



**THE PREPARATION  
OF SOIL SURVEY REPORTS**

## CHAPTER ONE

### A BASIC OUTLINE FOR SOIL SURVEY REPORTS

In addition to providing a framework within which the problems of report writing can be conveniently discussed, a basic outline for soil survey reports serves a number of useful purposes:

- (a) it expresses certain minimum requirements of all soil survey reports and ensures that these requirements are not overlooked when more detailed outlines for specific surveys are drawn up;
- (b) it emphasizes the range of information to be obtained and carefully recorded during the course of a survey and is, therefore, a useful guide in the preparation of work plans when the survey commences. The minimum requirements of a soil survey report are, in effect, the minimum requirements of the survey itself;
- (c) an outline of report requirements provides both incentive and guidance in studying available literature on the environment of a survey area and assists in making a preliminary selection of data which is likely to be significant in recording and interpreting the survey findings. In a similar way, it encourages the establishment of contacts with experts in fields other than soil science whose assistance will be required in the preparation of a reliable and satisfactory report;
- (d) the optimum presentation of the results of an individual survey will probably necessitate some departure from the basic report outline but, so long as these changes are made within a standard framework, broad similarity in the arrangement of separate reports will remain. Uniformity of presentation offers obvious advantages to readers who may wish to compare the findings of different surveys and is especially helpful to editors called upon to combine reports on different surveys or reports on different aspects of a multi-disciplinary project.

The conditions under which soil surveys are undertaken are so diverse that it would be impossible to plan a report outline equally appropriate for all. This diversity arises not only through technical differences in the environment, or purposes, of the various surveys but also through administrative differences which dictate whether or not the final soil survey report will stand on its own or form part of a larger report involving other disciplines. Therefore, a fairly detailed report outline, specific to the survey itself, should be prepared as early as possible. Indeed, the requirements of this outline should be considered at the time that the work plans are drawn up, as soon as a general impression is obtained of the required complexity of the work and of the survey data. Experience from a number of FAO surveys, carried out under very diverse conditions, has already shown that the basic report outline presented in this text provides a suitable framework for the construction of detailed outlines for a wide variety of soil survey reports.

An enormous volume of data is collected during the course of most soil surveys. Even if it were possible, it would not be desirable to publish all of this data in the final report since data that was essential in explaining the main findings would be lost amongst data of very specialized interest. Nevertheless, all of the data should be carefully preserved. In soil surveys conducted by the Soil Conservation Service of the U.S. Department of Agriculture, all data collected as the work proceeds is placed in a "soils handbook" for the particular survey. The handbook is maintained in loose-leaf form so that data on

different subjects can be inserted in different parts of the book as and when it is collected. This is an excellent procedure. The soils handbook serves as a permanent record of all the data collected, from which information appropriate for the final report can be selected. Possession of a report outline at an early stage can be of obvious assistance in arranging the material in the handbook and in deciding where separate sheets of data should be inserted.

The headings of the basic outline for soil survey reports presently used by FAO are given at the end of this Chapter and the subject matter included under each of these headings is discussed in the remainder of the publication. Firstly, however, it may be helpful to explain the principles, or the reasoning, which underlies this choice of report arrangement.

## BASIC PRINCIPLES GUIDING REPORT ARRANGEMENT AND CONTENT

Soil survey reports attract readers from many different walks of life and there are considerable differences in the length of time for which different aspects of soil survey information are likely to remain valid. These two important considerations are taken into account in planning the general structure of the report outline:

### Subdivision of the Overall Report: Considerations of readership

In the basic outline the overall narrative part of the report is presented in three sections, each primarily directed at a different kind of reader;

- (a) **The Summary of Conclusions and Recommendations:** This section is primarily intended for the busy administrator, often at a high level in Government, who may be vitally interested in learning how the broad findings of the survey can affect his development planning. He is unlikely to have either the time or the specialized interest to delve into details in the remainder of the report but if the summary encourages him to think it necessary, he is probably in a position to delegate a specialist to do this for him.
- (b) **The Main Body of the Text:** This part is written for the general reader, who may have no specialized knowledge of soil science, but who has the time and the interest to find out as much as he can about the survey and is prepared, therefore, to read through the main body of the text consecutively. He expects the text to have a logical, consecutive arrangement and does not want his reading to be disrupted by lengthy inclusions of detailed data, or highly technical material which he does not need to understand. In developed countries, farmers themselves form an important part of the general readership of soil survey reports but in developing countries this readership is mainly composed of extension workers, junior administrators and professional men in soil science and other disciplines.
- (c) **The Appendices:** In contrast to the main body of the text the various sections of the Appendix and their content are not intended to be read consecutively but rather to serve as a source of reference for the more complex, more technical findings of the soil survey. These sections are primarily intended for professional soil scientists who require such data for later studies in the area - and who may wish to check on specific technical points that are not of interest to the general reader.

### Subdivision of the Main Text: The "life" and nature of the survey data

In the proposed outline the main body of the text is divided into four parts:

- I. Description of the Environment
- II. Survey Methods
- III. Description of the Soils
- IV. Interpretation of the Survey Data

The first three parts are factual. They are based on observations and measurements made during the survey and on factual data derived from other sources. The fourth part is different. It presents conclusions rather than facts. The conclusions themselves are based, of course, on the facts recorded in other parts of the report, but their validity is dependent on knowledge and on circumstances existing at the time of the survey.

Clear separation in the outline places desirable emphasis on the importance of the interpretative aspects of the survey findings. To many readers the interpretations will form the most interesting and valuable section of the report at the time it is published. It is important to encourage the author of a report to recognize this fact, so that he ensures that the interpretative section receives the attention it deserves.

Changes in social and economic conditions, and the acquisition of scientific knowledge, may eventually invalidate the interpretative part of the report without significantly reducing the value of the factual information. In other words, the interpretations are likely to have a much shorter useful "life" than the factual data. If need be, the latter can be reinterpreted at a later date. This consideration alone provides an excellent reason for keeping fact and inference in the report completely separate.

Subdivision of the basic outline in this way is convenient in explaining and emphasizing the lines of thought which should be followed in preparing detailed outlines for individual surveys. Whether or not it will be helpful to divide the actual report into separate parts, or whether precisely similar headings should be used, will vary from one survey to another.

Other important considerations which have guided the drafting of the basic outline include:

#### The Importance of Maps in Soil Survey Reports

Maps provide the most convenient source of information on soil survey findings and, to a large extent, the text of a survey report serves to answer queries which cannot be explained on the maps themselves. Recognizing the supporting role of the text and the need for easy cross-reference, the proposed report outline emphasizes that both factual and interpretative descriptions of the soils should be grouped in the text in the same units which are used on the various maps. Within the text it may well be desirable to refer to other groupings, but the headings and sub-headings used to group the descriptive material should correspond exactly to the mapping legends. Furthermore, all references to individual soils within the text should be clearly related to units shown on the maps.

#### Establishing Confidence in the Survey Findings

Emphasis is placed in the outline on description of the methods employed during the survey and of the criteria used in soil classification and interpretation. This information may later provide the only convenient basis for assessing the accuracy and validity of the survey and perhaps for deciding whether additional survey work in the area is necessary. It may be beneficial for a surveyor to consider at an early stage in his survey whether or not his methods will appear satisfactory under such exposure. The records required to give an accurate account of sampling intensity need to be collected from the very beginning of a survey.

The nature and presentation of explanatory material can also influence the credibility of a survey report. Novel conclusions or suggestions require explanation, particularly if they are, or appear to be, at variance with previous thinking. If the steps in this explanation can be supported by references to recognized scientific literature, so much the better. However, excessive explanation, particularly when supported by a mass of references that are scarcely relevant or carry little weight, can have the reverse of the desired effect, sowing seeds of doubt in a reader's mind where none existed before.

#### Allocating Space in Relation to Value

The various sections of a soil survey report are not equally valuable. Sections which describe the facts discovered and the interpretation of these facts are of fundamental importance. Other sections are mainly explanatory, describing how the survey was carried out, how the data was organized, and the environment in which the soils have developed and will be used. These supporting sections are by no means unimportant but a clear sense of proportion is needed to decide how much explanation should be included, how much the reader can be expected to find out for himself. By careful selection and reorientation of supporting information the author can save the reader much time and provide him with a better understanding of the survey findings. Each superfluous phrase makes the report a little less readable, a little less memorable. The space allotted to each theme needs to be weighed against the contribution it will make to the report as a whole. In particular, the author must guard against the intrusion of his own pet interests, lest they be allowed to occupy more than their share of the text.

The problems of apportioning available space need emphasis early in this publication for, in this connection, the expansion of the separate items of the basic outline given in later Chapters could be misleading. The amount of space devoted to describing the required subject matter under different headings reflects only the relative complexity of describing these requirements and bears no relationship to the relative importance of the different subjects or to the space which each should occupy in the report.

#### Proving that the Job Requested has been Completed

Many soil surveys are carried out in relation to specific terms of reference or as a part of a more extensive project with a specific plan of operations. It is most important to ensure that the report clearly indicates to what extent the original requirements of the survey have been fulfilled. This is not only a question of comprehensive reporting but also of logical layout. Failure to complete any part of the required work should be explained - not conveniently forgotten!

### HEADINGS OF THE PROPOSED BASIC OUTLINE

Here, only the main headings of the different sections of the proposed basic outline are presented - in effect, a slightly expanded version of the table of contents of the proposed report. The suggested contents of each section is described in the next chapter.

#### INTRODUCTORY SECTIONS

Abstract

Acknowledgements

Table of Contents

(List of Tables and/or illustrations)

List of Maps

(Glossary of Special Terms - if brief)

Introduction

Summary of Conclusions and Recommendations

MAIN TEXT

Part I: The Environment

Chapter 1: General Description of the Area

- (a) Location, population and communications
- (b) Climate
- (c) Physiography (including geology, geomorphology, relief and surface drainage)
- (d) Natural vegetation
- (e) Present land-use and human activity
- (f) Other (factors of special significance in the area, e.g:- wild life; sources of water in arid and semi-arid areas, etc.)

Part II: Methods

Chapter 2: Survey Methods

- (a) Office methods
- (b) Field methods
- (c) Laboratory methods

Part III: Soils

Chapter 3: General Properties of the Soils; their Genesis and Classification

- (a) General properties of the soils
- (b) The soil classification and mapping legend
  - (i) taxonomic soil classification and correlation
  - (ii) the mapping legend

Chapter 4: The Soil Mapping Units

Part IV: Interpretation of the Survey Data

(The number and titles of Chapters in this part of the report are dependent on the purpose and findings of the survey). A possible arrangement might be:-

Chapter 5: General Capability of the Area

- (a) The land capability classification
- (b) Land classification criteria

- (c) The land capability groups
- (d) Suitability of the soils for specific crops

Chapters 6 (7) (etc.): Suitability of (part of) the Area for  
Irrigation (rangeland) (woodland) etc.

- (a) The suitability classification
- (b) Classification criteria
- (c) Interpretation of the classification
- (d) Further studies required to implement development

CLOSING SECTIONS

References  
(Illustrations)  
(Glossary of special terms - if long)

Appendices:

- (I. Additional Technical Information
  - (i) survey methods
  - (ii) soil genesis
  - (iii) soil classification and correlation)
- II. Detailed description of individual soil units
- (III. Soil analytical data)
- (Index or Indices, if any)

Maps

## C H A P T E R   T W O

### EXPANSION OF THE BASIC OUTLINE

This Chapter discusses in detail the subject matter which it is intended should be included under each of the headings of the Basic Outline.

#### INTRODUCTORY SECTIONS

##### Abstract

An abstract is provided at the very beginning of the report to enable a potential reader to judge very quickly whether he is likely to benefit from reading all, or part, of the report itself. Provision of an abstract also assists documentation services to include an adequate summary of the report in their records, through which the attention of many more potentially interested readers may be drawn to the report.

To serve these purposes the abstract must be short (about 250 words) and yet must provide a self-contained summary of the more important findings of the survey and of the methods by which these findings were achieved. All information summarized in the abstract must be available in the report.

Wherever possible it is desirable to provide translation of the abstract in widely used languages.

##### Acknowledgements

In FAO reports, acknowledgements of assistance received in the execution of the survey or in compiling the report are given on a separate page, immediately following the abstract. A section of acknowledgements can equally well be placed immediately after the Introduction.

The purpose of such a section is obvious but it needs to be prepared with care. The indiscriminate scattering of superlatives detracts from the apparent sincerity of acknowledgements and if all and sundry receive personal mention it is difficult to single out those most deserving of the author's thanks.

##### Table of Contents

A good table of contents illustrates the whole structure of a report and guides the reader to those parts of the text in which he has particular interest. The table must be comprehensive, including the headings of all important sections but if it is too detailed its value as a convenient source of reference will be greatly reduced. Some expansion of the table of contents is justified if the report includes no index.

Normally, it is desirable to include all "first-order" and "second-order" headings which appear within Chapters of the main text and possible "third-order" headings if their subject matter is of special reference interest. In addition, the table should clearly show the position of Conclusions and Recommendations; the Glossary (if any); the location of lists of maps, tables and illustrations and the subject matter of separate Appendices. If large separate maps accompany the report, their nature should also be listed.

Careful arrangement is important to the clarity of a table of contents. This includes inseting, to indicate the relative "order" of the various headings.<sup>1/</sup> The wording of items

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<sup>1/</sup> The reader is referred to Chapter Three for a discussion of ways of indicating headings of different "order".



in the Table of Contents should correspond exactly with headings in the text. All page references must be correct, if the reader is not to be frustrated, indeed, infuriated. Checking of page references in the Table of Contents, and of cross-references in the text, is the last step in report preparation, immediately prior to printing.

#### List of Tables and/or Illustrations

Detailed lists, showing the subject matter and page reference of tables and/or illustrations, are of value to the reader for purposes of cross-reference. They are especially valuable when, for reasons of convenience and economy in publication, tables and illustrations are grouped in blocks within the text and are separated, therefore, from the subject matter which they illustrate.

#### List of Maps

This list also serves for cross-reference and refers primarily to small maps which are included within the text. Larger maps, appended to the report, may be included in the list, but such maps usually deserve separate reference in the Table of Contents.

#### Glossary of Special Terms

The aim of this section is to ensure that the text will be readily understood by the maximum number of readers. A very lengthy glossary should rarely be needed. A short glossary, confined to terms, weights and measures peculiar to the area surveyed and to a few technical terms, abbreviations or symbols, unavoidably used in the main body of the text, will usually be adequate.

The glossary should be placed at the front of the report only if it is so brief that the reader can reasonably be expected to remember the terms whilst reading the text. If the glossary forms a lengthy source of reference it should be placed at the back of the main text.

#### Introduction

The Introduction should provide a concise account of the purpose of the survey and of its organization and administration. It should include, without separate headings:-

- (a) An outline of the purpose of the survey, summarizing the Terms of Reference (if any) and giving a brief account of the background which created the need for survey.
- (b) A brief account of the execution of the project; starting and finishing dates; areas surveyed in various levels of detail; staff involved, national and expatriate (if any); training courses organized and of other activities or achievements not directly related to the immediate aims of the survey.

A final paragraph can usefully be devoted to explaining the arrangement of the report, drawing attention to the Summary of Conclusions and Recommendations and explaining the separation of factual and interpretative data and the presence of more technical information in the Appendices.

The basic outline does not include a Preface. On occasion, however, a Preface signed, if not written, by a person of high standing, can add authority to a soil survey report. It should be very brief and should draw attention to the contribution made by the survey to development aims. Normally, a Preface precedes even the Table of Contents, appearing immediately after the title page.

## Summary of Conclusions and Recommendations

A soil survey should lead to the formulation of a number of precise conclusions relating to the nature and distribution of the soils studied and to their development potential. A need to recommend certain specific lines of future action may also be recognized. These findings will be discussed in detail in various parts of the text. The complexity of soil survey findings is such that they can very rarely be summarized adequately in the report Abstract. Yet a summary of findings is very desirable for the benefit of busy administrators and planners who may have only marginal interest in the more technical aspects of the report.

Logically, a summary of conclusions and recommendations should appear at the end of the narrative part of the text. In a short report this placing would be satisfactory. Placement at the beginning is recommended, however, to ensure that this summary is not lost amidst text and appendices, which in most soil survey report are unavoidably lengthy. Coming at the beginning, it is especially important that the subject matter of this section be confined to a summary of the findings of the survey, lest it include very obvious and very tedious repetition of the Abstract or of the Introduction.

Many readers will judge the value of the survey from the contents of this section. Clearly, therefore, it is the most important section of the report and must be prepared with exceptional care. It must be concise, but it must also be self-explanatory. Its purpose is to encourage readers to study the remainder of the report but they should not be forced to do so in order to obtain a general understanding of this section. To assist readers to locate information of particular interest, individual conclusions and recommendations should be cross-referenced to related discussion in the main text.

Any temptation to impress the reader by the sheer volume of conclusions and recommendations arising from a survey must be firmly repressed. Inconsequential comments serve only to distract attention from recommendations and conclusions of real import. Thus, the contents of this section can only be finalized when the remainder of the report has been completed and the relative importance of all items considered for inclusion can be validly assessed.

A clear distinction should be drawn between conclusions, which call for no immediate action and for which some element of uncertainty is permissible, and recommendations, which must be firmly stated and unambiguous. Separate sub-sections, possibly with separate sub-heads, should be devoted to conclusions and to recommendations.

In summarizing the findings of the survey in the sub-section on conclusions, emphasis should be placed on interpretative findings, since these are likely to interest a wider range of readers. The sub-section can usefully open with a statement, frequently in tabular form, of the proportion and/or areas of soils (or land) of differing potential identified. Purely numerical distinctions between soil (or land) classes, e.g:- Class I, Class III, are not sufficient. The significance of each class must be briefly defined, although it may be desirable to note that more precise definitions of each class appear later in the text. Where possible, practical alternative uses of all, or part, of the surveyed area should be summarized. The general nature of development requirements (e.g:- inputs, such as fertilizers, mechanization, drainage, etc.) should be outlined and any major social, technical or economic development problems should also be summarized.

Areas mentioned in the conclusions, or the recommendations, should be identified in such a way that the reader can locate them on one or more of the maps which accompany the survey report.

If they are to stand a good chance of implementation, recommendations should be pertinent, practical and not too numerous. Subjects which, in different surveys, may usefully form the basis of recommendations include:-

- (a) the identification of areas where immediate development effort is recommended;
- (b) the identification of other areas having future development possibilities;
- (c) the nature of additional survey work required prior to development, in particular to provide "feasibility-grade" data to attract investment capital;
- (d) the need for research, or pilot development, to solve specific problems;
- (e) the need for organizational or administrative changes to facilitate development. (Such recommendations must remain within the competence of the soil survey team and the action required should be within the capacity of the authority responsible. A recommendation for an increase in laboratory support by the establishment of a field laboratory is a possible example).
- (f) specific proposals for the establishment of training courses and/or training facilities for survey staff.

Each recommendation deserves a separate paragraph. If, unavoidably, there are a very large number of recommendations, it may be desirable to group them according to subject matter under minor headings. To emphasize the important purpose of these paragraphs they should be introduced individually, or collectively (depending on their number) by the phrase "It is recommended that..."

If the survey report is but a contribution to an overall report on a multi-disciplinary project, the surveyor must ensure that his conclusions and recommendations are not at variance with those of his specialized colleagues. If need arises, he must negotiate compromise recommendations before writing this section.

## MAIN TEXT

### Part I: The Environment

#### Chapter 1: General Description of the Area

This part of the report should give a concise, yet reasonably complete and accurate, picture of the environment of the survey. As a minimum requirement, each section should provide all the information needed to support the conclusions and interpretations made in the remainder of the report.

In most reports the chapter should include a small scale map showing the location of the survey(s) in relation to the country as a whole. Other small maps showing the distribution of vegetation, climatic phenomena, etc. within the area(s) surveyed can be very helpful in reducing the required amount of text.

In preparing this chapter the author should draw upon all available information relating to the area, clearly indicating the source of his data in each case. In many areas a large amount of such information will be available. The author must then make a careful selection, avoiding data that is not strictly relevant to the description or interpretation of the soils which he has surveyed, and carefully summarizing the remainder.

The sub-headings proposed for this Chapter in the Basic Outline are only intended as a guide. They will meet the needs of many surveys but the adequate description of certain environments may demand slight changes in emphasis and the inclusion of additional headings. For example, in describing many arid or subarid areas, separate sub-sections on geomorphology and hydrology are desirable.