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PEOPLE, PIXELS, POLYGONS:
Putting people on the map, putting people in the picture

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ABSTRACT

The complex inter-relationship between population, resources and development in the Pacific island region has attracted considerable political attention for some time, with a growing political recognition emerging in recent years across the region that demographic and other social and economic statistics play a key role in contributing to informed decision-making.

This paper explores how geographic information systems (GIS) can contribute to the latter, and provide an alternative to traditional data dissemination and information management, which are seen as the key bottlenecks preventing a more widespread utilization of sociodemographic and socio-economic data for policy development and planning. The paper addresses both technical and thematic/content issues associated with the development of such a system, and draws on case studies from four Pacific island countries, highlighting the system's emphasis on user-friendliness and flexibility, its different functionalities and widespread applications, its contribution to facilitating and improving access to data, and thus increasing the transparency of policy analysis, development and planning.

The views expressed in this paper are those of the authors and not necessarily those of the Secretariat of the Pacific Community, Noumea, New Caledonia.

Introduction

Policy analysts and planners in the public sector, following a more established practice in the private sector, are increasingly embracing Geographic Information System (GIS) technologies, to manage a growing demand for complex data and information available from censuses, surveys and administrative sources, in a more user-relevant and –friendly way. Guided by one over-riding objective, to assist decision-makers to more effectively cater for the needs of their stakeholders and clients (general public/population), geographic information systems are ideally suited to provide Governments with a solid basis for informed, that is, evidence-based decision making. With both tangible expressions and perceived benefits of development usually not distributed equally across a country or throughout society, as evident in rural-urban and intra-urban disparities in measures of well-being (including hardship or poverty) and regarding access to infrastructure and services, documenting such evidence in an unambiguous format like a series of maps, not only provides real information (which numbers by themselves don't), but by "providing a picture and telling a story" does so in a far more powerful way compared to dry tables or unimaginative charts and graphs.

According to William Playfair (1801), the pioneer of graphical methods for presenting statistical data, a good visual display will provide as much information "in five minutes as would require whole days to imprint on the memory, in a lasting manner, by a table of figures". Two centuries later, and the general impression one obtains from a random scan of Pacific Island countries' statistical publications, and development policy documents, as well as professional journal publications and conference papers and presentations by demographers and other social scientists (with the notable exception of geographers), is that visualisation techniques are still either unheard of by many, or regarded as synonymous with pie and bar charts (Haberkorn, 2001).

With people the key players when it comes to social and economic development, contributing to the creation of wealth and well-being, as well as the manifestations and perpetuations of hardship and poverty, and considering our disciplinary focus on people and populations (*demos*), and the emphasis on recording/description, at least us demographers could be doing better. Given the very explicit relevance of spatial and geographic patterns for many of our analytical endeavors, be they related to physical (environment, resources) or cultural space, location, or socioeconomic place, one cannot but wonder why geographic and spatial applications have not had a more prominent impact on our discipline, either from an analytical or visualization perspective. While it would go beyond the scope of this paper to speculate upon some of the reasons[1], we seem, as a social sciences discipline, still primarily leaning towards data and analytical methods and writing for fellow demographers, rather than focusing explicitly on the policy relevance of our work, and on making this relevance more visible to a largely non-demographic, non-technical audience in the form of providing user-relevant (and –friendly) information[2]. It is in this context of paying greater attention to translating data into information (Haberkorn, 1997), that geographic and spatial information science and systems could make a major difference to our discipline. Although colleagues working in the UN and the World Bank, at North Carolina and IASSA — to just mention a few agencies coming immediately to mind — have for many years applied spatial analysis and

[1] An obvious reason refers to a widespread lack of GIS-friendly data, as will be discussed more fully at a later stage.
[2] Burch (2001:1) in a recent paper on the structure of demographic knowledge, bemoans demography's continued preoccupation with empirical data and analytical techniques to the neglect of systematic development of theory.

geographic information systems (GIS) as effective visualization and analytical tools, demography as a discipline is yet to explore their full potential.

This paper seeks to explore how spatial information and geographic information systems can benefit demography, by making its disciplinary relevance to many facets of public policy concerns both more transparent and accessible. It illustrates the visualisation and analytical power of GIS with reference to ongoing work by the Secretariat of the Pacific Community's Demography/Population programme's development of a national population GIS (*pop*GIS) prototype for Pacific island countries and territories. It addresses both technical and thematic/content issues associated with the development of such a system, and draws on case studies from four Pacific island countries, highlighting the system's emphasis on user-friendliness and flexibility, its different functionalities and widespread applications, its contribution to facilitating and improving access to data, and thus increasing the transparency of policy analysis, development and planning.

What do we mean by geographic analysis and information systems, and how can they benefit demography?

Geographic Information Systems (GIS) refer to specific tools, or toolsets of spatial analysis, which itself is grounded in geographic information science (McGregor, 2000)— referred to variously as GISc or GIScience. GIS is basically a computer-assisted information management system that contains geographically referenced data. These can range from simple administrative data bases, with a reference to a region (eg. census collection district, postcode, town), to a street address, or something with an exact latitude/longitude location. Apart from *points* or *pixels* (street address, lat-long specification) and *polygons* (space, such as an administrative area, like a postcode), *lines*, such a rivers and roads, make up GIS' third type of spatial object. A key function of GIS is the ability to link descriptions of locations (spatial data) with characteristics of particular features or phenomena (attribute data) found there. The former could, for example, refer to all islands in a particular Pacific island country or territory (PICT), where less than half of all households have access to safe drinking water — with the latter information referring to attribute data.

Thematic maps or atlases produced with desktop mapping tools represent the *'lower'* end of GIS applications and spatial data. The more complex *'high end'* of geographic and spatial analysis and visualisation capabilities is illustrated by fully interactive electronic atlases (Kraak and Ormeling, 1996), in maps delineating demographic surfaces containing thousands of data points (Vaupel et al., 2000), and in techniques like 'neural spatial interaction modelling' and 'travelling wave solutions' — products, tools, techniques often requiring expensive equipment, and extensive analytical knowledge and experience, out of reach (and often usefulness) for most non-technical users. In between lie a broad spectrum of applications with varying degrees of interactive and modelling facilities and technical complexity. The *pop*GIS prototype for Pacific island countries and territories, and developed by the Secretariat of the Pacific Community's Demography/Population programme falls into the latter category, as illustrated later on.

Working at the demographic data-research and socio-economic development policy and planning interface, our key operational mandate and professional objective and challenge is to communicate population data and other related sociodemographic and socio-economic

statistics to national policy-makers and regional/international development agencies in such a way that key messages are understood, deemed valid, and hopefully make their way through a vast and complex bureaucratic maze to ultimately underpin policy and program development. Establishing that a particular PICT' national primary school enrolment rate of 84 per cent is the result of considerable sub-national variations, and which are not consistently compatible with the physical location of schools and teachers is one thing, and a relatively simple task. However, communicating this information and the need to target specific geographic areas with priority programs over the next few years (at the temporary expense of not being be able to attend to every place in an `equitable manner') to an audience with a committed aversion to facts or politically unpalatable news, is an altogether different challenge. **It is in this context that a GIS has its most powerful use and impact, and it is this very functionality of GIS that is the focus of this presentation**. Spatial applications in this context, not only benefit demographers and other population scientists in providing powerful analytical and visualisation techniques, but through the enhanced ability to make demography more relevant to non-demographers, they also provide demography with a legitimacy extending beyond academia (Haberkorn, 2001).

Developing a national population GIS prototype for Pacific island countries and territories – the political context

Social and economic development planners and policy analysts from most Pacific island countries and territories attending a Regional Seminar on Population and Development in Noumea in March 2001, stressed their need for simplified population data, and to have access to such data at different levels of geography below simply national aggregates. They also highlighted the need for population specialists to pay more attention to the policy relevance of demographic/statistical work, and to making this relevance more visible to a largely non-demographic, non-statistical and non-technical audience. The general consensus emerging from this meeting was that too much emphasis was still being placed on statistics and data, compared to providing actual planning and policy-relevant information.

A tangible result of this meeting was the Secretariat of the Pacific Community Demography/ Population programme's resolve to embark on an ambitious multi-year/multi-country project to design country-specific population geographic information systems. Our goal was to target and involve statisticians and policy analysts/planners, representing the prime producers and users of demographic, social and economic statistics and information, and to design a system capable of handling diverse applications in line with different needs. A system conducive to

- effective and user-friendly dissemination of national and sub-national data,
- planning and policy-development affecting different levels of administrative/political geography, and to
- monitoring progress against a framework of key social and economic development indicators (such as reflected in, e.g., the United Nations *Millennium Development Goals*).

The following pages discuss the development of a national population GIS prototype (popGIS) for Pacific Island countries and territories, drawing on our experience with four SPC

member countries: the Federated States of Micronesia (FSM), Kiribati, Samoa and Vanuatu, representing the region's three major ethnic/cultural groupings, Melanesia (Vanuatu), Micronesia (FSM, Kiribati) and Polynesia (Samoa; see Illustration 1). All countries had recently conducted a national population census (1999-2001), and expressed a willingness to participate in this multi-year project. Range of statistical and spatial data, as well as their degree of quality and completeness varies considerably between countries, and the geographic layout of these countries also presents many challenges, particularly in the case of atoll environments (Kiribati), with islands so small and spread out that they are almost impossible to represent in a single standard map.

Illustration 1: *pop*GIS Project Countries

*Pop*GIS Development

Our development of a national population GIS prototype (*pop*GIS) for Pacific Island countries and territories has been guided by the overriding goal of making population data, and other social and socio-economic statistics compiled by national Statistics agencies and other sources more accessible to the intended users of these data. The project memorandum with our principal funding agency, the United Kingdom's Department for International Development, is unequivocally clear about this goal: to "*demonstrate the usefulness of GIS as a planning tool, in increasing users' understanding and hence use of local area data for planning purposes*". Targeting two distinct groups of intended GIS users, the producers of data and statistics (staff of national statistics offices; information managers/analysts in other sectoral agencies) and the main users of this data (staff of national economic policy and planning agencies; sectoral planners and policy analysts in other Government and private sector agencies), the *pop*GIS has been designed to meet two distinct, but nevertheless related user needs[3]:

- To more effectively **disseminate data** and statistics, through a more user-friendly and user-relevant means of communication (visualization), and to
- Facilitate basic population and other types of exploratory **data analysis**.

[3] The emphasis here is on user needs, not need by users, as both groups (producers AND users of statistics) do have needs to disseminate information AND undertake population and other types of social analyses.

The key goal in designing these national population GIS was to produce a user-friendly and flexible *decision-support tool* that can provide population data and other related socio-economic statistics on demand, and do so at various levels of geography. Moreover, because it offers alternative and visually more appealing ways of presenting data, as compared to the standard fare of volumes of tabulations, it invites data queries and hence promotes more widespread data utilisation. The SPC *pop*GIS is becoming a dynamic planning tool, supporting effective planning within its member countries, by allowing policy analysts and planners to obtain the exact data they need in order to identify and target local-level disparities and problems.

All four national *pop*GIS are currently available in-country amongst a select group of users (participants of the first national user workshops) beta-testing. The underlying databases combine information from each country's most recent population census with digital geographic data, all available on one CD-ROM, enabling users to undertake various levels of data analysis, by having direct access to:

- Information on population size, composition, distribution and characteristics such as age, sex and education data, as well as detailed data for ethnicity, religion, marital status, occupation, industry and other variables;
- Household characteristics such as income, housing type, general facilities, and household economic (agricultural/fishing) agricultural activities.
- Population information linked to other important service location information from Health, Education, Planning and other service providers.
- Developments are currently underway, to expand the population databases by including extensive cross-tabulations for some demographic, eduction, labour force and income features, to allow users to undertake more refined analyses of major differentials (e.g. economic activity by level of education; education level/economic activity of women of child-baring age) at various sub-national levels.

*Pop*GIS Design

GIS is not new to Pacific island countries and territories. *MapInfo* has been the de facto standard GIS package for many years, with a high level of user training and support, (including being taught at the University of the South Pacific in Suva, Fiji). A drawback however in small countries with considerable human resources constraints, is that off-the-shelf GIS packages (i) are usually aimed at GIS professionals, not GIS novices, and (ii) contain a wide range of detailed tools and functionalities that easily confuse untrained users. Acknowledging this reality, and recognizing the importance of *ownership* to the success of developing/promoting and maintaining a sustained use of an easy-to-use/operate GIS system (see also Hall et all. 1997), prompted our decision to develop a customised, in-house (SPC) package from scratch, with the active involvement of national staff from all four project countries, and tailoring these systems to specific country needs.

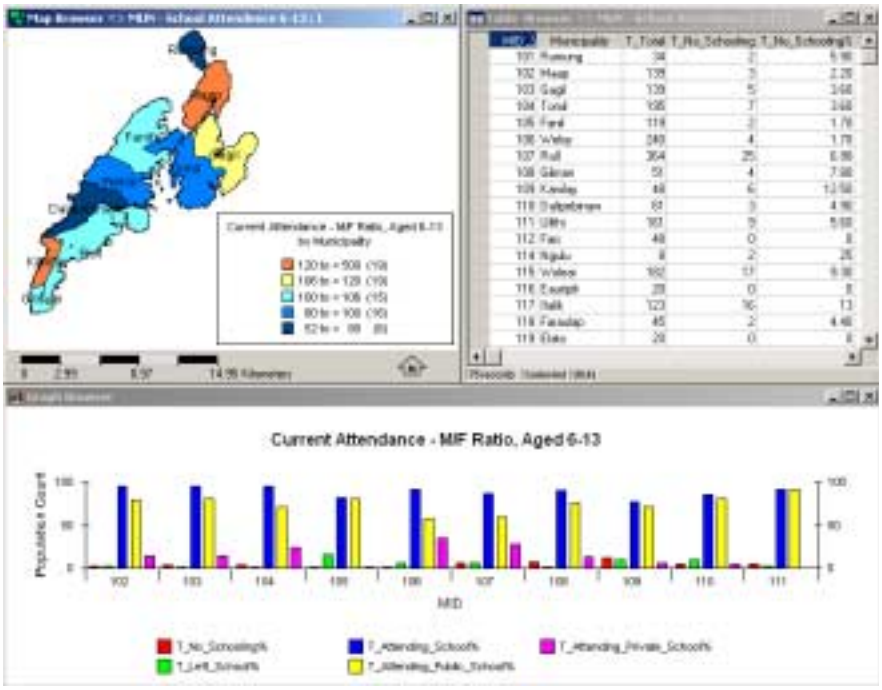
The *pop*GIS has been designed from the ground up within the *Microsoft Visual Basic* programming environment, incorporating MapInfo's *MapX technology* for all mapping functionalities, and is iteratively being built-up and refined from country to county[4]. As part

[4] For a more comprehensive account of development and design detail, please refer to Bright et al. (2003).

of the development process, the Demography/Population program offers a series of professional attachments to national statistics and planning agency staff in Noumea, who work with Noumea-based GIS programmers, population and development specialists and database designers to design the basic database, create data queries and also clean spatial data for use in the system. Microsoft Access stores the population base data and theme settings (see illustration A-1 in appendix), enabling users to select a pre-defined "theme", and have all the complexities of querying the database and map design taken care of. The later also prevents "unintentional cartographic self-deception" (Monmonier,1996), whereby untrained users incorrectly construct a map and confuse themselves as to what it actually means.

The *popGIS* software is the main GIS interface for accessing and exploring all population data. The system consists of a multiple document interface, with three main windows each representing a different method of data output – map, table and graph. (Illustration 2).

Illustration 2 : Main components of the population GIS



Other than simply mapping, graphing and tabulating data, as the *pop*GIS develops, more complex statistical and spatial analysis functionalities are being added. Currently, some key features allow the calculation of weighted averages, setting of custom ranges, and synchronising map and tabular data sets, which allows users to select/search for specific records in the table, with the corresponding record located on the map. The table and graph interfaces are designed to look and feel like Microsoft Excel, and functionalities available for them are similar.

- Within the table browser, new fields can be formulated, statistics calculated, and outputs can subsequently be exported to applications like Excel.
- The graphing browser allows for a whole range of settings that can be modified, as well as exporting graphs to other applications and image files.

- The mapping browser includes most standard mapping functionalities – zoom, pan, select and identify features. However, navigation around countries has been improved by adding functionality to a popup window, which allows users to zoom into specific islands, provinces or other administrative areas.

Additionally, in countries where geographic regions are difficult to visualise on a single map because islands are spread over hundreds of thousands of square kilometres of Pacific Ocean, a '*split mapper'* concept has been introduced. This creates several map windows, each displaying a different region simultaneously. An advanced user who may wish to manipulate the currently displayed map properties can do so, which includes the ability to create/modify custom ranges and colours. As with table and graph functions, map data can be exported to various image formats and other applications.

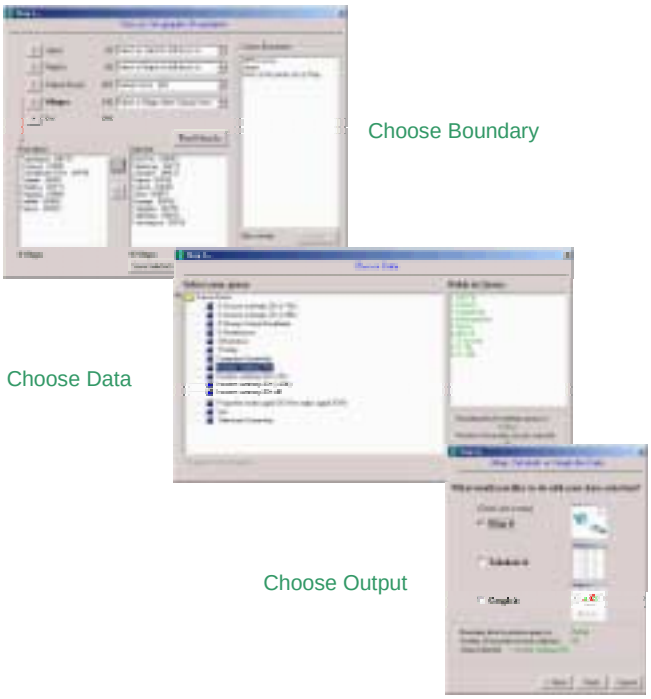
In writing a custom application like the popGIS, there is total control over what users can see, what they access, how simple buttons are and so on. Right from the onset, the design of a simple, clear interface has been paramount. As computer literacy varies considerably within Pacific Island Countries and territories, detailed help files and popup info tools are used widely. The multiple document interface, with the three main windows (map, table and graph browsers), perform most of the work inside the main parent window. Buttons, menus and wizards have been structured along similar intuitive lines as other *Windows* applications. In order to extract data queries, an *Extraction Wizard* is available, which involves three main steps (Illustration 3):

- **Choose Boundary** – Select the level of geography to be queried, including boundaries to be used at that level. There is a hierarchy set up for census data that allows users to drill down and find particular areas. For example, an FSM user may want to look at all municipalities within the state of *Yap*. To do this they would select *Yap* at the state level then all municipalities within Yap would remain in the hierarchy. Much in the same way that other systems such as the ABS *CData* package structure their administrative boundaries.
- **Choose Data** – Nested hierarchy has been set up for each country that follows the same layout as the census questionnaire and/or other data hierarchies. Within this hierarchy individual queries are stored, and can easily be retrieved by a user wanting to look at *Education* for example.
- **Choose Output** – This is the last step in the process where a user selects how they would like to output or visualise the results from the query selected. They can choose from one or all of, map, table or graph.

Furthermore, an *administrator assistant* program (*AdminAssist*) has been developed to facilitate modification of theme queries[5] in the system (changes and additions). Base data and queries are updated by logging into the software, which has access to all the databases (both are password protected). National system administrators can perform basic base table maintenance, as well as create/modify queries that are stored in the *Theme Settings* database (see Illustration A-1, Appendix).

[5] Theme queries define what data to extract from the underlying database (e.g. census database), and how to display these data on a map.

Illustration 3: Extraction of Data Query



Promoting the use of national *Pop*GIS

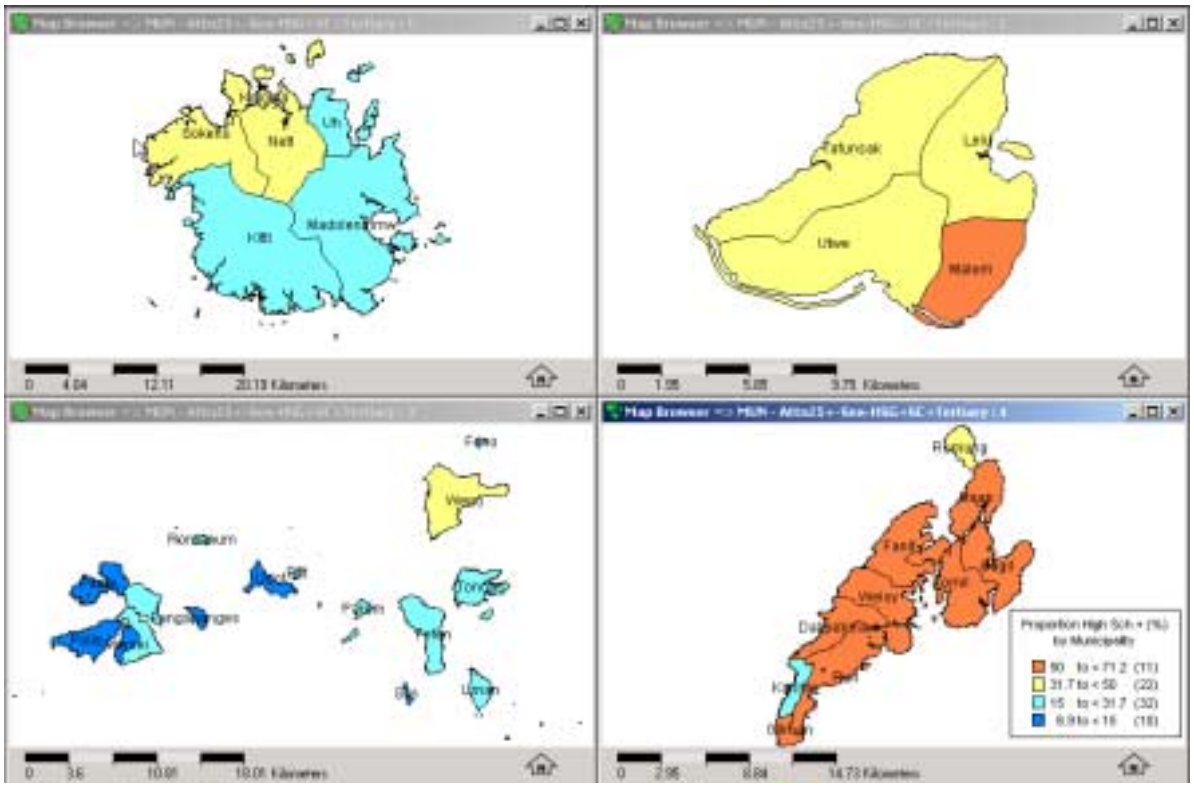
To familiarise intended users with the system, a series of introductory and advanced level national user workshops are conducted in each country, usually comprising of 12-15 planners, policy analysts, statisticians and information managers from various Government agencies. National statistical and planning departments usually provide half of the participants, with health, education, social development, agriculture/natural resources and environment agencies providing the rest. These workshops usually run over a two-week period.

The *introductory* workshops comprise of a formal workshop routine, made up of lectures, group discussions and practical applications, followed by a second week of individual follow-up at people's place of work, and individual project work with participants who wish to undertake a specific project. Regarding the formal training component, this aspect is structured along three objectives (parts): it

- Provides an introduction to population and development, and basic demographic concepts, measures, and indicators; it also discusses the components of population growth, and how to undertake basic projections;
- Introduces users to their national *pop*GIS, involving hands-on GIS applications; and it
- Shows users how to use their national *pop*GIS, to prepare short population reports and research/policy briefs, and how to "package" their results and prepare one-page executive summary style reports and power-point presentations (Illustration 4).

Illustration 4: FSM workshop templates highlighting state-level and municipality level comparisons

Proportion of FSM adults with completed High School or more as their highest level of educational attainment, 2000



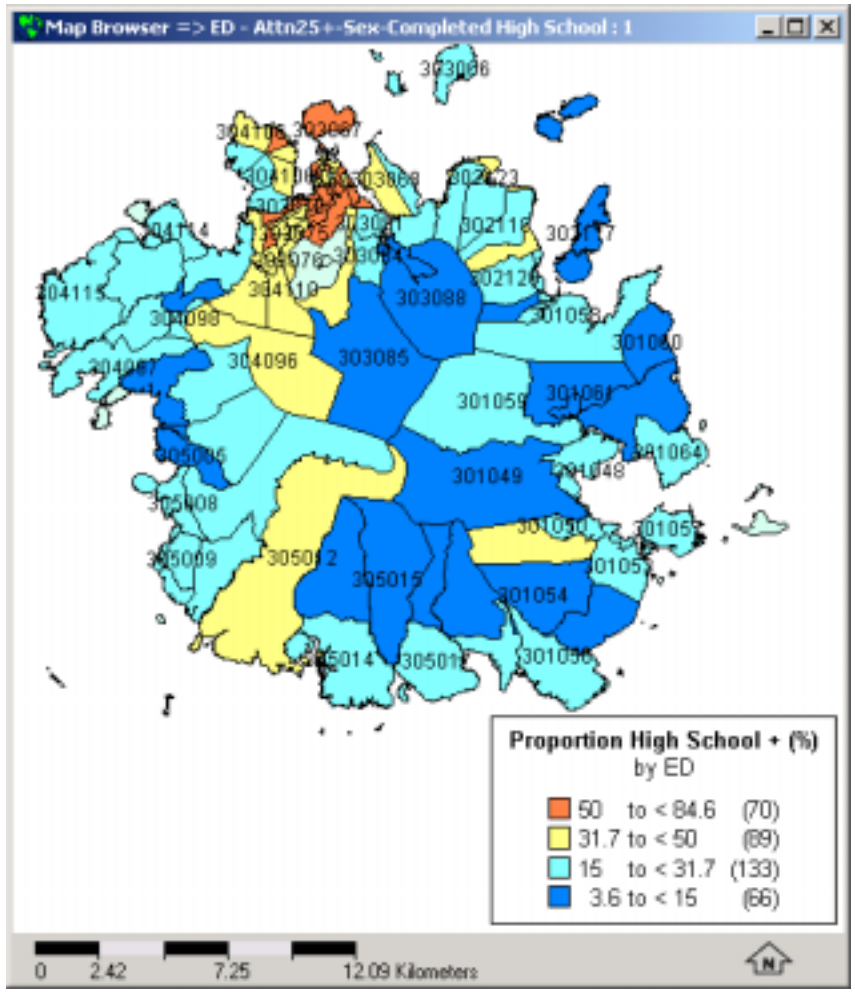
Key Finding:

- **31.7 % of FSM adults reported to have completed High School education or more as their highest level of educational attainment.**

Other Points of Interest:

- This proportion varies markedly between States, with more than half of all adults in Yap (52.3%) falling in this category, ahead of Kosrae (46.9%), Pohnpei (31.1%) and Chuuk (24.8%).
- It also varies considerably between Municipalities, from a high 71% and 65% in Yap, to a low 7.0% and 7.5% in Chuuk.

Proportion of FSM adults with completed High School or more as their highest level of educational attainment, 2000 (Ponhpei



<u>Key Finding</u>:

- **The 31.7% average for Pohnpei conceals very substantial contrasts across the states 11 municipalities.**
- **The highest proportion of adults with at least a completed high school education is found in Kolonia (47.4%), ahead of Nett (38.8%) and Sokehs (34.4%). Kapingamarangi (11.5%) and Sapwuafik (12.1%) show the lowest figures for Pohnpei municipalities.**

<u>Other Points of Interest</u>:

- These contrasts are even more pronounced at a smaller level of geography, census enumeration districts, ranging from 84.6% (an ED in Nett) to 4% (one ED in Sokehs).

Regarding individual project work, participants usually work on a topic/theme of immediate relevance to their current work programs. In the case of Vanuatu, for example, the country's provincial planners worked on the production of a socio-demographic and socio-economic profile of their respective provinces. The *advanced level* workshops cover the full range of system functionalities, such as, for example, teaching users how to set their own breaks/ranges, how to create more advanced maps integrating mapping and graphic functionalities, and how to create multiplier layer maps (combining different themes and data sets).

Different levels of geography

As shown in illustration 4, one of the key features of the national population GIS systems is the ability for users to interrogate the database, as well as visualize results, at various levels of national geography. This function is clearly one of the most powerful aspects of the system: it "democratises" access to public data, and empowers users to select data, and create information for their own customised applications, rather than restrict them to published information, which is often only available at national level, and if accessible at lower levels of geography, usually only at great financial costs to users, and/or coming with long time delays. Various levels of administrative geography at which data and information are available, is shown in Illustration 5.

Illustration 5: Different levels of political geography at which data are currently available in national population GIS

	Federated States of Micronesia	**Kiribati**	**Samoa**	**Vanuatu**
States (S) / Provinces (P) / Regions (R)	**4 States** Chuuk, Kosrae, Pohnpei, Yap	**3 Regions** Gilbert islands, Phoenix, Line	**4 Regions** Apia Urban area, NW Upolu, Rest of Upolu, Savaii	**6 Provinces** Torba, Sanma, Penama, Malampa, Shefa, Tafea
Islands (inhabited)		**23**	**4**	**66**
Municipalities (M) / Area Councils (AC) / Political Districts (PD)	**76 (M)**		**43 (PD)**	**63 (AC)**
Villages		**183**	**330**	**2,151**
Census enumeration areas / districts	**372**	**87**	**887**	**620**

The key to improve data access and utilisation for planning and policy development is to provide such data and information at levels that are meaningful to informed decision-making. With social and economic development, or the lack thereof - usually illustrated in varied expressions of hardship and poverty - normally not distributed equally throughout a country (or any level of geography, for that matter), it is important that data and information management underpinning planning and policy development acknowledge such different

levels of political and administrative geography.

This is neatly indicated in Illustration 6, describing various levels of household access to improved sanitation facilities[6].

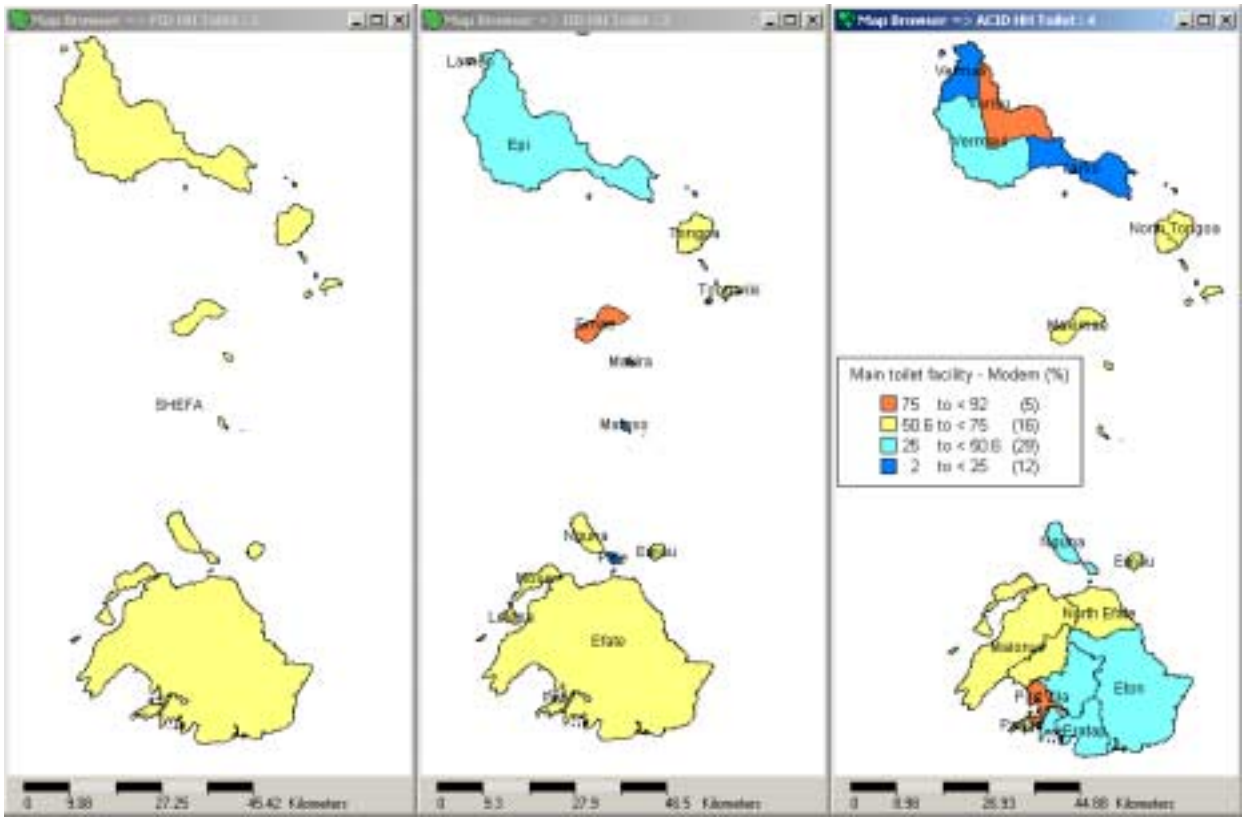
- The first map depicts one of Vanuatu's six provinces, Shefa, which, at provincial level, shows the highest level of household access to improved sanitation facilities (68%);
- Map two highlights the contrasts between islands within the province of Shefa, ranging from 2 to 92 per cent; and
- Map 3 underlines considerable further contrasts within islands, across area councils –

all of which highlighting quite clearly where specific Government interventions ought to take place in the context of achieving 'national-level' development objectives and targets.

When dealing with different levels of sub-national geographies, it is absolutely critical to bear in mind that different ways of spatially aggregating data might yield substantially different patterns or relationships (Bright & Veenendaal, 2002; Monmonier, 1996). Average income levels, for example, describing the overall well-being of a specific area, may in fact mask substantial contrasts on the ground, highlighting that this average in fact (i) may resemble absolutely nothing in real life (e.g. does not describe a single community or household), and instead masks (ii) extreme spatial polarities. Analogously, creating 5-6 different categories when in fact there is little justification to look at more than 2 groupings, can also create an illusion of complexity where in reality none exists.

Illustration 6: Access to Modern Sanitation Facilities by Province, Island and Area Council

[6] Defined as having access to either a flush toilet, water-seal toilet, or a ventilated improved pit latrine.
Reference here is made to Vanuatu, where 50.6% of all households have access to such facilities. This national aggregate varies, at provincial level, between 32 and 68% coverage (Source: 1999 census)



Mindful of the power of visual images, we devote much care and attention in our workshops to highlight the inherent danger of unethical practices. Once out and visible in the public domain, information represented in images, such as in a map, leave a lasting impression and are difficult to change. Particular care is required when populating large polygons with relatively small numbers, as this can, without appropriate caveats, create false impressions of regional homogeneity when we know there are either substantive intra-regional variations, or highlight major inter-regional contrasts, when we know these could well be more reflective of small populations (or insufficient sample sizes). While most professionals are guided by, and abide by some form of professional ethics', with the growing popularity of GIS, particularly among non-technical users in government and in business applications, there is a real danger when too much emphasis is placed on visualisation at the expense of conceptually sound and methodologically justifiable analyses, posing a real danger with "powerful images provided by well designed maps ... overtaking facts" (Haberkorn, 2001).

Future Directions

As with any GIS project, regular database updates and system modifications are critical to sustaining its relevance and use over time. In the context of small Pacific island developing nations with a limited human resources base, ongoing training (inclusive system support) is equally critical, as today's trained and enthusiastic *pop*GIS users may no longer be in their current position next year, replaced by other and less experienced colleagues. Hall et al. (1997) highlight the fact that if users are not sufficiently trained to sustain the use of a project, it is unlikely that the tools will ever be productively used after project completion.

The beginners and advanced level *pop*GIS workshops organized and run by the SPC

Demography/Population program in each country ensure that users understand the basic design of the system, and how to use it for both data dissemination/information management, as well as for creative data exploration and analysis. Participant feedback after these workshops have led to continuous system improvements, as have regular e-mail call-ins from participating countries. And a third user workshop, planned to be held annually on a regional/sub-regional basis from 2004 forward, is designed to brings together 2-3 system administrators from each country, learning how to update/modify existing databases, and create/add new ones, as other administrative databases become accessible, or with new surveys being conducted. Bringing together system administrators from various Pacific island countries and territories has the added advantage of contributing to setting up formal/informal professional networks, where administrators in one country can be called upon to assist with specific tasks elsewhere, thus further adding to the sustainability of these national *pop*GIS systems.

Having these national *pop*GIS systems developed initially for four Pacific island countries, our challenge ahead is not only to maintain these four systems, but extend this service to an additional thirteen Pacific island countries and territories which have, since project inception, requested our assistance in this field. Discussions are underway with development agencies, such as AusAID, NZAid, the United Nations Fund for Population Activities and the Asian Development Bank, to ensure that our initial efforts to assist “putting the Pacific on the map” can be extended to keeping it there for several years to come.

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Appendix

Illustration A-1: Main components of the population GIS