhoon season, usually once every four days, during the months of July, August and September but decrease later.

Intertropical Convergence Zone. — The intertropical convergence zone is the region where the northern hemisphere trades meet the southern hemisphere trades. This region of convergence may at times be well defined, or it may be diffused. When it is observed it is characterized by towering clouds of cumulonimbus accompanied with showers and widespread thunderstorms. The axis of convergence which usually is oriented in an east to west direction, does not remain stationary at the equator but it migrates north or south of the equator depending on the season. It migrates with the sun following the heat equator. Thus, during the summer of the Northern Hemisphere, it is usually found north of the Philippines. During winter, it is found south of the equator. It oscillates over the Philippines during the months of May and October.

Monsoons. — A great portion of our rainfall may be ascribed to monsoon weather. We experience two types of monsoon winds in the Philippines, namely, the Northeast monsoon and the Southwest monsoon. These monsoons are caused by the thermal variations of the Asiatic mainland. During winter the Asiatic Continent is snowbound and the resulting high pressure cell over China sends northeasterly winds over the Philippines, giving us cool temperatures, and causing much rainfall over the eastern coasts of the Philippines. This happens during the months of November to February. During the summer of the Northern Hemisphere, the Asiatic Continent becomes warmer than the surrounding seas and a low pressure cell develops over the continent. This causes a flow of moist southwest winds over the Philippine areas, bringing rain over most of the western portion of the country. This happens during the months of June to September. Thus, aside from typhoons the southwest monsoon is responsible for the great portion of the rainfall during our wet season.

Cold Fronts. — These are weather disturbances characteristics of temperate regions. During the winter of the Northern Hemisphere, they usually move as far as the southern Philippines. A cold front is a region which separates cold air from warm air. It moves such that cold air replaces the warm air. Inasmuch as cold air is heavier than warm air, the warm air is pushed aloft by the cold air giving rise to widespread cloudiness and light rains. In the Philippines this happens during the months of November to February.

Local Disturbances. — The topography and geographical location of a locality exert great influences on its weather and climate. However, certain disturbances are induced locally by certain factors so that they

may be felt only in a particular locality. Thunderstorms, when caused by local heating or by forced upslope motion of the air over mountain regions may be classified as local disturbances.

Thunderstorms occur when towering cumulus (clouds) reach a height where the temperature is well below the freezing point. They are then called cumulonimbus clouds. These clouds form when there is a continuous updraft of moist air. The approach of a fully developed thunderstorm is preceeded by gusty winds, at first, blow towards the advancing storm. As the thundercloud arrives overhead, the wind changes in direction blowing out from the storm in a forward direction. Heavy rain with hail, thunder and lightning accompanies the storm changing gradually into continuous rain with decreased intensity. The life span of the thunderstorm is short, lasting for about one or two hours. The dissipation of the thundercloud is accompanied by descending air which imparts a cooling effect on the atmosphere after the storm.

Orographic lifting refers to the process where air is forced to ascend over sloping surfaces such as the side of a mountain. Thus, the windward side of a mountain receives more rainfall than the leeward side. The occurrence of sea breeze promotes the orographic lifting of the air over mountain slopes near coastal areas.

READING OF CLIMATE MAP

A climatic base map of the Philippines is shown in Fig. 1. This map shows the outline of the large islands and their geographical location with reference to latitude and longitude. The archipelago lies between latitude 4°30' north and 21°20' north, and longitude 116°55' east and 126°36' east. Also shown on the map sheet, among others, are the legends on the four climatic types, the delineations of geographical areas on which each of the climatic types prevail (but without the shading which the seminar participants would accomplish during the workshop), the graphic scale in kilometers, the frequency of tropical cyclones in per cent, the rainfall chart for each of the four climatic types, and the International Treaty Limits.

Description of Climatic Types. — In order to acquire a deeper insight on what the four climatic types are, a description by Manalo[4] is given hereunder:

> "Since temperature differences in the archipelago are really very slight and since rainfall differences are on the contrary important and decidedly variant due to the combined influence of topography and air stream direction, we will base our classification of the Philippine climate upon the types of rainfall. In other words, the four types of climate chosen will be based upon the presence or absence of a dry season and of a maximum rain period.
>
> FIRST TYPE: Two pronounced seasons; one dry from November to April, the other wet during the rest of the year. All the regions on the

[4] Juan Manalo, Weather Bureau, Manila (no date).

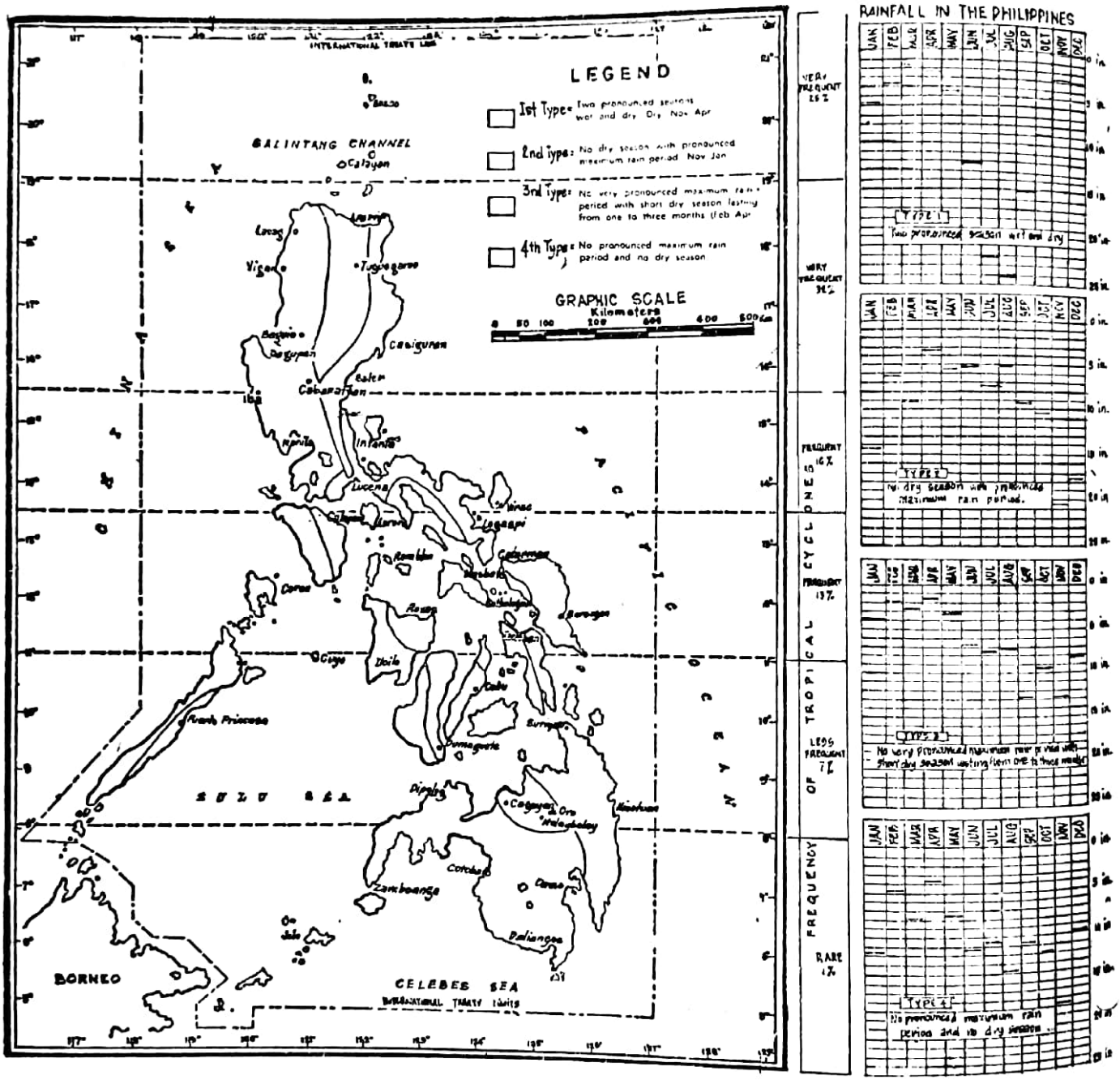

FIGURE 1. CLIMATE MAP OF THE PHILIPPINES

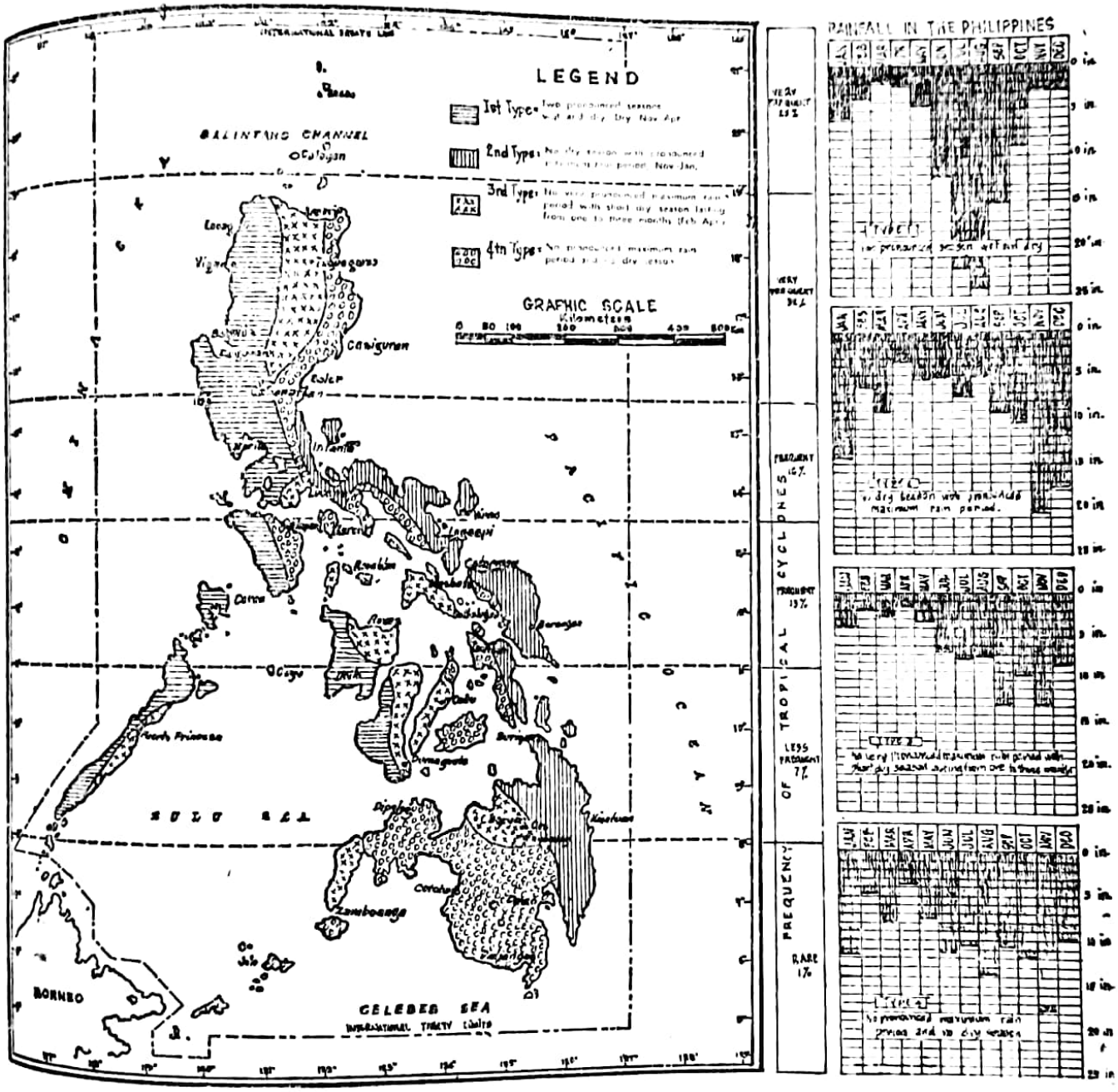

FIGURE 2. CLIMATE MAP OF THE PHILIPPINES

Western part of the islands of Luzon, Mindoro, Panay, Negros and Palawan are of this type. The controlling factor is topography. The localities of this type are shielded from the northerns and even in good part from the trades by decided mountain ranges but are open only to the Southwest Monsoon and Cyclonic storms.

SECOND TYPE: No dry season; with a very pronounced maximum rain period from November to January. In this class fall Catanduanes, Sorsogon, the eastern part of Albay, Camarines Norte, the eastern and northern parts of Camarines Sur, a great portion of the eastern parts of Quezon and Samar, the eastern part of Leyte, and a large portion of eastern Mindanao. These regions are along or very near the eastern coast and sheltered neither from the northerns and trades nor from cyclonic storms.

THIRD TYPE: Seasons not very pronounced; relatively dry from November to April and wet during the rest of the year. The maximum rain periods are not very pronounced, with the short dry season lasting only from one to three months. Regions with this type of climate are the western parts of Cagayan (Luzon), Isabela, Nueva Vizcaya, the eastern portion of the Mountain Province, southern Quezon, Masbate, Romblon, northeast Panay, eastern Negros, central and southern Cebu, part of northern and western Mindanao and most of eastern Palawan. These localities are only partly sheltered from the northern and trade winds and open to the Southwest Monsoons or at least to frequent cyclonic storms.

FOURTH TYPE: Rainfall more or less evenly distributed throughout the year. The regions affected by this type are the Batanes Province, northeastern Luzon, the western parts of Camarines Sur and Albay, Bondoc Peninsula, eastern Mindoro, Marinduque, western Leyte, northern Cebu, Bohol and most of central, western and southern Mindanao, and the Sulu Archipelago.

Mountain climate might reasonably form another (type of climate. However, this can be reduced to some of the above types as far as some climatological elements are concerned, except as to temperature which decreases with a gain in altitude, and rainfall, which generally increases with height."

Table I shows the climatic type characteristics and geographical distribution.

Reading a map is not just looking at it. It is perceiving with the seeing eye, which means having or forming a mental image of the object in focus and relating this to any other object or objects or symbols relevant to the focused object. For example, I happen to be curious about a roundish island called Marinduque. From climatic map of the Philippines I can gather the following information: Marinduque has the 4th type of climate which means that rainfall is more or less evenly distributed throughout the year; it is situated south of Tayabas Bay, lies between Mindoro Island and Bondoc Peninsula and south of Lucena City, Quezon Province; in terms of coordinates, it lies between latitude 13° and 14° north and on longitude 122 east. Considering the whole Philippine Archipelago chain of islands, Marinduque lies near the dead

TABLE I. CLIMATIC TYPE CHARACTERISTICS & GEOGRAPHICAL DISTRIBUTION

TYPE	SEASON		GEOGRAPHICAL DISTRIBUTION	DOMINANT WIND SYSTEM
	DRY	WET		
1	6 mos. Nov.-Apr.	6 mos. May-Oct. Heavy rains July-Sept.	All the western parts of Luzon, Mindoro, Panay, Negros and Palawan.	Southwest monsoon typhoons
2	NONE	12 mos. Heavy rains Nov.-Jan.	Southeastern part of Quezon Province including Polillo Is., northern and eastern parts of Camarines Sur, Camarines Norte, Catanduanes, Sorsogon, eastern parts of Albay, Samar, Leyte, and Mindanao.	Northeast monsoon, trades and cyclones
3	1-3 mos. (Feb.-Apr.)	9-11 mos. No pronounced heavy rains	Western parts of Cagayan, Isabela and Nueva Vizcaya, eastern Mt. Province, southern Quezon, Romblon, Masbate, northeast Panay, eastern Negros, central and southern Cebu, part of northern Mindanao, eastern Palawan, and the western part of Zamboanga Peninsula.	Partially sheltered from northerns & trade winds & partly open to Southwest monsoon & cyclones
4	NONE	12 mos. Rains evenly distributed	Batanes, northeastern Luzon, western parts of Camarines Sur and Albay, Bondoc Peninsula, eastern Mindoro, Marinduque, western Leyte, northern Cebu, Bohol, most of central, western and southern Mindanao, and the Sulu Archipelago.	All winds partially responsible

SOURCE: Manalo, Juan. Four types of Climate of the Philippines. Weather Bureau, Manila (no date given).

CamScanner

center. Moreover, 19% of tropical typhoons passing through the Philippine Area of Responsibility (PAR) affect the island of Marinduque. Thus, the ability to read a climatic map can be rewarding to one interested in looking for relevant information incorporated therein.

MAKING A CLIMATIC MAP OF THE PHILIPPINES

For the purpose of the workshop in this seminar, the procedure provided hereunder and to be performed by each participant is very simple. The needed materials are supplied with the handout.

Procedure:

1. Examine carefully the base map and the legend on climate types.
2. Read the information or characteristics of each climate type (nos. 1, 2, 3 and 4) and the places on the map where each type prevails. Mark temporarily with a pencil the number of the type corresponding to the delineated areas on the map. Do this for the four types and areas involved.
3. Make distinct shadings or markings for each climate type rectangle (▭) provided in the legend. You now have four rectangles with distinct shadings, from type 1 to type 4. Starting with the first type, and noting the regions or geographical areas marked with the pencil as No. 1 (see step 2 above), use the same shading to fill up all these areas under type 1. Repeat for the second, third and fourth climate types.
4. Check your work and correct mistakes if any.

You have now accomplished your climate map (see figure 2).

REFERENCES

(1) Calooy, Jesus E. 1975. Philippine Climatology, PAGASA.
(2) Prof. D. Z. Rosell's base map of RP Climate with Rainfall Chart.
(3) Climate Map of the Philippines, 1972 National Economic Atlas, Republic of the Philippines, Philippine Coast and Geodetic Survey, Dept. of National Defense, Manila, 1973.
(4) Popular Information Series No. 2 Weather Bureau, Manila, 1962.
(5) Formation of Rain Through Hygroscopic Seeding. Weather Bureau, Manila, 1975.
(6) Nones, Gil P. What is a Weather Forecast? Weather Bureau, 1975.

CamScanner

MAP PRODUCTION IN THE PHILIPPINES

by

ANTONIO P. VENTURA[1]

INTRODUCTION

A map portrays, in reduced scale and in graphical form a portion of the earth's surface. It may show population, as in a special map with statistics on inhabitants of a specific area, or where people build shelters, produce food and clothing, or define lines of transportation and communication. A map can picture roadways and rivers, communities or groups of them, in which people live and travel or man-made structures like bridges, airports, dams, railways, radio towers and others. A map may also reveal changes in the politics, society, economy and culture of the nation. In total, a map defines the geographic limits of land and water where citizens of a country held together by ties of nationality exist for successive generations.

In a geography class of an elementary school, if there is any, pupils will learn that a map is a colored drawing of many islands that make up the Philippine Archipelago. Yet, but not necessarily, why or how a map is made and by whom may be asked. The more observant among them may have noticed that an official map of the country has a notation that it was published by the Bureau of Coast and Geodetic Survey, Ministry of National Defense. Perhaps from these, some more lines can be told about the BCGS.

THE BCGS — A NATIONAL MAPPING AGENCY

Sometime in 1901, the BCGS existed as the Manila Field Station of the former U.S. COAST AND GEODETIC SURVEY, Washington, D.C. Its history, however, has remained rather obscure for lack of detailed records which would have dramatized the importance of its work or provided hints for the future when maps or charts would improve in content and usefulness. But definitely, its past was devoted to mapping and charting the Philippines in a more adequate way in view of the scarcity and obsolescence of Spanish maps in those times.

It took many years of survey work and collection of related data before better maps and charts could be made of the 300,000 square

[1] Commodore, BCGS, Retired Director of the Bureau of Coast and Geodetic Survey.

kilometers of land and 985,000 square kilometers of internal waters. It is a task still going on and may well continue into the future. This can be imagined because of the physical changes being brought about by nature and man. Changes occur when a part of an offshore area is reclaimed, altering the original shape of the shoreline, or by natural wave action which erodes beaches, and forms sandbars to make certain waterways too shallow for safe navigation. The growth of communities, the construction of new bridges, highways, ports, and other infrastructures alter the landscape of the country at a rapid pace. As a consequence, maps and charts have to be revised constantly in order to conform with such changes.

In December 1941, war interrupted the survey activities of the BCGS and caused the destruction of its facilities, and dislocation of personnel. But upon the liberation of the country in 1945, the Bureau received a share of rehabilitation benefits which greatly helped in its gradual recovery. Its reconstruction period was characterized by recall or recruitment of personnel, acquisition of its own buildings and cooperative resumption of surveying work with the USGS which provided map making facilities and the use of survey vessels. Within a few years, training grants abroad were extended to qualified Filipino employees.

The Bureau's working force was patterned after that of its U.S. counterpart agency which consisted of a commissioned service, enlisted personnel and civil service employees. This organizational set up defines a division of labor wherein field work and maintenance of vessels are the responsibilities of the commissioned officers and enlisted men while processing of survey and other data, map and chart compilation, reproduction and distribution of publications are delegated to the civil service employees.

As an end product, the BCGS prints various kinds of maps and charts, as well as allied publications of certain earth sciences, which are offered for sale to the general public. Surveys and maps are also made by BCGS for other agencies, both public and private, when requested to do so. To name several of these projects performed during the last several years are those for the Bicol River Basin Development Program where the BCGS surveyed about 100,000 hectares of the basin area and produced approximately 300 map sheets at scale 1:4,000. Likewise, we performed surveys and produced maps for the Laguna Lake Development Authority and the Task Force for Flood Control and Related Activities. You can also see those newly compiled and printed maps covering the western part of Pangasinan. In progress are those for Ilocos Norte and Metro Manila. New maps covering the Cagayan Valley will come out soon. This is a project with aid from the Japanese government. In short, the BCGS is the principal national government agency engaged in cartography — the science dealing with the production of

CamScanner

maps and charts from the original surveys to the final printing. These different maps and charts are used in commercial shipping and fishing industries, for studies on population distribution and human settlements, researches in the location of food and energy resources, as bases in planning flood control, air and marine anti-pollution measures, environmental preservation, infrastructure programs, and other economic development projects of the country.

As a mapping agency, the BCGS executes several types of surveys to collect information for use in the production of its topographic (land) maps, nautical (water) charts and aeronautical (air) charts. Data on specific subjects are compiled and printed as bound publications such tides and current tables, magnetic hourly values, notices to mariners, coast pilots, triangulation, leveling, and oceanography which are made available to the public.

Original and revision surveys are being done by the BCGS include control surveys which aim to establish fixed marks on the ground and which are concreted and called triangulation stations. These stations are located at different places throughout the country, usually at the tops of mountains for use as reference in mapping and cadastral surveys. Since these points are oriented to the latitudes and longitudes of the globe, they have geographic coordinates and their positions and distances are measured by electronic and computerized instruments like the tellurometer and the modern JMR — Doppler Survey Set — an application of satellite geodesy. By interconnecting such points or stations, thousands of imaginary triangles of different sizes (hence the name triangulation) are formed which cover the entire country.

The shape and elevation of the 7,100 islands and islets of the country are drawn as a map based on data gathered by topographic or land surveys. For small, flat areas this type of survey is done by the planetable method. But for very large areas with high or mountainous terrain, photogrammetric techniques are employed based on aerial photographs fed to stereoplotters by operators and converted to map drawings on different scales.

Hydrographic surveys gather data on water, depths and their positions, as well as characteristics of the sea bottom. The latest BCGS instrument for this type of survey is the computerized Integrated Hydrographic Survey System installed aboard the RPS Atyimba. On the other hand, tagline surveys seek to record water depths around piers and wharves for the safe berthing of ships, while wire drag surveys verify the possible existence of underwater dangers to navigation like submerged rocks or wrecks. All the data collected from these surveys are refined and included in the construction of various nautical charts.

In turn, these charts are used by the captains of ships as they navigate within waters, or by a harbor pilot guiding the port approach of a foreign ship. The many motor vessels of our fishing fleets also rely on nautical charts for safe passage to the country's fishing grounds.

Permanent tide gage installations are maintained by the BCGS in Manila, Legaspi, Cebu, Davao, Jolo and Tacloban. These tide gages record the heights and times of high and low tides in the country. Such records are processed and programmed for computers, and finally compiled and printed as an annual publication called "Tide and Current Tables." These are sold to government and private entities engaged in shipping, shipbuilding, fishing, coastal constructions like those of ports, harbors and beach resorts. Tidal information also appears on charts affected by such data and serve as index to the chart user.

Gravity surveys being conducted by the BCGS have the objective of collecting data which are evaluated for the practical use of geologists, exploring for mineral and oil reserves in the country. Knowledge of the earth's gravity field is also indispensable for space technology and the Bureau's efforts in this particular endeavor are contributed to the World Data Center in Colorado, USA. The importance of this type of survey is evidenced by the use of its results as bases in researches on energy sources.

Closely related to gravity observations is the magnetic survey continuously conducted by the Bureau's Magnetic Observatory in Muntinlupa, Metro Manila. This observatory records the changes in the magnetic field of the earth within the Philippines which affects the magnetic compass used by a ship captain, an air pilot, or a cadastral surveyor. Actually, a compass rose indicating magnetic variations or changes is shown on both the nautical and aeronautical charts being published by the BCGS for guidance in correcting directions in sea and air navigation.

Cadastral surveyors, on the other hand, may refer to the "Magnetic Hourly Values" published in a 5-year epoch, which also is sold to the general public.

In the chronology of BCGS history, an event of significance was its assumption of the functions of the former Board of Technical Surveys and Maps in 1973. This was the result of the Integrated Reorganization Plan of the government instituted for more effective management which, in the case of BCGS concerned mapping objectives of the country. Consequently, a year later, the BCGS was designated agency-chairman of the "National Committee to Coordinate and Standardize Surveying and Mapping Activities." Its membership was composed of some 13 govern-

ment agencies participating wholly or partly in mapping operations. In 1975, Bureau was selected as the Philippine Cooperating Agency in a project sponsored by the UNDP which was designed to improve the mapping capability of the country. As of now, approximately $1.6 million in the form of equipment and supplies have been given to us. Expert assistance in the various fields of surveying and mapping have also been extended. As a matter of fact, five foreign experts are still with us. In manpower development, several of our men have been sent abroad, either for further studies, training or observation trips. In-house training has also been conducted thru the UNDP assistance.

OTHER MAPPING AGENCIES

Aside from the BCGS, there are other agencies of the government doing mapping work. Their mapping activities are designed or geared for specific needs and/or purposes. Among these agencies may be mentioned:

1. Bureau of Lands which executes cadastral surveys of the different municipalities in the country for titling purposes. It also performs public land surveys. End products are large scale cadastral maps.
2. The Bureau of Mines and Geo-Sciences compiles and publishes the geological maps of the country. It also prepares morphological maps on land forms and substrata and on mineral resources of the country.
3. The Bureau of Soils has the responsibility for soil classification and the preparation and production of soil maps including land use.
4. The Bureau of Forest Development has the responsibility for laying down and delineating forest reservation areas and forestry resources of the country. These are depicted on the maps they produce.
5. The Ministry of Agrarian Reform is primarily tasked with the land reform program of the country. For this purpose, it conducts topographic as well as parcellary mapping.
6. The National Irrigation Administration is entrusted with the construction of projects for irrigation purposes. For most of their work, large scale maps are needed.
7. The National Census and Statistics Office is primarily concerned with the statistical investigation of population, human settlements, agriculture, commerce and industry, etc. and prepares maps to show these findings in suitable forms.
8. The Ministry of Public Works and Highways executes limited hydrographic surveys in ports and harbors. It also prepares road maps including roads classification from super highways to barangay roads down to the trails.
9. The Armed Forces of the Philippines Mapping Center supplies the mapping requirements of the military. Aside from printing topographic maps, it is also capable of producing aerial photo prints and photomosaics.

CamScanner

10. The Philippine Air Force has a unit which performs aerial photography. Like the AFP Mapping Center it has also its own photo laboratory, where positive prints and mosaics can be prepared.
11. Certeza Aerophoto Systems, Inc. is a private firm that does all kinds of surveying and mapping. Clientele are mostly government agencies that need maps or aerial photographs in the pursuit of their mandated tasks. It has also done and is still doing jobs in foreign lands.
12. F.F. Cruz and Co. is another big firm doing all kinds of surveying and mapping work. There are some more of these private firms too numerous to enumerate.

With all these government agencies and private firms in some way or another contributing to the production of maps and mapping materials in the country, it may be pertinent to inquire if duplication of work and a consequent loss in effort, time and money does not result. The answer is not necessarily. The government has taken steps to insure that there is coordination in this regard.

——oOo——

Republic of the Philippines
Ministry of Transportation and Communications
BUREAU OF POSTS
M a n i l a

SWORN STATEMENT
(Required by Act 2580)

The undersigned, DOMINADOR Z. ROSELL, editor of PHILIPPINE GEOGRAPHICAL JOURNAL, published QUARTERLY, in ENGLISH at BICUTAN, TAGIG, METRO MANILA, after having been duly sworn to in accordance with law, hereby submits the following statement of ownership, management, circulation, etc., which is required by Act 2580, as amended by Commonwealth Act No. 201.

NAME	ADDRESS
Editor: DOMINADOR Z. ROSELL	P.O. Box 2116, Manila
Managing Editor: LYDIA P. ORDOÑEZ	P.O. Box 2116, Manila
Business Manager: DOMINADOR Z. ROSELL	P.O. Box 2116, Manila
Owner: PHILIPPINE GEOGRAPHICAL SOCIETY	P.O. Box 2116, Manila
Publisher: PHILIPPINE GEOGRAPHICAL SOCIETY	P.O. Box 2116, Manila
Printer: BOOKMAN PRINTING HOUSE	373 Quezon Ave., Q.C.
Office of Publication: PTRI Compound, Bicutan, Tagig, Metro Manila	

In case of publication other than daily, total number of copies printed and circulated of the last issue date Oct.-Nov.-Dec., 1982.

1. Sent to paid subscribers	510
2. Sent to others than paid subscribers	490
T o t a l	1,000

(Sgd.) DOMINADOR Z. ROSELL
Editor-in-Chief & Business Manager

SUBSCRIBED AND SWORN to before me this 26 day of April 1983, at Manila, the affiant exhibiting his Residence Certificate No. 1047219 issued at Cavite City, on April 17, 1983.

(Sgd.) FRANCISCO G. AGUSTIN
Notary Public
Until Dec. 31, 1984

NOTE: This form is exempt from the payment of documentary stamp tax.

MEMBER'S FORUM

On Conservation of Resources

October 28, 1982

The Philippine Geographical Society (PGS)
P. O. Box 2116, Manila
Philippines

Dear Fellow Members:

In response to your request for ideas on the need to conserve and preserve our environment which will be taken up in our special meeting called for Friday, October 29, 1982, I am offering the following:

CONSERVATION OF OUR ENVIRONMENT

(Probing the options PGS can exercise to help conserve and preserve our air, water, soil, forest, flora, fauna and other vital life-giving elements of our natural resources against the accelerating onslaught of pollution, contamination, deterioration and destruction.)

THE PROBLEM

The supply and reproduction of the said life-giving elements within the 30,000,000 hectares of the Philippines has been rapidly shrinking per capita as our population* increased from 667,612 in 1591 to 6,635,426 in 1903 or an average annual increase of 17,332 in 402 years. However, during the last 40 years, population has multiplied three times, from 16,000,303 in 1939 to 47,914,017 in 1980 — when the average density passed 1.5971 persons per hectare.

As of May 1, 1980, Cavite, our most densely populated province, had 771,000 persons within its 128,760 hectares or nearly 6 persons per hectare.

The City of Manila — the most densely populated city in the world — had 1,629,249 residents squeezed in 3,830 hectares, or 424.608 persons per hectare (110,030 per square mile) as of the 1980 census. To top it all, Manila's population at least doubles during daytime.

There are not many places left like Palawan which had only 372,000 persons in its 1,489,630 hectares or nearly 5 hectares to sustain each person where — allow me to quote from the PGS circular dated September 27, 1982 — one may possibly "experience or behold the beauty of nature's

CamScanner

unblemished surroundings." With the accelerating activities on oil exploration and its support industries, this "Garden of Eden" condition may not last too long unless proper land use, planning and control is undertaken.

The increase in population has, especially during the last half century, been compounded by the more rapid multiplication of individual demand — for bigger houses, more machineries and gadgets, conveniences, "necessities", etc. For example, pollution-producing motor vehicles have multiplied 6 times in 20 years from 172,470 in 1960 to 1,111,433 in 1980.*

All of the so-called "necessities" brought about by civilization and progress means extraction of materials and energy from our thinning natural resources whose capacity to maintain sound and healthy life is nearing, if it has not already passed its limits.

AGGRAVATING THE PROBLEM

Our love of and partiality for imported goods or discrimination against local ones drain our economy of the much needed foreign exchange.

The country's annual deficit of "registered" imports over exports* already exceeded ₱2 billion last year. The figures are actually greater because we have every reason to believe that an additional bulk of both exports and imports are technically smuggled or otherwise unrecorded.

An unbiased analysis of our imported items — particularly those technically smuggled — should reveal a lot of goods for which we have or could have better local substitutes or we could do better without.

Unfortunately, to cover the deficit we are forced to barter away our natural resources in the raw such as logs which as trees serve as deterrents to pollution and floods. As a result, our forests are continually ravaged.

REORIENTATION OF SOME OF OUR SENSE OF VALUES AND ACTIVITIES

(1) If more of us will take to walking or bicycling to and from our places of work or activities — as what is done even in some countries with 5-10 times our per capita income or countries which are producers-exporters of oil — we will not only save on foreign currency expended for automobiles, spare parts, and fuel, but the exercise will also improve our health and reduce pollution.

(2) If more of us will involve ourselves in the cleaning of our surroundings, gardening, or even farming which may serve as our

* Please see statistical compilation.

regular exercise, we will not only save on doctor's fees and medicines, but we will become physically and mentally fit without the expensive and sophisticated "health clubs."

(3) If we will take an inventory of the contents of even a modest home, we will most likely find a good number of items hardly used or seen if at all — with each item representing materials and energy expended.

(4) If we will only examine some of our houses, we will find many built far beyond the need for shelter. There are many hardly used or unused sections or spaces which were added probably because it is "fashionable", to satisfy one's ego or to boost one's status symbol. Even among "modern" offices, both government and private, a good number could maintain or even improve their efficiency with less space and luxury appointments. Again, each of these extra items mean unjustified depletion of our natural resources.

(5) If we will create more "rurban" planned development of farm-homes in the countrysides, urban concentration of human population will be minimized. Even with less facilities, utilities and services but with the amenities of healthy unpolluted surroundings, people will stop flocking to metropolitan centers where developments have mostly been laid out for maximum use of motor vehicles.

(6) If we will teach more of our people sanitation and health habits especially in public markets and small eateries, like proper gathering and "packaging" of their refuse and garbage, this will facilitate unpolluting collection and disposal.

(7) If we will encourage integrated factories or "systems" of factories whereby the wastes of one can be used as materials of another, then there will be less amount of wastes to dispose. Moreover, if we can devise simpler and less costly method of sewage and other waste treatment or waste recycling, then even the smaller factories and agricultural industries can economically adopt them.

(8) If we will return to and improve organic farming and use of natural detergents, we would be able to do away with chemical fertilizers, insecticides, etc., which are now being probed to be not only pollutants but toxic chemicals.

(9) If we can restore the use of rivers and estuaries in urban centers like Manila as means of transportation using less polluting fuels, they will be used less for garbage disposal and even restore marine life in its waters.

(10) If we can tailor our economic aims to integrate with environmental conservation, survival need not clash with material prosperity.

FINALLY, if mankind is to survive, we now have to aim at a SIMPLER LIFE — where our notion of success, prosperity and happiness need not be gauged by accumulation of wealth with the least effort, indulgence in luxuries, ostentation and frivolities — which means wanton dissipation or destruction of nature's bounties.

WHAT THE PGS CAN DO

A. Mobilize its reservoir of scientist and other experts to —
   1) Arrive at figures on the oxygen-producing and pollutant-absorbing capacities of different species of trees and plants, at different ages or sizes, in different regions, etc
   2) Arrive at figures on the pollution-absorbing capacities of different sources like types and sizes of motors and engines, certain chemicals, wastes, garbage, etc.
   3) Arrive at the minimums on trees and maximums on the number of people to maintain the necessary balance in certain areas — which will serve as a major basis for regulations on pollution control.

B. Education and information campaign which the PGS can undertake in its name with greater credibility.
   1) Expand the PGS magazine with more articles on the subject written for the ordinary readers for wider dissemination.
   2) Have more books written on the different subjects related to conservation possibly for adoption by the Ministry of Education, Culture and Sports.
   3) Have more articles written on said subjects for nation-wide printed and broadcast media.
   4) Conduct seminars, lectures and symposia.
   5) Launch contest on making posters, slogans, jingles, essays and the like with conservation as theme on both local, regional and national levels.
   6) Producing radio/TV/movie spots in cooperation with the National Media Production Center as a public service feature.

Finally, in order for PGS to better undertake these and other projects, we should consider its transformation into a foundation with a permanent staff and a place of its own. As a foundation, it would encounter less difficulty in raising funds to better realize its objectives in serving our people especially the young and the following generations.

With hopes that these modest thoughts could contribute in crystallizing more solid ideas, opinions and action among our membership, I am

Yours for conservation,
ANTONIO VARIAS

CamScanner

STATISTICS

1. *POPULATION*

a. POPULATION INCREASE IN THE PHILIPPINES

Year	*Land area in hectares*	*Population*	*Density per hectare*	*Sqm. to sustain one person*
1591	30,000,000	667,612	0.0222	450,450.4504
1799	-do-	1,502,574	0.0500	200,000.0000
1877	-do-	5,570,000	0.1856	53,879.3103
1896	-do-	6,261,339	0.2087	47,915.6684
1903	-do-	7,635,426	0.2545	39,292.7308
1918	-do-	10,314,310	0.3438	29,086.6783
1939	-do-	16,000,303	0.5333	18,751.1719
1948	-do-	19,234,182	0.6411	15,598.1906
1960	-do-	27,087,685	0.9029	11,075.4236
1970	-do-	36,684,486	1.2228	8,177.9522
1975	-do-	42,070,660	1.4023	7,131.1416
1980	-do-	47,914,017	1.5971	6,261.3480

b. MOST DENSELY POPULATED PROVINCES as of May 1, 1980 (with a density of more than four (4) persons per hectare).

Province	*Land area in hectares*	1980 *Population*	*Density per hectare*	*Sqm. to sustain one person*
Cavite	128,760	771,000	5.9878	1,670.2298
Laguna	175,970	989,313	5.6220	1,778.7266
Pampanga	218,070	1,182,000	5.4202	1,844.9503
Rizal	130,890	556,000	4.2478	2,354.1598
Bulacan	262,500	1,095,963	4.1750	2,395.2095
Cebu	508,840	2,092,000	4.1130	2,431.3153

c. LEAST DENSELY POPULATED PROVINCES as of May 1, 1980.

Province	*Land area in hectares*	1980 *Population*	*Density per hectare*	*Sqm. to sustain one person*
Palawan	1,489,630	311,644	0.2092	47,801.1472
Kalinga	704,760	190,118	0.2697	37,078.2350
Quirino	305,720	83,232	0.2722	36,737.6928
Agusan	896,550	260,576	0.2906	34,411.5622
Occ. Mindoro	587,980	220,898	0.3756	26,624.0681
Abra	397,560	160,196	0.4029	24,820.0546

CamScanner

2. *IMPORTS OVER EXPORTS* (FOB Value in MILLION US$)

Year	*Value of Exports*	*Value of Imports*	*Bal. of Trade Favorable-* (Unfavorable)*	*Ave. Exch. (Rate* (P/US$)
1935	101.93	85.54	16.39*	2.000
1940	155.92	134.73	21.19*	2.000
1945	0.67	28.93	(28.26)	2.000
1950	332.70	356.18	(23.48)	2.000
1955	419.26	536.34	(117.08)	2.000
1960	535.44	624.52	(89.08)	2.000
1965	795.74	835.25	(39.51)	3.900
1970	1,142.19	1,159.30	(17.11)	5.729
1971	1,189.25	1,260.83	(71.58)	6.305
1972	1,168.43	1,333.60	(165.17)	6.682
1973	1,837.19	1,596.62	240.57*	6.755
1974	2,724.99	3,143.26	(418.27)	6.791
1975	2,294.47	3,459.18	(1,164.71)	7.238
1976	2,573.68	3,633.48	(1,059.80)	7.384
1977	3,150.89	3,914.76	(763.87)	7.346
1978	3,424.87	4,732.20	(1,307.33)	7.314
1979	4,601.19	6,141.73	(1,540.54)	7.323
1980	5,787.79	7,726.91	(1,939.12)	7.454

3. *MOTOR VEHICLES*

Year	*In Use*	*Manufactured*
1960	172,470	—
1965	273,203	11,545
1970	458,287	13,733
1971	474,746	19,037
1972	658,071	20,909
1973	735,241	30,488
1974	852,253	44,246
1975	865,037	48,658
1976	885,366	50,578
1977	986,466	58,645
1978	993,935	68,000
1979	1,069,139	69,000
1980	1,111,433	88,000

4. *BUILDING CONSTRUCTION*

No.	*Floor Area (Thousand Sqm)*	*Total Value (Thousand* P)
—	—	—
18,786	—	479,212
15,485	2,899	420,148
14,712	2,476	442,086
19,589	2,746	529,811
20,668	2,656	589,430
16,645	2,477	996,968
19,133	3,711	2,174,873
8,219*	1,422	844,186
36,723	3,624	2,286,935
26,828	3,850	2,963,098
41,717	5,509	5,234,919
39,104	5,358	5,734,238

* 1st six months only.

—oOo—

A C K N O W L E D G M E N T

The Philippine Geographical Society gratefully acknowledges a grant from the National Science and Technology Authority (NSTA) in support of this issue of the Philippine Geographical Journal. Arrangements for this subsidy were made by the Philippine Social Science Council, Inc.

CamScanner

BULACAN PROVINCE

Random Notes of a Student of Soil Geography

It was during the soil survey work of Bulacan Province that many interesting facts regarding the soils and their relation to the activities of man were obtained.[1]

If the province is viewed from the air, the low and level alluvial plain is seen toward the west, and the nipa and mangrove swamps toward the southwest. This plain is part of the Great Central Plain. The eastern section consists of foothills and rolling areas which gradually rise to form the western flank of the eastern Cordillera. This Cordillera consists of several high parallel ranges extending north and south. The Angat River rises in these mountains and flows with many curves and twists through the towns of Norzagaray, San Rafael, Baliuag, Bustos, Quingua, Pulilan, Paombong, and finally into Manila Bay. There are several other small rivers which add to the picturesqueness of the landscape.

These various topographic features of the province have greatly influenced the several types of soils formed. The soils of the slightly rolling lands of the Santa Maria-Angat area differ from the soils of the San Rafael-San Miguel area. The soils of the higher upland and mountain areas differ from the soils of the lowland and flood plain regions of the Bigaa-Calumpit, and a portion of Baliuag and San Miguel areas. The soils in the mangrove swamps differ from place to place due to the various types of materials carried and deposited by the water.

The influence of various types of soils upon the activities of man is well illustrated in the province of Bulacan. The good soils of the province are technically known as Obando fine sandy loam, Bigaa clay loam, Quingua silt loam, Quingua fine sandy loam, and Bantog clay loam. These soils are located in the regions from Polo to Bigaa, Malolos, Calumpit, Quingua, and Baliuag. The Bantog clay loam is located north of the town of San Miguel. About eighty-one per cent of the people of the province live in these area of good soils. The several products of the various soils give varied directions to the agricultural and industrial activities of the people. The Bigaa clay loam soil gives the highest yield of rice in the province. Irrigation has helped to increase the yield. The Quingua silt loam soil produces good yields of tomatoes, peanuts, corn, rice, and several other crops. The best mangoes in Bulacan are grown on this type of soil.

The hydrosol soil, which is composed of the bañgos fishponds and the nipa and mangrove swamps, shapes the activities of the people of Hagonoy, Paombong, Malolos, and Bulacan. Vinegar and roofing material are now the most important products of the nipa palm. Bangos fishing is one of the most lucrative industries of the province. It has helped maintain the standard of living of many people in these towns during the economic depression. In spite of the destructive floods that sometimes visit them, they are more prosperous than the people living in the upland regions of the province.

[1] See "Technical Bulletin No. 5" Department of Agriculture and Commerce.

In contrast to the good soils of the lowlands, the rolling, upland and mountain areas are covered with poor to fair soils technically known as Prensa soils, Buenavista soils, Sibul soils, and Novaliches soils. Despite the large area, only some nineteen per cent of the people of the province lived here. The Prensa and Novaliches soils are located south of the Angat River, while North of this river are the Buenavista and Sibul soils.

Reddish brown upland soils like the Novaliches soils are known in other tropical countries as red loams. As a soil type it has been found poorly suited to plantation or commercial agriculture. "The soil is also disadvantageously located from the standpoint of health and sanitation," says a famous soil authority. "This dual handicap has been inimical to the support of even moderate populations." Large areas of Novaliches soil are uncultivated. Upland rice barely yields more than twenty cavans a hectare. Fruit trees such as cashew, mango, and santol have been planted there, but the Alibangbang trees are better adapted to this soil than these fruit trees. Commercial agriculture on this type of soil will succeed only under the most efficient management and modern methods. Such types of soil would be more valuable if they were forested.

The rolling lands from San Rafael to San Idelfonso and San Miguel have been planted to rice for several years. The soils in this area are technically known as Buenavista soils of silty clay loam, clay loam, and silt loam. About 27,000 hectares of this area belong to the San Juan de Dios Hospital. Farming is done by the so called inclinos, renters, and casama, share-croppers. This system of agriculture is not conducive to the wise use of the land. The land is allowed to erode, and the natural plant-food contents are rapidly depleted. The soils of this region may be rated as poor to fair. The crop returns of the farmers in this region are so low that the people have become restless and dissatisfied. The "Sakdals" of Bulacan Province are from this region. The uprisings in San Ildefonso a year ago are probably largely due to the poor returns from the land. Under normal conditions the produce of this type of soil may be enough to sustain a passable standard of living, but during generally unfavorable economic conditions, unexpected developments may arise.

When the board of directors of the Philippine Milling Company at Mindoro contemplated the transfer of its central to the Buenavista Hacienda, a group of agricultural experts visited the area to evaluate the soils for possible sugar production, and found the place unsuited for such a venture.

The Sibul soils in the regions of Sibul Springs and Biac-na-Bato are potentially good. Luxuriant vegetation is always associated with the soil of a limestone region. The municipal authorities of San Miguel have set aside an area for colonization in the northeastern part of the district. The hope is to establish a community that will utilize some of the resources in this part of the province.

Any attempt to appraise the economic, social, and political conditions of any region should take into consideration the soils of that region as one of the most important factors in the appraisal. Such geographic significance is clearly illustrated in the province of Bulacan.

CamScanner

This Publication is Available in MICROFORM

FOR INFORMATION
CONTACT:

University Microfilms International

Institution .....

Address .....

.....

.....

Title of publication .....

University
Microfilms
International
18 Bedford Row
London, WC1R 4EJ
England
300 North Zeeb Road
Ann Arbor, MI 48106
USA

business begins

with the printed word. . .

You start with your favorite newspaper to keep you up-to-date. Through the day, magazines, reports and documents go with the progress of your work. But, as we know it, business could not exist for a day without the printed word. And of course, you always prefer better printed words. You have this quality printing at . . .

BOOKMAN, INC.

OFFSET AND LETTERPRESS PRINTER • PUBLISHER • BOOK MANUFACTURER

...company
the Buenavista
...ines

373 Quezon Avenue, Quezon City
Tel. 60-96-49 • P. O. Box 709, Manila