

GIS and Remote Sensing

SOPAC Policy Paper

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SOPAC Miscellaneous Report 326

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1 EXECUTIVE SUMMARY

The purpose of this document is to detail SOPAC's policy on GIS & Remote Sensing with respect to standards, data confidentiality, data exchange and the unit within SOPAC responsible for formulating, maintaining and updating the above as well as recommendations for SOPAC governing council.

2 BACKGROUND

Geographic Information Systems (GIS) have become an essential tool for analysing and displaying spatial data with linkage tabular or attribute data that allows presentation of accurate and timely information to decision makers to assist in the responsible management of the resources of the Pacific Island Countries.

In addition, images from remote sensing platforms such as satellites and aircraft offer a cost effective method for analysing onshore, coastal and inshore resources and the ability to integrate these images into Geographic Information Systems provide valuable tools for resource monitoring, hazard mapping, asset management and land use planning.

SOPAC is the regional organisation that has the mandate for GIS and Remote Sensing due to its extensive experience in applying these tools for developing scalable and sustainable solutions using cost effective and readily available components.

SOPAC is recognised as the most appropriate organisation to provide the link between remote sensing data suppliers, hardware and software suppliers, research institutions and the end users of the systems and data where the cycle of design, deployment and training is essential. This has proved to be the most effective method of assisting member countries with GIS and Remote Sensing applications that are sustainable.

SOPAC conducts 5 programs with 12 units (see Attachment A) where all 9 technical units employ GIS and Remote Sensing in their ongoing tasks. The Information Technology Unit is tasked with overall coordination in this field.

3 STANDARDS

To assist in delivering the most effective services the following standards should be adopted.

3.1 Data Documentation

All spatial data should be fully documented and should include:

- Location of data
- File names and file formats
- Data origin and accuracy
- Data scale
- Projection, spheroid, datum and scale
- Annotation
- Ownership

For example, SOPAC and Fiji Forestry data catalogues are readily accessible at SOPAC's web site. It should be noted that the catalogues only contain the information on the datasets and not the data itself.

SOPAC is in the process of implementing a metadata catalogue format based on ANZLIC recommendation. This metadata catalogue will be available in draft form in August 1999. The metadata catalogue will contain required information for data documentation.

3.2 Data Scale and Sheet Coverage

It is important to recognise that the scale of spatial data defines not only the ratio between the map and the real world but also the accuracy and the representation (generalisation). It is impossible to transfer data from one scale to another. SOPAC will adopt the scale set for individual countries and the following table demonstrates the set for Fiji:

	Scale	Suitability
1:	500,000	Overview
1:	250,000	Topographic map series
1:	50,000	Topographic map sheet series
1:	25,000	Topographic map sheet series working sheets
1:	10,000	operational scale Forestry Plantation maps, Utilities in urban areas
1:	5,000	cadastral maps, Utilities
1:	1,000	cadastral maps, Utilities

3.3 Common File Formats

System established within one country should have the export and import facility to deal with agreed common file format of the country, this is DXF for vector data and TIF or ERDAS LAN for raster data in Fiji. Data formats are further detailed in Attachment B.

3.4 Reference of New Spatial Databases

New established databases should be established with the agreed common:

- Data scale
- Projection, spheroid, datum and scale
- Annotation
- Map sheet coverage
- File format

3.5 Data Availability

The main spatial data sources necessary to establish the base of every GIS should be delivered free of charge. This data is:

- The main road network
- The river system
- The main villages and towns
- The main landuse cover
- Contour information or DTM

3.6 Map Projection and Datum

SOPAC will support the main projection used in the country. In Fiji for example, the Fiji Map Grid with WGS72 and not Cassini or other projections will be adopted. It creates unnecessary workload if more than one projection is used in a country. SOPAC will adopt the official projection system as specified by the country or in substitute by the PCGIAP geodesy sub-committee.

For Regional Data or when the Datum is not available SOPAC will use the WGS84 Datum as specified by appropriate body.

3.7 Physical File Format

Standardisation of physical file formats should be adopted in a country and installed software must be capable of import and export to this file format.

MapInfo is the Regional standard as per IT-PACNet recommendations, SOPAC will adopt this file format exclusively for storing Vector data. SOPAC will develop converters to national file format if the need arise.

For Raster Data, SOPAC will adopt TIFF to store image data.

3.8 GIS Software

The regional standard for GIS vector data is MapInfo and the tools include MapBasic with optional addons such as Vertical Mapper. The MapInfo GIS has been adopted under the SPOCC Regional Information Technology Strategies committee that meets annually to review IT standards for member countries of the SPOCC organisations.

4 DATA EXCHANGE

4.1 Open Data Policy

If image data or digital maps are produced through aid donor support, SOPAC will not charge if this data is used by another government sector. For example, if an image backdrop or a street map is created for a power utility under EU funding, SOPAC will not charge if a water utility requires the same data. This policy, however, will be mindful of copyright laws.

4.2 Open Software

When SOPAC provides assistance in developing software the source code and detailed documentation will be provided. In addition, SOPAC will select software that is cost effective and appropriate for the task. SOPAC will adopt the GNU licence format.

4.3 Sustainable Hardware

SOPAC selects and installs hardware solutions that provide the most effective investment for the end user environment that may be subjected to poor power and lack of climate control.

4.4 Communication among Users

SOPAC supports communication between GIS and Remote Sensing users through assistance in setting up e-mail facilities. SOPAC supports the Regional GIS and Remote Sensing newsletter and the GIS-PACNet mailing list and in addition informs all Pacific Islands Countries about available image data for the region and latest technical news through its web site.

To Subscribe to the list send SUBSCRIBE GIS-PACNet to list-request@sopac.org.fj

4.5 Data Clearance

Data held in SOPAC will be classed in 4 categories:

1. Confidential
2. Regional Data
3. Country Data
4. Public Domain

Any person requesting Category 1, 2 or 3 data from SOPAC will need to fill in a form that will be developed either as a standard or customised to suit the situation and submit it to the Director who will seek approval from the Member Country Representatives as appropriate. An undertaking is included that the data is for the sole use of the recipient and cannot be transferred to further parties without similar approval.

Category 4 data is already from the public domain and will be transferred on the understanding that copyright notices are preserved.

All data recipients will inform SOPAC of the purpose of and the work done with the requested data.

5 RESPONSIBILITIES

The unit within SOPAC responsible for formulating, maintaining and updating GIS & Remote Sensing Policy is the Information Technology Unit where any updates will be carried out in consultation with other units and such updates transmitted to the SOPAC Governing Council for endorsement.

ATTACHMENT A - SOPAC CORPORATE STRUCTURE 1999

1. Resource Development Program

- 1.1 Mineral Resources Unit
- 1.2 Water Resources Unit
- 1.3 Energy Unit

2. Environmental Science Program

- 2.1 Coastal Unit
- 2.2 Hazard Assessment Unit
- 2.3 Ocean Unit

3. National Capacity Development Program

- 3.1 Human Resource Development Unit
- 3.2 Information Technology Unit
- 3.3 Disaster Management Unit
- 3.4 Publications and Library Unit

4. Corporate Services Program

- 4.1 Corporate Management Unit
- 4.2 Finance and Administration Unit

5. Technical Management Program

ATTACHMENT B - SOPAC RECOMMENDED DATA FORMATS

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1 Introduction

The following document defines the recommended formats for the exchange of data between the secretariat and other organisations. The document is divided in three parts:

1. Media and formats
2. Official Data Formats
3. Other data formats for exchange

The first part describes the media and physical formats employed for data storage, the second the official or recommended formats while the third part describes the data formats that SOPAC secretariat can read or export to, but none of these formats are used for data storage inside the secretariat. It is therefore recommended to provide data in the formats defined in the second part unless it is absolutely impossible by the third party. In the case where none of the formats described are suitable, please contact us directly before supplying any data.

2 Media and formats

The following media and formats are specified in the order of preference. All sizes are native size without any compression scheme,

2.1 DVD-ROM

Size: 12 GB

Format: DVD standard

Comments: This is to become the preferred format as soon as the technology will allow the creation of DVD-R. DVD-Ram medium is currently being evaluated.

2.2 CD-ROM or CD-R

Size: 650 MB

Format: iso9660 or Joliet

Comments: This is the preferred format. It can contain up to 650MB of data. The CD-ROM can be in the iso9660 or Joliet format for support of long file names.

2.3 ZIP disk

Size: 120 MB

Format: PC-Format

Comments: Easiest format to transfer files between computers. ZIP disk and drives are now widely used.

2.4 Floppy disk

Size: 1.44 MB

Format: PC-Format

Comments: This medium is not recommend for Pacific Island Countries due to mould and fungus growth on the media after several months. Floppy disks should be Teflon coated to maximise useful lifetime.

2.5 Exabyte tape

Size: 2 GB or 5 GB (High Density)

Format: Unix tar format, native NT tape backup format, ArcServe 6.5 format.

Comments: No hardware compression or password-protected sessions should be used. DAT and Exabyte are equally preferred.

2.6 DAT tape

Sizes: 2 GB (DDS), 4GB (DDS2), 12 GB (DDS3)

Format: Unix tar format, native NT tape backup format, Arcserve 6.5 format.

Comments: No hardware compression or password-protected sessions should be used. DAT and Exabyte are equally preferred.

2.7 QIC 150

Sizes: 150 MB

Format: Unix tar format

Comments: This media is not recommended for new data exchange, it is only for backward compatibility with older systems.

2.8 Reel

Sizes: 650 bpi or 1200 bpi

Format: Unix dd format

Comments: Lower densities such as 300 bpi are not read by our drive. This media is not recommended for new data exchange, it is only for backward compatibility with older systems.

3 Official Data Formats

The following formats are classified by data type.

3.1 GIS Vector

Format: MapInfo Native format

Additional information to supply: Datum (7 parameters) and projection parameters.

Comments: Preferred format for data storage. MapInfo was the only available low cost GIS software when it was chosen.

3.2 GIS Raster

Format: ERDASS imagine img

Additional information to supply: Datum (7 parameters) and projection parameters

Comments: Raster software is not as convenient and low cost as MapInfo, therefore ERDASS imagine is the recommended application for processing raster data before converting data to GIS backdrop or final GIS vector data. In addition, some raster data can be used in MapInfo through the Vertical Mapper add-in.

3.3 Satellite or Aerial photo

Format: ERDASS imagine img, TIFF

Additional information to supply: Datum (7 parameters) and projection parameters

Comments: ERDASS is used to rectify and correct satellite and aerial photo. Rectified TIFF images can be used for backdrop display.

3.4 Digital Terrain Model

Format: XYZ ASCII delimited

Additional information to supply: Datum (7 parameters) and projection parameters

Comments: The data should not be gridded but simply filtered for errors. Such data is recommended over gridded data as it leaves the operator the choice of grid step.

3.5 Bathymetry and Imagery non gridded

Format: XYZ ASCII delimited

Additional information to supply: Datum (7 parameters) and projection parameters

Comments: The data should not be gridded but simply filtered for errors. Such data is recommended over gridded data as it leaves the operator the choice of grid step. Imagery should be slope corrected as well as other correction.

3.6 Multi-beam bathymetry or imagery raw data

Format: xtf

Additional information to supply: Datum (7 parameters) and projection parameters

Comments: Format developed by TRITON which is now widely accepted.

3.7 DTM/Bathymetry or other Gridded data

Format: Vertical Mapper, XYZ ASCII delimited

Additional information to supply: Datum (7 parameters) and projection parameters

Comments: Gridded data is not convenient as the resolution is already fixed but it may be the only format available

3.8 Seismic

Format: SEG-Y

Additional information to supply: track lines

Comments: SEG-Y is a common recognised format, particular care should be taken in the writing of SEG-Y headers for greater compatibility.

3.9 Ship track, magnetism, gravity

Format: MGD77

Additional information to supply: Datum (7 parameters) and projection parameters

Comments: This format is widely used by the US National Data Centre to collect research vessels activities.

3.10 GPS rover data

Format: NMEA format

Additional information to supply: equipment and accuracy

Comments: none

3.11 GPS base station data

Format: RTM format

Additional information to supply: equipment and accuracy

Comments: none

3.12 CTD

Format: Any

Comments: No format is currently recommended. Format should be provided for interpretation.

3.13 Weather data

Format: Any

Comments: No format is currently recommended. Format should be provided for interpretation.

3.14 Wave data

Format: Any

Comments: No format is currently recommended. Format should be provided for interpretation.

3.15 Document

Format: Microsoft Word, PageMaker

Additional information to supply: version

Comments: Use of styles is highly recommended as well as embedded images rather than OLE documents. For PageMaker all linked documents must be supplied.

3.16 Presentation

Format: Microsoft Power Point

Additional information to supply: version

Comments: none

3.17 Spreadsheet

Format: Microsoft Excel

Additional information to supply: version

Comments: none

3.18 Database

Format: Microsoft Access, Dbase, ASCII delimited (Tab)

Additional information to supply: version

Comments: no format is particularly recommended as most of the SOPAC databases are being transferred to Microsoft SQL Server.

4 Other data formats for exchange

These formats are for the exchange of data. SOPAC can read and write to these formats when no other format is supported or available.

4.1 Image

Format: TIFF, JPEG, GIF, Bitmap

Comments: Particular attention should be given to format that perform lossless compression such as JPEG.

4.2 Raster

Format: DXF, shapefile, ARC-Info export format

Comments: DXF does not contain any attribute data and is not suitable for GIS but only for mapping. ArcInfo data is not readable unless converted in the ArcInfo export format. For all these formats the datum (7 parameters) and projection parameters must be supplied.

4.3 Document

Format: WordPerfect, RTF, ASCII, PDF, HTML

Comments: All major formats can be read, however conversion between formats may lose the pagination. Acrobat PDF is mainly used for export.

4.4 Spreadsheet

Format: Paradox, Lotus

Comments: All major formats can be read.

5 Data from Research Vessels

The following data must be provided when sensors are installed:

1. Bathymetry and Imagery raw data
2. Bathymetry and Imagery non gridded
3. Ship track, magnetism, gravity
4. Seismic
5. Other non gridded data
6. CTD
7. Weather Data