GIS and *Risk-GIS*: Decision Support Tools

What is GIS?

Many of the decisions we make every day involve being able to access, understand and utilise the space around us. This type of information is referred to as spatial information, and when visualised, we can see relationships, patterns, and trends that may not otherwise be apparent. A Geographic Information System (GIS) is mapping software that provides spatial information by linking locations with information about that location. It provides the functions and tools needed to efficiently capture, store, manipulate, analyse, and display the information about places and things. The key components of a GIS are:

- Tools for entering and manipulating geographic information such as addresses, political boundaries, geological features and building information
- A database management system (DBMS)
- Tools that create intelligent digital maps you can analyse, query for more information, or print for presentation
- An easy-to-use graphical user interface (GUI)

The synthesis of data and the essential mapping of the spatial relationships between natural hazard phenomena (earthquake, landslide, cyclone, etc.) and the elements at risk (people, buildings, infrastructure) require the use of tools such as GIS. The relationships that are most significant in risk analysis and modelling are largely spatial. To accommodate this spatial emphasis, Geoscience Australia makes extensive use of GIS tools and technologies, as demonstrated in Figure 1.

Risk-GIS at Geoscience Australia

While GIS has been used as a tool to address specific aspects of risk management, there are few examples of integrated risk management applications. There are obvious advantages in developing a fusion between a philosophy of risk management and the power of GIS as a decision support tool, hence *Risk-GIS* as it has been termed. The objective of *Risk-GIS* is to aid decision making and problem solving in fields that have a bearing on community safety and sustainability. As such, it provides the analytical 'engine' which drives the natural hazard risk assessment process. It also provides a more potent form of risk communication through its capacity to provide a visual representation of risk situations.

The creation of *Risk-GIS* as the central enabling methodology/philosophy of the multi-hazard risk assessments undertaken by Geoscience Australia has been an evolutionary process. Originating from an adaptation of the 1995 edition of the AS/NZS 4360 Risk Management Standard, the modern *Risk-GIS* model is a reflection of the experience of many people from a wide range of disciplines.

To see how *Risk-GIS* has worked in practice, reference should be made to the published Geoscience Australia multi-hazard risk assessments of Cairns (Granger and others, 1999), Mackay (Middelmann and Granger, 2000), and South-East Queensland (Granger and Hayne, 2001).

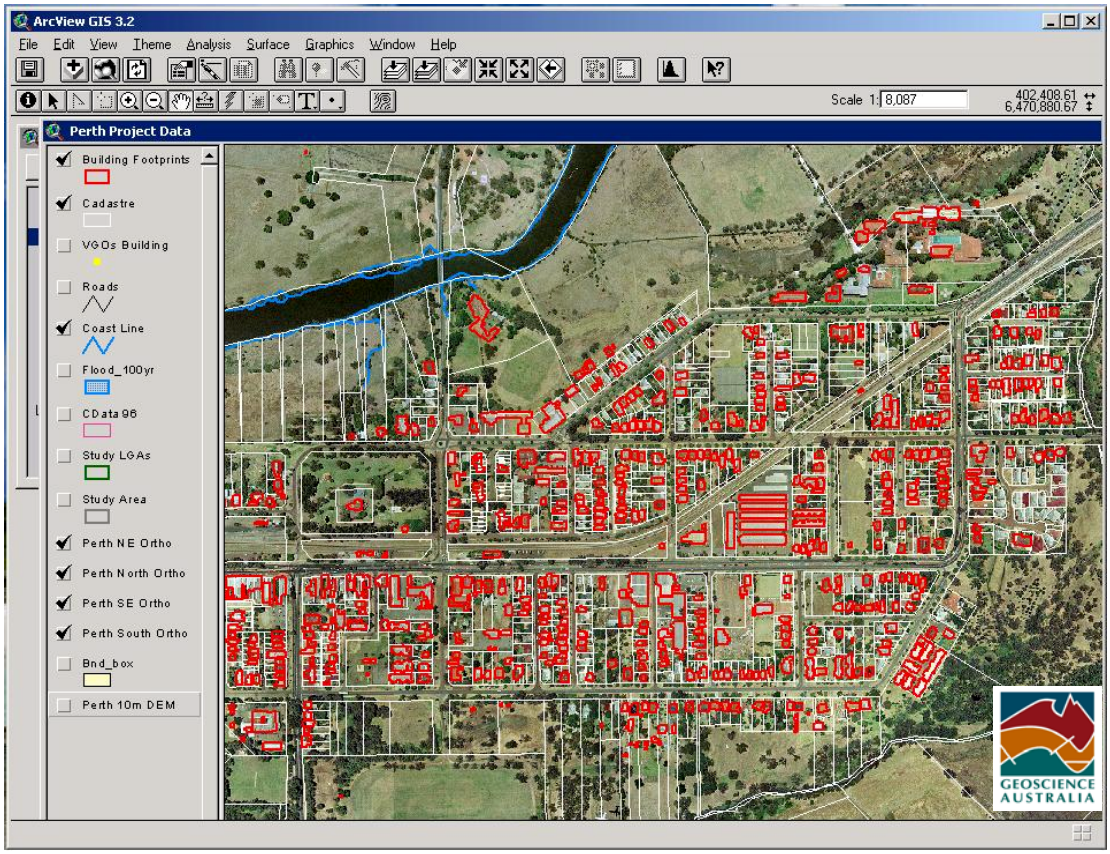

Figure 1. GIS software, such as ArcView, allows an enormous amount of information to be visualised in a spatial situation. The visualisation allows scenario modelling to occur, so that responses to natural hazards can be incorporated into local emergency management plans.