A data bank of Australian resources

In 1979, the CSIRO Division of Water and Land Resources began work on a challenging job: creating a computerized system for storing and analysing a diversity of information about Australia and its people.

Known as the Australian Resources Information System (ARIS), it now contains data on, among other things, terrain, climate, vegetation, soils, dwellings, industry, and roads. The current list of subjects covered is given in the table, and more data will be included.

The data-storing aspect of the system is called ARDB — the Australian Resources Data Bank.

A key feature of the system is that all the data sets are related to standard geographic areas covering the whole country, without gaps or overlap. Data can be processed arithmetically, logically, or statistically. Already about 2000 variables have been introduced into ARDB to describe each discrete area called a Basic Mapping Unit (BMU).

The BMUs are either local government areas (shires, municipalities, or cities), or multiples or divisions of them in cases where these are inconveniently small or big.

Two other components complete ARIS — the Australian Resources Mapping graphic data bases in Australia.

The scientists have designed ARIS to solve the following sorts of problems.

Location problems involve searching for regions meeting criteria for particular proposed activities. For example, the system could be used to find 'possible' locations for a uranium enrichment plant or a major quarantine station, or to find areas on the New South Wales coastline suited to conservation, recreation, or development.



Meteorological data are part of the ARIS data bank.

System (ARMS) and the Australian Resources Bibliography (ARB).

As the main tool for getting information out of the system in the form of maps, ARMS can produce final maps, with data coded to chosen shades, as black and white or colour film or as coloured computer plots.

The bibliographic component, ARB, is a collection of references to relevant resource inventories, studies, and maps, and is at an early stage of development. So far, a trial set of 250 references has been geographically coded and computerized. Work is proceeding to make ARB compatible with existing computerized biblioPolicy problems involve searching for areas affected by, or subject to, various resource and environmental policies. As an example, it may be necessary to find areas subject to the New South Wales State planning policies.

Monitoring problems involve searching for areas where some specified type of change is occurring. For example, the system could locate all areas with a population growth rate greater than a certain figure.

Inventory problems involve searching for areas containing particular resources or environments. Problems in this category could include the finding of areas that have potentially highly productive soils.

Much of the effort of the ARIS development team, led by Dr Doug Cocks, is still going into the improvement of technical aspects of the system, but team members are contemplating at least one major task: to generate a range of alternative national land utilization strategies. The project will examine 15 diverse land-use goals, which range from the maintenance of environmental quality through to the provision of land for such uses as parks, recreation areas, or industrial development sites, and for heritage protection.

A demonstration of the capabilities of ARIS emerged from an attempt to

Where to put a new city?

Should the need arise, where would be a suitable site for building a major new city? According to ARIS, it may well be in Queensland, between Mackay and Rockhampton. Data on geology, land form, water resources, minerals, roads and railways, ports, and so on were used to provide ratings for the urban suitability of all areas throughout Australia.

As a first step, the program totally excluded some areas from consideration: those with little available water and those in the Murray–Darling basin where salinity is a problem. Also, mountainous and unpopulated regions were ruled out. A 'combined exclusion map', rejecting areas affected by one or more of these drawbacks, was then produced. Next, the team identified areas where there are good, but not overwhelming, reasons for not siting a city. These areas are: liable to natural hazards (such as cyclones, earthquakes, bushfires, and floods); already heavily populated; inaccessible; lacking natural construction materials; or in environmentally fragile zones. A 'combined avoidance map' was produced, rating each area according to how many undesirable factors it carried.

Similarly, a 'combined preference map' was produced, showing the number of factors favouring different areas. Such factors included: a pleasant climate, proximity to energy supplies and to the coast; and favourable prospects for resource development.

Putting all the maps together gave the 'promising areas map' shown here. The Broadsound Shire, in this demonstration, stands out as the most promising site. Of course, much more detailed investigation would be needed if construction of a new city was planned.



The Broadsound Shire in Queensland, marked in green on the map, is the area most favoured for a new city, says ARIS.

The ARIS data bank

Present and proposed data cover:

- population and housing ' (Australian Bureau of Statistics Census)
- the environment (soils, vegetation, terrain, land form)
- coastal features (foreshore and backshore land form, vegetation, land use)
- climatic variables
- Commonwealth land holdings
- ▶ railroads
- mineral production and mining
- environmental hazards (cyclones, bushfires)
- energy costs (location of major supplies, heating/cooling costs)
- environmentally fragile areas such as wetlands
- water resources (uncommitted yield, surface water use, supplies for metropolitan areas)
- location of major economic development areas
- airports (number, whether scheduled or commuter flights)
- electricity distribution
- thermal comfort

These data sets are already included in ARDB or are available and can be added if required.

answer the hypothetical question 'where would be a suitable site for building a major new city in Australia? The answer appears in the accompanying box.

In the Year of the Tree (1982), ARIS was also used to find out, in general terms, where trees are lacking and should be planted. In answering a request from the Department of Home Affairs and Environment, the team programmed ARIS to combine its data on degree of modification of the natural vegetation (in particular, trees) with data from the Department describing areas with appreciable erosion.

The Department then mapped the results of this study as an aid to distributing funds for tree planting among shires.

Another ARIS exercise has been to find out where over Australia to place a geostationary satellite so that the greatest number of people, not presently in range of a television transmitter, can receive its signals.

The ARIS system is being designed to be usable by people without computer training. Eventually, access to ARIS will be available, to everybody through the Australia-wide CSIRO computing network, CSIRONET. At this stage of its development, only a few outside tasks can be accepted by the ARIS team.

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