

AUSTRALIA ON PAPER

by

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The writer outlines some of the skills that go into the production of maps, and defines scales and projections in a way that will clarify any elementary misconceptions about them. There is some comment on the various uses to which maps may be put. A brief history of Australian mapping, with special references to governmental mapping, is provided – developments of the earlier years are explained in outline, and more detail is supplied about the achievements and difficulties of the past 30 years. The author describes the functions of the principal governmental mapping authorities in Australia, and lists the various series of maps for which they are responsible.

“A map is a graphic portrayal of selected elements of all or part of the physical and cultural environment.”

A map is more than just a piece of paper. It is the end result of an application of the knowledge and expertise of a large number of people in a wide range of occupations.

Almost anything can be, and is mapped; routes which motorists are advised to travel (so familiar to us as the road map), crop yields, incidence of disease, geology, industrial activities, potential land use, population distribution and so on. These and an almost infinite variety of topics are vital factors in the development and maintenance of our society, and can best be portrayed graphically, rather than verbally.

The raw material comes from a variety of sources. The surveyor, in conjunction with the photogrammetrist working from aerial photos, provides the material from which the base map is constructed. They work with sophisticated equipment of extreme precision, and employ mathematics of a high order, to produce the accurate bases required in modern maps. To the base can be added the information gathered in the field by social and physical scientists. The theoretical scientist and the statistician can provide information on many further topics while the civil engineer uses the base as a foundation for his design work. The compiled data must be edited, assessed and subjected to a method of presentation which satisfactorily transforms the raw material into an easily comprehended graphic form. This commonly presents many problems, both aesthetic and practical. The nature, completeness and accuracy of the data; the anticipated end use for the map; printing methods and economies of production: these all impose limitations. The most important considerations are those of scale and projection. The scale chosen will depend on the nature of the data to be portrayed and the degree to which it can be generalised or symbolised. All maps are a generalisation, to some degree. The map user must appreciate this, and the extent to which various scales affect generalisation. The projection is the means by which the spherical surface of the earth is transferred to flat paper. Distortion of area, shape and direction is the inevitable result, but projections can be constructed to minimise the distortion of any of these factors, at the expense of the others. Thus a projection giving minimum variation of areas is selected for distribution maps, while navigation maps require a projection giving true directions. The map user must also be aware of the fact that the map portrays the situation as at a given time, and that changes almost certainly will have occurred.

The preparation of the map proper involves many different skills – those of the draftsman, the designer, the typographer and the artist; while its publication involves those of the photographer and the printer. The modern cartographer is a specialist in one or another of the skills required in map preparation, but he must also be familiar with the processes involved in compilation and publication. The traditional cartographer is now all but extinct in the face of this increased technology.

Computers are now coming into use as data banks and control media for automated cartographic plotting and drafting. The new techniques being evolved are opening even wider fields of cartographic activity. They will supplement and extend the cartographer's cope, rather than replace him.

The finished product is a combination of the expertise of all the researchers, artists, and craftsmen involved, and the result, if well designed, can be regarded as a true work of art. In fact, the map is one of the few successful marriages of art and science.

The uses to which maps can be put are as varied as their subject matter. The most familiar to the general user are the road map and the army ordnance or topographic map. These provide basic information for both the private individual and the professional user.

From the point of view of scholarly understanding and research, and its application in civil administration and development, however, the most important are the topic or thematic maps, some of which have been referred to above. These maps are generally the end result of a program of research, and are intended both as a working tool and as a medium of communication between specialists in positions of social responsibility in both theoretical and practical fields.

In many cases the map is the most convenient and easily understood means of conveying information. It frequently accompanies printed matter, and gives details of the main points being made by a report or a thesis, and of the methods by which these main points were arrived at. Maps and plans produced for internal use by many government departments are exceptionally important, though the general public may not know of their existence. They are primarily working tools for development and maintenance projects. Without a map, the scientist, planner and administrator would, in many cases, be almost literally working blind.

Australian Mapping

Prior to the settlement of Australia, maps of this continent were almost entirely outline ones, or sheets in world atlases produced by European nations. On the foundation of each Colony or Province of Australasia, it became apparent that there was a need for maps to delineate land available for sale to the public since this was a prime function of the colonizing body. The primary subdivision of an area of land for a purpose such as this is a cadaster. In the early years, cadasters were, of necessity, achieved by a rapid and often crude and disconnected field survey, which showed a bare minimum of topographic detail, usually stream patterns only, with major ranges occasionally shown diagrammatically. This, however, set the pattern of future land alienation and resubdivision. The mapping authorities were the Colonial lands departments.

Outside the more densely settled areas, maps were drawn showing pastoral runs; these were even less accurate, being based largely on field sketches and notes derived from exploration and early pastoral occupation. To the cadastral

base maps each Colony came to add such topics as geology as the need and opportunity arose. Maps with these topics as their theme, however, covered only a small percentage of Australia, being limited to areas where there was a specific interest in that theme, such as the Victorian Goldfields from the 1860's. The basic cadastral surveys thus constituted almost the whole of the map coverage in Australia until relatively recent times. They were, moreover, deficient in accuracy and highly generalised. An important but little known aspect of mapping was the maps and plans produced by Government agencies for Public Works. These were based on detailed and relatively accurate survey, but of specific and limited areas. The data accumulated rarely found its way into the general maps.

The need for a unified and accurate Australia-wide survey, based on proper triangulation methods, became apparent when the defence forces attempted to combine the various colonial cadastral surveys in order to provide a uniform base set on which to add topographical detail from their own surveys. For a time, the task of coordination was too great.

Federation paved the way for concerted action and World War I provided the initial impetus. The Survey Section of the Royal Australian Engineers began its own Australia-wide survey program in 1914, using field techniques, and producing what were admittedly only a few topographical maps between the Wars, at a scale of one mile to the inch, covering areas of strategic importance only.

State government departments were initiating or expanding their own mapping programs, producing some thematic maps and continuing their general survey operations, mainly for public works. In each State the lands department remained the principal mapping and survey authority, closely associated with government printing services. Both the Royal Australian Navy and the Royal Navy continued their programs of coastal charting, which had been in progress from the pre-Colonial era, unaffected by terrestrial or Colonial administrative considerations.

The increasing use of the motor car caused an accelerated public demand for maps and facilitated field survey and data collection for mapping. More significantly, the use of aircraft from 1930 onwards for aerial survey, based on photographs, opened up immense possibilities for interpretation and assessment of natural and cultural features. Coordination between the States, however, remained almost non-existent; the Army remained the only Australia-wide mapping authority, but with limited funds and resources.

The 1939-45 War brought into being an emergency program of mapping by the Royal Australian Army Survey Corps – as the survey section was then known. Topographic mapping at a scale of one mile to the inch was continued in vital areas, while most of the balance of the continent was covered by a new, emergency edition, providing maps at four miles and eight miles to the inch. These were a result of field reconnaissance to a large extent, and showed basic topography for the first time. The old cadastral and pastoral plans were relied on for detail in some areas.

After the War the State lands departments set up full mapping sections for their own topographical mapping. Their first major undertaking was a topographical series at a scale of 1:31,680 (40 chains to the inch) for development and planning purposes. The new mapping programs were built around the science of photogrammetry, which had developed rapidly under War-time pressure. The necessary aerial photography was initially provided by private contractors, but is now a function of the department itself in most

States. Other State and some Commonwealth Government departments realised the need for mapping programs, and set up their own organisations. Others again used material from the lands departments as a basis on which to build their own programs.

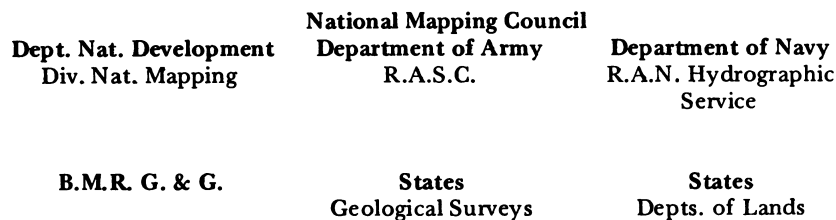
Owing to lack of co-ordination at State and Commonwealth level, problems began to become apparent; in an effort to solve these a National Mapping Council was formed in 1946 to undertake liaison between the government authorities concerned. This was followed in 1947 by the National Mapping Section of the Commonwealth Department of the Interior, which itself became responsible for mapping on behalf of the Commonwealth Government (apart from that undertaken by the Army). Expansion and improvement of the services initiated by the Army in war-time continued, and the Department of the Interior began its topographical series at a scale of 1:1,000,000. The provision of necessary air photography for Commonwealth mapping was afforded by the R.A.A.F.

In 1956 the Division of National Mapping was created as part of the new Department of National Development. It is now, together with the Army Mapping Service, the authority responsible for Commonwealth mapping. The National Mapping Council continues to function as the authority responsible for standards, organisation, and liaison between the Army, the Division of National Mapping, and the State departments of lands, and as a co-ordinating body for other State and Commonwealth map-producing agencies; principally between the Commonwealth Bureau of Mineral Resources, Geology and Geophysics, and the State departments of mines and geological surveys.

In 1958, the first national mapping program was initiated. By the end of that year, the first maps with constant scales easily convertible to metric terms (1:50,000; 1:100,000; 1:250,000) were introduced, to replace those in scales based on imperial mensuration.

The Principal Mapping Authorities in Australia

The relationships between mapping authorities in Australia can be illustrated in the following diagram:



The Division of National Mapping is responsible for air photography, and for mapping (topographical, aeronautical, geographical and special) for other Commonwealth departments. It is responsible for the survey and mapping of the Australian territories. It has obligations towards the basic national survey and the establishment of survey control, and international liaison with regard to survey data. Its program includes maps at scales of 1:1,000,000 (topographical – international map of the world); 1:250,000 (topographical, with the Royal Australian Survey Corps); 1:100,000 (topographical, with the R.A.S.C.);

1:50,000 (topographical, with State lands departments and the R.A.S.C.) and 1:100,000 air photo indices and the Atlas of Australian Resources.

The Royal Australian Survey Corps is responsible for topographical maps only, supplementing the Division of National Mapping and State lands departments' works on maps at scales of 1:250,000; 1:100,000 and 1:50,000, both in Australia and in Papua/New Guinea. Technical assistance is also given to countries such as Indonesia.

The Royal Australian Navy is responsible for hydrographic and coastal charts.

The Bureau of Mineral Resources, Geology and Geophysics is responsible for geological mapping at a scale of 1:250,000, in conjunction with the State geological surveys. The States also produce larger scale series, especially geological surveys at 1:50,000, and various special large scale regional and thematic maps, such as those illustrating mineral occurrences. These maps are generally available only in technical reports.

The State lands departments remain the principal State mapping and publishing authorities. Their operations are of a large and varied character. The prime function is traditionally cadastral mapping at various scales. Additional information, such as stock routes, local government areas, or local court district boundaries, are often added for administrative purposes. Large scale topographical/cadastral series, at scales of 1:10,000 or larger, are being introduced, for administrative and developmental purposes. Generally, these are restricted to the more densely settled areas. The vast number of maps involved, and the detailed work necessary, mean that this will be a long-term project for most mapping authorities. Similarly, orthophoto maps are now being produced for some purposes by some States. These show selected cultural and physical detail superimposed over an accurate assembly of air photos. Topographic mapping at a reasonably large scale (1:50,000) in conjunction with the Division of National Mapping, and other scales for local use (generally 1:25,000) are other features of the State's departmental programs. The old scale of 1:31,680 is now virtually abandoned in favour of those mentioned above. In addition, a range of miscellaneous maps is produced (often for other departments) each State determining its own requirements. These include maps produced for tourist purposes, those illustrating land use or the location of national parks, and those showing transport facilities. A few of the larger State departments such as Forestry and Planning now have their own fully operational cartographic establishments, although they rely on the lands departments to some extent for such elements as base data and printing.

Outside the sphere of the Division of National Mapping, many Commonwealth departments produce maps, for both internal and public use. The Commonwealth Scientific and Industrial Research Organisation (C.S.I.R.O.) prepares regional series, covering a range of topics such as geomorphology, forestry, soils, hydrography and plant culture. It also produces maps which form part of officially published series, such as the Soils and Land Use Series for Australia and Its Territories. The Department of the Interior has embarked on a comprehensive topographical coverage of the internal Territories of the Commonwealth, for planning purposes, beginning with the Canberra district.

Post war development has given rise to the need for this type of comprehensive regional coverage, but at the necessarily large scales involved, progress has been slow, and priorities strictly controlled. The N.S.W. Premier's Department was early in the planning field in the immediate post-war years; it produced regional reports in which maps were prominent. The Central Planning

Authority in Victoria, and Cumberland County Council in New South Wales, were also engaged in resource and facility assessment for planning purposes. Other States and organisations followed suit. These ventures mark the first comprehensive oversight of any part of Australia. The C.S.I.R.O. regional studies and some new State programs are now well under way.

The State departments responsible for harbours and marine matters have also experienced an increase in demand for maps and charts; ports and harbour works have needed to be represented on maps and diagrams to meet demands caused by changing and increasing use of sea-borne traffic. The Navy's hydrographic surveys have also been given priority status.

In all, some 50 State and Commonwealth Government departments are engaged in major mapping programs throughout Australia, while a further 25 produce occasional maps in one form or another, generally for special purposes such as reports. The most important of these concern forestry, soils, planning, public works, water supply and transport. Many other government departments have a large output of plans. While these are not maps, properly speaking, they are closely related and in many cases are now used as a primary source of material in map compilation.

Over 30 private organisations are engaged in mapping, many under contract to State government departments. Others, such as the publishers of road maps and directories, are issuing material for the public.

Mapping in Australia has long lagged behind other developed nations. This is the result of a combination of factors – a large and difficult land area, and a small population with the consequent shortage of trained personnel – and, most importantly, a shortage of funds.

While the first of those factors still remains, new techniques are overcoming the difficulties, and are facilitated by an increase in the funds available, as a result of the renewed and strengthened awareness of the vital role that mapping can play in the development of the nation. Training of specialised staff is now well advanced also. Much remains to be done, but in the last two decades great progress has been made in coverage, as well as in the quality and scope of the output.

Papua New Guinea Records Project

A Papua New Guinea records project has been launched by the Pacific Manuscripts Bureau, Research School of Pacific Studies, Australian National University, and the inaugurators have been fortunate enough to obtain the services of Mr. Kevin Green, formerly Chief Archivist of Papua New Guinea, as Project Director. Mr. Green began his career in archives in the Archives Office of Tasmania, and was subsequently (before going to Port Moresby) on the staff of the Business and Trade Union Records Unit at the Research School of Social Sciences, A.N.U.

The aim of the New Guinea Records Project is to locate unpublished documents of historical, literary and scientific value on Papua New Guinea, and to supply copies to participating libraries. The Government of Australia has provided a subsidy, and the balance of the finance is to come from 19 co-operating libraries (in Australia, New Zealand, the United States, and Papua New Guinea itself) who will pay a subscription each year for two years. The project will enjoy the hospitality of the Department of Pacific History in the A.N.U., and Mr. Green will be directly responsible to the Executive Director of the Pacific Manuscripts Bureau.