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Research Article

Make Better Decisions Through a Web-Based Coastal Zone Management Spatial Tool

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Abstract

The ultimate aim of using spatial datasets and spatial data modelling is focused on enabling a sustainable environment by bringing the public policies into practice. The consequence will be sustainable spatially aware strategic planning for all levels of Australian government. Geographical Information Systems (GIS) are the platform that can serve this aim provided that model, current process and spatial datasets are fit for purpose. To bring public policy into practice a broad range of knowledge from different disciplines is needed. Most decision-making processes are pressured in terms of time and driving forces and also the process is beyond the knowledge of individuals in the various disciplines. There is a need for immediate uptake models and tools which are relevant to the target subject that will facilitate this decision-making process. This paper will focus on realizing the utility of spatial data and spatial data handling in order to help climate change adaptation programs at the local government level. Web-based mapping tools can assist planners to prepare for the changing climate conditions in Bass Coast Shire Council. The GIS team has gathered data from various climate research organizations to understand projections of what different climate scenarios might look like over the next 100-year period. From this website demo it is hoped that the user will understand how the tool works, background information on different GIS platforms, access to interactive mapping, online geospatial analysis tools, videos, open source resource, sea level tools, modelling, 3D visualization and direct download access to various planning and natural resource data sets relating to environment management. We will provide some results from our elevation data analyses through these Web map visualization tools.

Keywords: *Spatial, Modelling, GIS, 3D, Visualisation, Web-based, Climate Change*

Introduction

History shows that from time to time, progress in advancing functionality in decision support has depended on the diffusion and adoption of innovation [1]. In Australia, at present, GIS adoption is by third-tier government agencies and local organizations. Especially, can it be argued, from a survey of local-area, e.g. LGA, DSE regional offices, GIS Lab data processing practice; there is a lack of data flow coherence [2]. This paper results from an analysis of the relative significance of constraints upon adoption of the full power of digital spatial data handling with coherence in the service of the Phillip Island Nature Park (PINP) and related organizations. The coherence problem is shown to be overcome by adopting a data directory model including well-trialled data dictionaries. The biggest constraint is shown to be access to adequate software for data sharing and maintenance: mainly a problem of finding the funds to pay proprietary software license fees. Although this is not unusual, it is shown that recent advances in efforts to promote data sharing and spatial data visualization, worldwide (in the form of open-source software) promise a revolution in the construction of detailed geographies (time and space). Transparency and utility are greatly improved, and the user-base of the digital spatial database can greatly increase in size by extending itself to include many naive users. Exemplification is made using several decision support tasks faced by Phillip Island National rangers, Shire environment officers and community LANDCARE groups. Empowering the naive user in the interests of maximizing the value of spatial information will implement of public policy by promoting diffusion of digital spatial data handling and transparency in government [3]. An assessment of the scope for improving the diffusion of digital spatial data handling within the Coastal area community. Establishing an interface through which relevant data can be shared with all stakeholders. Clearly, visualization would be involved, and for that, a sound spatial database is a pre-requisite. Thus, the scene is set for a research project with a focus on increasing the GIS user population among decision support teams.

Study Area

Phillip Island is about 140 km south-southeast of Melbourne, Victoria. Phillip Island Nature Park (the Nature Park) is the renowned home of one of Australia's most popular natural wildlife attractions—the Penguin Parade. Created by the State Government in 1996, it is the only 'Nature Park' in Victoria. Like all conservation areas, it is managed under the Crown Land (Reserves) Act 1978(Vic.). As stated in the Phillip Island National Parks Management Plan [4], the Summerland Peninsula and its Penguin Parade is an easy 90-minute drive from Melbourne. The Nature Park features unique wildlife and spectacular scenery. It is an island adventure with flora and fauna reserves, wetlands and breathtaking coastal scenery. The Nature Park is part of the traditional lands of the Bunurong Aboriginal people. The Nature Park is self-funding from revenue from its four main visitor venues; Penguin Parade, Koala Conservation Centre, Churchill Island and the Nobbies Centre. In 2007/08, the Nature Park welcomed 707,837 paying visitors from around the world and a further 350,000 people visited the Nobbies Centre to which entry is free of charge. All profits generated by these main attractions are reinvested into

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research, conservation, environmental and educational initiatives on Phillip Island. Figure 1.

The out-reach web GIS for naïve users a Possible Solution?

One technology with the potential to widen communication in coastline management planning is Google Earth Outreach GIS (GEOGIS). A GEOGIS is in many aspects similar to a traditional GIS, but it encompasses web visualisations as a key output and interaction method. In this paper, we propose a few ways, by using GIS tools, to improve naïve user teaching, learning, presentation and outreach. The GEOGIS aspect has evolved mainly as an interface technology within which user interaction issues are of key importance. The more traditional GIS act as a data storage and manipulation technology. The important role of visualisation in environmental decision-support has been recorded by a number of authors who have highlighted the need to develop such techniques to assist in the public presentation of complex environmental process models [5]. The recent development of GEOGIS provides an opportunity to further develop public involvement in coastal zone management by providing the functionality to produce realistic virtual reality visualisations of different shoreline management outcomes [6].

These may prove to be a significant advance on traditional methodologies. Using a case study of the Phillip Island natural park in Victoria this article reports on a research project that is developing an integrated GEOGIS methodology for the assessment, visualisation and public communication of the environmental impacts of several proposed dictation support system.

Methodology

PINP Research website was created for up-grade of spatial data communication in support of improved data integration in PINP management through the adoption of spatial data and models by naïve GIS users. This website is designed to solve the problem that besets regional environmental managers wishing to increase return on investment in GIS by extending widening the agency GIS community by including the naïve users without further significant investment. In blog mode, it represents a repository for information and links to spatial data and information visualization, Video, free GIS software, environment modelling tools, Web application etc.

Spatial analyses and data communication are a variety of research approaches that involve examining data that has a spatial or geospatial component. This can include readings GIS features, model, video and PINP imagery. Using these approaches we present here a methodology for using spatial analysis for examining

Socio-economic information geospatially by joining Census and other similar data tables to geographic region Shapefiles. The methodology outlines a step-by-step process for performing the following steps:

1. Gathering, Creating, modelling and Preparing PINP Spatial Data

2. Identifying opensource tools, model and software for Spatial Analysis

3. Gathering information and spatial communication Technology Indicators

4. Data sources link, and spatial 3D analysis results

The work necessary for Step 1 to manipulate and generate spatial data requires the use of a GIS, while Step 2 can be performed using an internet browser (identifying opensource) and standard opensource software or dependent on the software platform being used (e.g. QGIS, Google Erath,). The approach for Step 3 is; the steps used in both platforms are explained in sequence.

It supports exploration of the relationships between information visualization and complex systems in ways that are designed to engage the interest of the naïve GIS user, and thus to increase the tendency for the GIS to be referred to more often. This website provides critical tools for success and efficiency. Accordingly, an executive can be presented with a high volume of complex data in the analyzed form. For the more experienced user, there are links to Free Environment modelling tools and tutorials. Environmental Modeling (EM) is a platform designed to help to facilitate the rigorous kind of spatial analysis and modelling that naïve users may aspire to or at least call for. With access to the tools for, creating a web-based GIS that supports video streaming and better data management, the number of GIS users among the PINP stakeholders will increase, especially after the adoption of "the common spatial model" approach to staging consensus-building meetings among stakeholders. The out-reach web GIS for naïve users is at http://pinpresearch.webs.com/ (see Figure 2).

Results

This out-reach improvement experiment can be tested by logging visitations. The PINP GIS officer and Rangers currently use this site (Figure 3). They are happy to learn different types of data analysis. If they have any query, they send it by email from this website: (http://pinpresearch.webs.com/apps/location/contact). Links are provided for identification of local priority issues for the natural environment, biodiversity management of beaches and bushland reserves, clean productive agriculture climate change impacts and adaptations as the first step to designing the open-site linkage tree.

A range of users has commented upon the PINP research website.

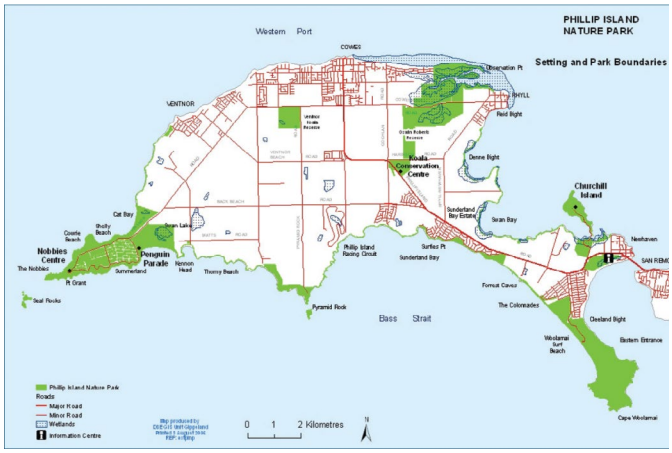

Figure 1: Phillip Island Natural Park. Source: DSE GIS Unit Gippsland (19th July 2006).

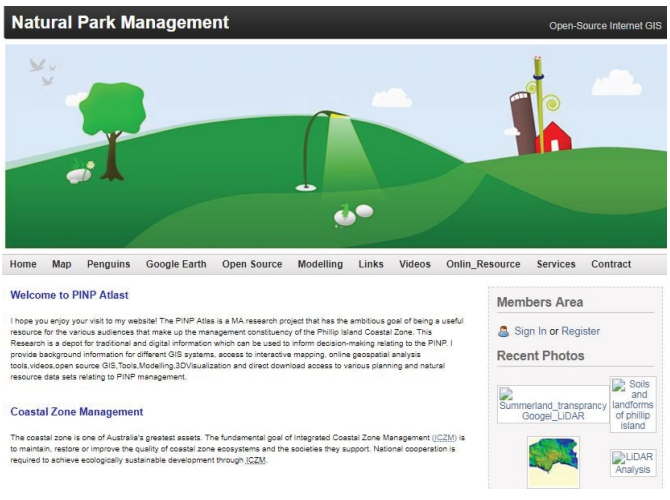

Figure 2: PINP Research website: display from the query (http://www.pinpresearch.webs.com/).

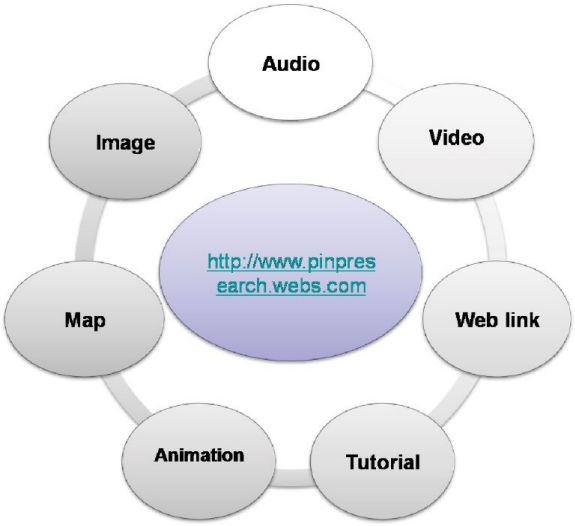

Figure 3: The PINP GIS website: conceptual representation.

PINP managers helped introduce us to other stakeholders and in evolving GIS data solutions. Comments on the first stages of this outreach phase of the project include:

"Wonderful protection of very lovable cute Koala. Work well done"

"Excellent innovation. We must protect this lovely species. Tracking penguins and monitoring their movements are an effective way to ensure their viability"

This is encouraging on the appeal to all stakeholders that the adoption of the" Neogeography approach" depends.

Discussion and Conclusions

The PINP Atlas is our MA research project that has the ambitious goal of being a useful resource for the various audiences that make up the management constituency of the Phillip Island Coastal Zone. From this website, everyone can enjoy GIS training. This research is a depot for traditional and digital information, which can be used to inform decision-making relating to the PINP. We provide background information for different GIS systems, access to interactive mapping, online geospatial analysis tools, videos, open source GIS, free environment analysis tools, modelling, 3DVisualization and direct download access to various planning and natural resource data sets relating to PINP management. Decision support systems evolve to suit the demands placed upon them, but the evolution can be constrained if multilateral decision making is called for by groups that have not maintained data that serves such wider purposes. However, in theory, modern ICT offers mitigation in these terms. To bring theory to practice it is necessary to exemplify utility. Our project is designed to exemplify the utility of maintaining stakeholder access to a website that provides scenario modelling functions using the new tools devised to service the naïve GIS user. If the exemplifications are accepted, the multilateral decision making called for by integrated resource management policy can be routinely supported by all stakeholder agents who must access and maintain the data.

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