# Fungis

Volume 2  Number 1  September 1991

## Newsletter of the Far North Queensland GIS Group Inc

### CHAIRMAN'S REPORT

Thank you to our Secretary Peter Rey for organising our June Seminar 'GIS in Progress'. Merryl Hardwick and Christine Henderson also helped with the seminar arrangements, and their assistance is gratefully acknowledged. The seminar proceedings are now printed, and a few spare copies are available for last minute orders at $10 each.

James Cook University plans to run GIS and remote sensing short courses in Cairns during November, and a Sumner School at Townsville in early 1992. Formal GIS and remote sensing training courses, ranging from Technical Certificates through to Masters Degrees are also available at JCU. Course details supplied by Steve Turton (Cairns) and Pauline Catt (Townsville) are included in this Newsletter.
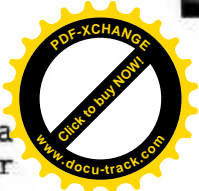
Mareeba TAFE and high schools in the Cairns area have indicated an interest in GIS. Our Committee will be pleased to provide advice to education centres considering the introduction of GIS into their curriculum.

The venue for our next General Meeting is the Atherton Shire Council Offices on 15th November. Bob Peever will describe the system he has been developing for Atherton Shire on Arc/Info (without the DCDB). In addition, Guy Carpenter will describe CSIRO's Tropical Forest Information System (TRCFIS) used to investigate relationships between climate and vegetation in a latitude band across Queensland. We look forward to seeing you at what promises to be a very interesting meeting.

The enclosed questionnaire will help us maintain our mailing list and assist JCU to plan its short courses in Cairns. Please complete the questionnaire, and return it as soon as possible.

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### NEXT GENERAL MEETING

The next General Meeting will be held at 10:00 am on Friday 15th November 1991 in Atherton Shire Council Chambers at 45 Mabel Street, ATHERTON.

## FNQGIS Group Inc

### MAILING LIST

### UPDATE & QUESTIONNAIRE

The mailing list is being updated, and a questionnaire is enclosed with this Newsletter. To ensure that you are on the new mailing list, please fill out the questionnaire. A **stamped addressed envelope** is enclosed for you to return the questionnaire.

## AGRICULTURAL PEST MANAGEMENT

The following article was prepared and submitted by **Crop Tech Research**, a privately owned organisation which has obtained industry funding to conduct an Integrated Pest Management program in the Bundaberg region. The primary aim of the Integrated Pest Management program is to reduce the reliance on total chemical control of the major pests and diseases that affect small crops in the area. Tomato Leaf Miner is the major insect pest of tomatoes in the Bundaberg region. Observations in the past seasons have indicated a slow build up in numbers during spring followed by a rapid escalation of numbers during summer.

To quantify the population dynamics of the insect, an intensive grid system of traps was established in August 1990. The traps, placed approximately two kilometres apart, consist of an attractant suspended over free water to catch the male moths. (The attractant is a piece of soft rubber impregnated with pheromone, which is an artificially manufactured scent that closely resembles the scent exuded by the adult female.) The 160 traps in the grid system are checked weekly.

During the early summer months, because of low numbers, counting the catch was relatively easy. However as the season progressed and the numbers increased this became a very time consuming chore (some traps contained up to 5,000 moths). To speed the operation, a system was devised whereby the moths were weighed instead of being counted. Although this system sacrifices some accuracy, statistical analysis has demonstrated the error obtained is within acceptable limits.

**MapInfo** GIS software was selected to process the mass of field information and generate a map showing the distribution and density of moths throughout the area covered by the monitoring grid. This approach provided a quick and easy means of communicating information obtained from the exercise to the crop growers. It was possible to observe 'waves' of infestation as they passed through the region. Data collation and generation of a map takes approximately one hour. Every week a new map is generated and published in the local newspaper.

This item was extracted from the ERSIS Winter 1991 newsletter - Alan.

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# GPS : THE RUSSIANS ARE COMING

Military paranoia in the United States has lead to the accuracy downgrading of the Global Positioning System (GPS) of satellite navigation. Uninhibited, the GPS signal can be accurate to 1m; However, the US Department of Defence has "dithered" the signal to an accuracy of no less than 100m. The Department of Defence says this "selective availability" code is primarily intended to reduce the accuracy available to unauthorised users (... the enemy). This policy, perhaps inspired by the frozen military attitudes suffered during the Cold War, is now under question due to unheralded breakthroughs in East/West relations.

Glasnost, the Russian phenomenon meaning 'openness' promoted by Soviet President Mikhail Gorbachev, is breaking new ground in US/Soviet diplomacy with spinoffs including unexpected advancements in global satellite navigation.

Throughout the 1980s the US designed GPS captured the imagination of the seagoing and surveying public, and navigation equipment manufacturers around the world. While the West's manufacturers and retailers scrambled for a commercial lead with their respective GPS products, 1990 has revealed the Russians have quietly developed their own version called **Glonass**. With a name sounding ironically similar to Glasnost, the Soviet system is close in character to GPS.

Glonass's similarities include satellite constellation configuration, frequency ranges and position determination principles. These similarities make it possible to consider integrating the two systems into a single receiver.

Californian electronics company **Magnavox** is at the forefront of GPS development and in late 1988 began working on a combined Glonass/GPS receiver. The prototype underwent initial testing late in 1990 and the claimed results were very encouraging.

Magnavox spokesman Jim Rhodes said, while on a visit to Australia, the USA was looking at working with the Russians on a joint system. He also confirmed the US Department of Defence was degrading the GPS civilian (C/A) code for military security reasons. He said the decision to degrade information accuracy was based on US fears of a pin-point accurate first strike nuclear attack on strategic installations. Military paranoia is alive and well in America. Although accuracies of between 10 to 20m were experienced at first with GPS, the US Dept of defence degraded the C/A code from March 25, 1990.
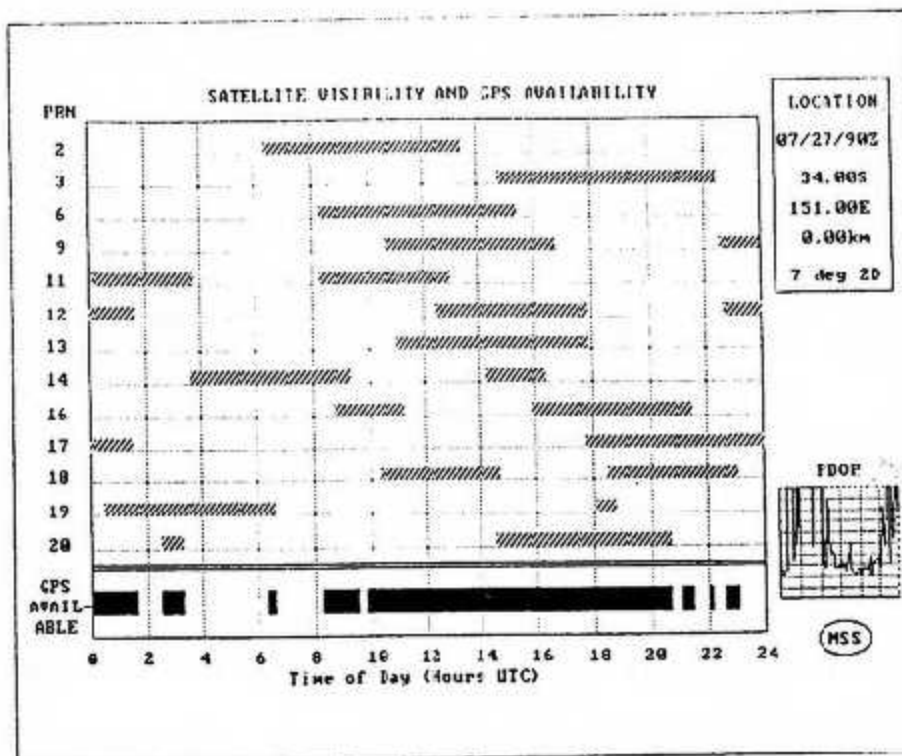
Accuracy levels are now limited to 100m, with a 95-98% certainty. This move by the US may prove ineffective if the Soviets allow uninhibited access to their system. "The Russians have said they will make Glonass available to all" Rhodes said. In a recent technical paper, Magnavox principal engineer Raymond Eastwood stated :- "Interestingly, when selective availability is invoked on GPS, degrading its accuracy to approximately 100m, Glonass may actually provide better time transfer

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and navigation than GPS." Eastwood said there were many advantages to an integrated GPS/Glonass receiver. "There is no doubt that better results can be achieved from using both systems than with either of them alone."

The possible availability of Glonass and the development of a joint Soviet/US satellite system has the potential to weaken the effectiveness of degrading the civilian GPS code. Rhodes said these factors, combined with mounting world-wide pressure from commercial operations for 'pinpoint accuracy', suggested there was a chance the GPS selective availability policy would be relaxed after 1993. While the Russians have been launching Glonass satellites since 1982, the US Department of Defence developed GPS in the early 1970s as a replacement for the SatNav system. When the US Navy developed SatNav during the 1960s it was the first major breakthrough into satellite navigation.

SatNav set new standards in electronic position accuracy, but it relied on tracking a single overhead Transit satellite and needed precise boat speed input. During gaps of up to 60 minutes in passes of Transit satellites SatNav dead reckons by recording the vessel's log and compass data.

Typical of man's quest for new knowledge, GPS is now replacing SatNav. Depending on the complexity of the GPS unit, information supplied can include :- latitude, longitude, speed, course, bearing, distance to next waypoint, time to go, crosstrack error, distance made good, elapsed time, multiple instant waypoints, waypoint memories, multiple route settings (with multiple waypoints per route) and more. Still in it's launch stage, GPS will eventually be a 24 hour satellite based navigation system with a positioning accuracy from below 1m to 100m, depending on the type of receivers and user status.
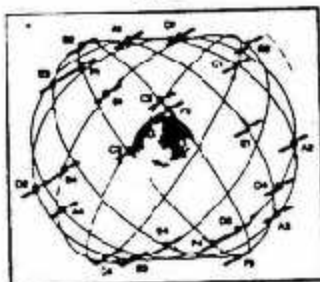
The US Department of Defence achieved a breakthrough with GPS accuracy in military use, but they didn't want unfriendly powers to tap into this precise positioning information. The solution was to develop two separate codes; the C/A code for everyone and P code for military use. C/A code gives a theoretical accuracy of 15 to 100m, while the secret P code has a theoretical accuracy of less than 1m to 11m. Despite this decision to degrade the C/A code, civilians can still obtain accuracy of 3 to 5m. Known as the 'differential GPS method', this system requires two receivers, with one located at a known position, or base station, that will act as a static reference point for the mobile unit. Tests indicate this system will have a range of around 1000 km from the base station. It was intended that the GPS would be completed by 1989. But the 1986 Challenger disaster caused a setback as NASA was forced to reassess its space program.

The new official deadline for GPS to be fully operational in 3-D (latitude, longitude, altitude) is 1993 and for Transit to be kept on air until 1996. In early 1991, 14 satellites were operational in the GPS system. Eventually, 24 satellites will comprise the GPS constellation. Of these 21 will be primary satellites and 3 active spares. Four satellites will be evenly placed in each of six orbital planes some 20,200 km above the earth's surface. This allows a minimum of 4, probably 5 and even up to 10 satellites to be simultaneously visible from any location on or above the earth's surface.

For navigation, which is a 2 dimensional solution not requiring altitude data, only three satellites are necessary. This means, at the present rate of the launch program (5 a year), 2-D coverage in Australia will gain 24 hours per day status by mid to late 1991.
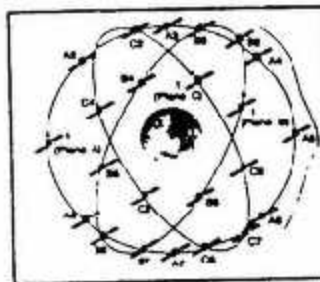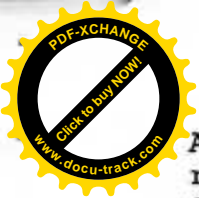
## SYSTEM COMPARISONS

GPS

- 24 Satellites (4 x 6 Planes)
- 1 Day* Ground Track Repeat
- 1 Frequency, Multiple Codes (CDMA)
- 1 and 10 MHz Code Clocks
- Kepler-Like Orbit Parameters
  *Sidereal Time

GLONASS

- 24 Satellites (8 x 3 Planes)
- 8 Day* Ground Track Repeat
- 1 Code, Multiple Frequencies (FDMA)
- 0.5 and 5 MHz Code Clocks
- Cartesian Coordinates

At present Australia is receiving about 18 hours of GPS coverage daily. Until the 3-D system is declared fully operational, all official government documents classify the system as experimental and carry the disclaimer "Use GPS at your own risk".

With the Transit satellites to remain operational until at least 1996 (if not beyond) SatNav will continue to provide intermittent fixes 24 hours a day. In the marketplace, GPS is creating plenty of interest with manufacturers releasing a variety of units from powerful multichannel receivers to relatively simple hand held units. There is also a small 'black box' GPS receiver unit now available which can be integrated into an existing Transit SatNav; This option gives the user flexibility between these two overlapping navigation systems. At the bottom end of the technology are the single channel slow sequencing receivers. These receivers read one satellite at a time and have to sequence through a series of satellites to obtain a complete set of measurements.
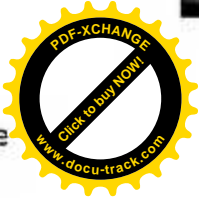
The signal strength to acquire a satellite is greater than the strength needed to maintain track on it. This puts single channel sequencing receivers at a disadvantage, compared to multichannel units, in low signal strength areas or where signal interference occurs. Because only one channel is available these receivers have to periodically stop navigating to acquire a new satellite. The frequency and range search to acquire a satellite can take 30 to 60 seconds depending on the individual receiver; During this time a navigation solution cannot be performed.

Multiplexed, or fast sequencing receivers, are single channel receivers that sequence through the satellites under track at least 50 times a second. Because of their ability to make numerous measurements of each satellite, these receivers are more responsive than slow sequencing units. But both slow and fast sequencing receivers are limited to the number of satellites they can track and they require a stronger signal than continuous tracking receivers. Multichannel continuous tracking receivers usually have from 4 to 12 channels built in and, unlike sequencing receivers, they can rotate through the satellites under track. These receivers assign a channel to one satellite and this produces a continuous stream of measurement information.

Once locked onto a satellite, these receivers require less signal strength to maintain contact than sequencing models.

The GPS satellite signals are inherently weak and are adversely affected by obstructions, like reflections off objects in the vicinity of the receiver. Additionally, as satellites approach the end of their serviceable lives their power level probably will reduce. With less signal strength required and a capacity to monitor numerous satellites at once, the multichannel receivers provide more precise measurements with continuously updated information and a faster time to fix. A six channel receiver designed to acquire position data as fast as

possible can compute the first fix in 30 - 45 seconds after power is turned on. A single channel receiver can take from 3 to 5 minutes to achieve a fix.

The above article was precised from a paper by Neil Patchett. Patchett's paper was written to enlighten the Maritime fraternity, but I feel will interest most FUNGIS readers - Alan.

## G.I.S. AND REMOTE SENSING COURSES AT JAMES COOK UNIVERSITY (1991-1992)

### 1. Cairns Campus of J.C.U.

**Date : November 1991** (exact dates yet to be determined)

**Venue : James Cook University (Cairns TAFE)**

Three 2-3 day short courses will be run on the following topics :-

A.  Image-based GIS. (Remote Sensing and Predictive Modelling in Resource Management.)

B.  Cartographic GIS. (Map Design and Spatial Analysis Techniques.) The emphasis will be on landuse/natural resource management issues/problems.

C.  Database GIS. (GIS and database design and operation.)

Further details on these short courses may be obtained from Steve Turton (JCU, Cairns Campus, telephone (070) 31 1237).

### 2. Townsville Campus of J.C.U. Summer School, February 1992

Two week Intensive Masters Level Course titled "G.I.S. and Environmental Management".

Further details may be obtained from Dominique Benzaken (JCU, Townsville, telephone (077) 81 4996).

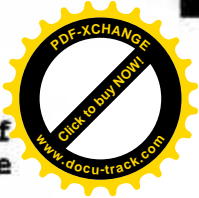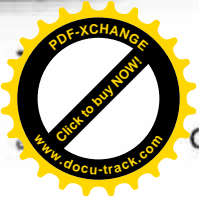### 3. G.I.S. Initiatives for 1992 in the Department of Geography, JCU, Townsville

The following new subjects will be taught by the Department of Geography :-

A.  **Introductory Geographic Information Systems and Remote Sensing.**

Course content will include : The nature of geographic information, mapping techniques with aerial photographic and remotely sensed data, electromagnetic radiation and remote sensing, techniques for analysing remotely sensed data, cartographic analysis and data classification techniques, data structures and computer models, environmental monitoring, resource mapping and management.

B.  **Geographic and Land Information Systems**

Course content will include : The role of GIS in strategic planning, urban and regional planning, social policy and resource management, GIS data structures, data modelling techniques, GIS analytical techniques, error and mutation management in GIS databases, GIS as decision support systems, GIS as a scientific and as a management tool.

C.   **Environmental Remote Sensing and Resource Survey Methods**

Course content will include : Scene models and the structure of remotely sensed data, spectral and spatial transformation techniques, geometric correction and data integration techniques, image verification and survey design, spatial modelling techniques in ecology and resource management, empirical modelling techniques, classification techniques, predictive modelling and cartography, resource mapping techniques.

Further details of the above three courses may be obtained from Jim Monaghan (Department of Geography, JCU Townsville, telephone (077) 81 4491).

D.   **Graduate Diploma in Geographic and Land Information Systems**

This one-year course will be available for the first time in 1992. Further details may be obtained from Jim Monaghan (see above).

4.   **Centre for Remote Sensing, J.C.U., Townsville**

A.   **Master of Science and Master of Engineering Science**

The Master of Science in Remote Sensing is designed for graduates with previous training and experience in remote sensing techniques and applications. The degree by coursework and dissertation is offered through an interdepartmental program. Training in GIS can form part of the program.

B.   **Post Graduate Diploma of Science in Remote Sensing**

The Post Graduate Diploma is designed for graduates with no previous experience in remote sensing. The Diploma by coursework and minor project is offered as a one year full-time or two year part-time course covering the principles of remote sensing, image interpretation, and hands-on training in digital image processing.

C.   **Graduate Certificate in Remote Sensing**

The Graduate Certificate is designed to meet the needs of professionals who wish to acquire skills in the application of remote sensing and GIS technology.

D.   **Technical Certificate in Remote Sensing**

The Technical Certificate is designed for people who do not have a degree, but do have considerable professional experience in their field, and wish to upgrade their skills.

E.   **Short Courses**

Short courses run from 3 days to 2 weeks, and may be offered at JCU Townsville Campus, or at any other suitably equipped venue in Australia or overseas. The two standard courses are :-

(i) Introduction to Remote Sensing Techniques

(ii) Introduction to Digital Image Processing

Other courses are designed to meet the needs of specific user groups.

Further details may be obtained from the Director, Pauline Catt, Centre for Remote Sensing, JCU Townsville, telephone (077) 81 5203.

## WHAT'S COOKING

We can't use our computers for GIS work only, and I have come across a rather useful piece of Aussie software called **Cookdisk**. Basically they have put a cookbook on disk, added a relational database and a host of subtleties. Main meals are arranged by food types, such as meat, poultry, seafood, rice and pasta. Other categories include salads, egg dishes, desserts, sauces, cakes, vegetables and a comprehensive cocktail guide.
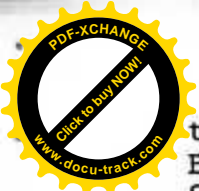
Two thousand recipes in all, with idiot-proof directions. Wading through such a list would be exhausting. In any case, all you've got in the fridge are zucchinis, bacon and apples. Enter these ingredients from the key word list and you'll discover all meals possible from such scanty rations. But disaster! You remember you don't own a stove and the Microwave is being serviced. Press 'O' for options and narrow the recipe list further by selecting 'cooktop only' meals. Of course this is the night when seven drunken friends have invited themselves for dinner. On the option list you evilly ponder the 'no cooking' and 'cold only' parameters. But no, better not squander too many karma points. Select 'O' again and change the number of serves to eight.

Damn. You need more apples, add them to your shopping list and print out both the list and the recipe.

Later, as the meal simmers, you return to the computer and maliciously calculate how much fat, cholesterol and kilojoules your guests will consume. In a weak moment you consult the cocktail guide to toast the smart cookbook. The meal over and the last guest departed, you return to the PC. At the bottom of your apple extravaganza recipe you type in the comments box "Max allergic to apples".

Cookdisk covers it's ground in rich detail. From poached eggs to dinner parties, herbs to hord'oeuvres, from explanations of cooking terms to advice on matching cheeses to wine. In many ways it resembles an encyclopaedia rather than it's glossy illustrated cookbook relatives. You can browse or select definite parameters and get straight to the point. There is simplicity for the novice and depth for veterans. Happily too, the program is not suffocated by a complex file structure. All prompts are permanently on screen and the help key (F1) is among the best encountered. It knows what screen you are looking at and explains all the relevant options. One can vary the screen display colours, and recipes can be modified, added or deleted.

In the setup, all one needs to identify is whether the printer port is parallel or serial. The manual starts with a picture of a typical keyboard and takes you from there. They even have a technical support hotline number. Cookdisk is put out by JBT Enterprises. To obtain your copy simply mail $90.00

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to Freepost 15, PO Box 152, Balmain NSW 2041 or Fax (02) 818 1206 (they even accept credit cards). Your Cookdisk will be courier-delivered at no additional cost. While this is not a Geographical information package, it certainly is an Information system that delivers. It is a pleasure to use it. - Alan.

## ARC-LASS : LOCAL AUTHORITY SPATIAL SYSTEM

Jenny Mansell, Account Manager Northern Region, **ARC Cadcentre** in Brisbane has advised that ARC Cadcentre supplies **ARC-LASS**, an integrated GIS/CADD package based on **GDS** software. It is understood that ARC-LASS has been designed to meet the GIS and CADD needs of Local Authorities. ARC-LASS runs on Digital Equipment computers using the VMS or RISC/ULTRIX operating system, and outputs to a wide range of plotters and printers.

ARC Cadcentre is an Australian company that is a major developer and supplier of software to the international GIS and database management market. Their software products include spatial information systems (GIS, LIS and AM/FM), programming languages, database interfaces, data capture systems, and document imaging and management systems.

Jenny Mansell would be happy to come to Cairns to talk about ARC Cadcentre's GIS and related products. If Members considered that it was appropriate, Jenny could be invited to give a talk at one of the FNQGIS Group's General Meetings. A demonstration of ARC-LASS could also be arranged if Members were interested. Please call Jenny on (07) 831 9022 or fax her on (07) 832 4041 if you would like to find out more about ARC-LASS or the other ARC Cadcentre software products.
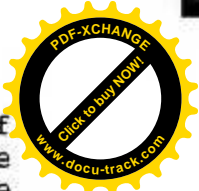
Peter Rey

## QUEENSLAND UNIVERSITY OF TECHNOLOGY

### New Courses for Surveyors

The Faculty of Built Environment and Engineering, which now contains the School fo Surveying, is progressing towards significant changes to its course structure. The present 3 year Bachelor of Applied Science (Surveying) course is to become a 4 year Bachelor of Surveying (final approval pending) commencing in 1992. Bridging arrangements between the Associate Diploma in Surveying from the University College of Southern Queensland (also available externally by 'distance education') will continue. In fact the 'bridging component' offered by the UCSQ may itself be consolidated to become a Bachelor of Technology (Land Surveying) award.

The double degree program of Bachelor of Applied Science (Surveying) & Bachelor of Business (Information Management) will incorporate the Bachelor of Surveying and extend from 9 semesters to 10. Also planned is a Bachelor of Applied Science (Land Administration ) on a 6 semester, 3 year program directed both to school

leavers and to surveyors and valuers seeking a post graduate second degree cognate to their original discipline. The course would cover mathematics, statistics, surveying and valuation, land economics and administration, environmental considerations, land information systems, cadastre, and land policy matters and Government. For further information contact Professor Kurt Kubik, telephone (07) 864 2626.

## YOUR NEW LEADERS

At the Annual General Meeting held in Cairns on the 14th of June, the incoming Committee were elected.

The office bearers are as follows :-

Chairman :
**Dr Andrew Hooper**

Secretary/Treasurer :
**Peter Rey**

Newsletter Editor :
**Alan Stafford**

Publicity Officer :
**Mike Stoodley**

Education Member :
**Steve Turton**

Local Government Member :
**Peter Swain.**

## OZRI5 - Arc/Info Users' Seminar, Brisbane

**ESRI Australia** held its 5th OZRI seminar in Brisbane recently. The seminar started on 29 September with workshops on PC Arc/Info 3.4D, Arc/Info Rev 6.0, and an introduction to image analysis which included a demonstration of the ERDAS image processing software. The seminar was held at the Hilton Hotel.

Users attending the seminar were able to present both evaluations of various Arc/Info software modules, and descriptions of the application of GIS in their organisations.

Arc/Info Rev 6.0 contains a TIN upgrade for improved 3-dimensional modelling, an improved GRID module for processing raster data, and a new database inquiry module called VIEW. The VIEW module, which will eventually be ported to PC Arc/Info, is designed to facilitate 'front counter' database inquiries by personnel who do not have GIS training.

Improvements in the PC Arc/Info 3.4D software upgrade are described below.

Peter Rey

## NEW SOFTWARE RELEASE

### PC Arc/Info 3.4D

ESRI released PC Arc/Info 3.4D earlier this year. Version 3.4D greatly facilitates performing geoprocessing on PC's.

The 3.4D upgrade has many new features, foremost of which is full integration with Aston Tate's **dBASE** database software. "It is very significant that we are now using the dBASE file formats, as they represent an industry standard and are used by many other applications, such as Spreadsheets." stated Joe Zastrow, ESRI PC Arc/Info software engineer.

Taking advantage of dBASE functionality within PC Arc/Info 3.4D gives users many of the features found in ARC/INFO 5.0. PC Arc/Info Version 3.4D is compatible with dBASE III+ and IV format files, and includes significant GIS functionality never before available on microcomputers. This software contains more than 70 new features and is designed to provide powerful GIS functionality while taking greater advantage of menus and user interface tools.

### Opening a New Window

With the introduction of Microsoft's **Windows 3.0** it is now possible to run multiple sessions of PC Arc/Info 3.4D on your PC at the same time. Users can now take advantage of the modern easy to use tools and user interface available with Windows 3.0. PC Arc/Info can be part of your 'desktop' solution with the simple, expandable, and powerful tools and interface available with the Windows release.

The capacity of running multiple sessions of PC Arc/Info at the same time can be extremely useful. For example you could have a CLEAN or a BUFFER running in the background while you are using ARCPLOT in the foreground. You could have an ARCPLOT and an ARCEDIT session and switch back and forth between them almost instantaneously. You could be testing an SML in ARCPLOT and have another window with a text editor to edit it. In effect, you can now have a 'micro workstation.' To accomplish this, you need a copy of Windows 3.0, and a '386' computer with at least 2 Mb of RAM (4 Mb+ is optimal) – Alan.

### EDITORIAL

I hope you will enjoy the review I did on the Cookdisk; If nothing else, it's not a bad database.

I have been trying for over a year now to obtain some words of wisdom from you to publish in FUNGIS – the only success being from our very hard working Secretary/Treasurer Peter Rey. I have decided to accept letters to the Editor (which you don't even have to sign it if you don't want to). I'll accept anything, even criticism – but just **please write to me**, Alan Stafford, at :-

Mossman Central Mill
PO Box 97
MOSSMAN QLD 4873.