Engaging Communities for Prioritising Natural Resource Management and Biodiversity Conservation Actions

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SUMMARY

Citizen science has a significant contribution to Natural Resource Management (NRM) through the acquisition and sharing of knowledge. Innovative online technology is playing an increasing role in the support and implementation of citizen science activities.
Two projects being conducted in Victoria are using web-based spatial applications to facilitate and support the use of community sourced information for natural resource management and biodiversity conservation. The Natural Resource Management planning portal (NRMPP) is a regional catchment planning tool designed for Catchment Management Authorities and Landcare organisations to plan and prioritise natural resource management works. State-wide Flora and Fauna Teams (SWIFFT) is network of community groups, individuals and organisations that is underpinned by online technology to share knowledge and data on biodiversity issues throughout Victoria.
Open source web-based spatial platforms are being used to deliver existing data from multiple sources, provide tools for the entry of spatial data and to provide information required for decision making. The focus of the two projects is to build knowledge management systems with tools that can be used by the community, land managers and other stakeholders to manage, control and share their own data in an online environment.
Submission and sharing of community biodiversity and NRM data using online spatial platforms, and federating it with regional, state and national environmental data is facilitating community engagement and providing a process for identifying opportunities to collaborate on NRM activities and biodiversity conservation projects.

Keywords: Citizen science, community engagement, planning, knowledge management

INTRODUCTION

There is significant and rapidly growing body of research demonstrating the importance of citizen science. Citizen science utilises volunteers in the collection or processing of data for a scientific study [3]. Essentially citizen science allows the participation of non-specialists in scientific research projects, generally acting as an experimenter or observer following established methodologies of a project run by professional scientists in having a contributory role [2].

Projects can also be shaped by the volunteers, forming ‘collaborative’ and ‘co-created’ projects. Citizen science therefore works through creating partnerships between science (scientists’) and the community [1]. Often referred to as crowd sourced data interpretation, volunteers have also been effectively integrated in to analytical tasks that are often labour intensive and require human interpretation [4].

Two Victorian citizen science initiatives are using online spatial and knowledge management technology to facilitate the collection, sharing and use of community information for biodiversity conservation and natural resource management. The Corangamite Catchment Management Authority (CCMA) Natural Resource Management Planning Portal (NRMPP) is a community planning tool that uses web-based spatial systems to capture local NRM activity and priorities for the development of local catchment plans. State Wide Integrated Flora and Fauna Teams (SWIFFT) is a state wide network of individuals, community groups and organisations that use online resources and spatial tools to submit, access and share information for protecting and conserving biodiversity.

The NRMPP [5] represents a successful collaboration between CCMA, the Centre for eResearch and Digital Innovation (CeRDI) at Federation University Australia (FedUni) and local Landcare networks. The primary aim is to spatially overlay local and regional NRM priorities to identify 'joint priorities' for potential partnership and investment. The NRMPP provides web-based tools for the CMA community to easily access the most current environmental datasets applicable to integrated catchment management and modelling. The projects promote the sharing of knowledge and information through the internet, allowing people to gain insights, present ideas, advice and information in a friendly and easy to use format, available at people's convenience.

SWIFFT [6] is a freely accessible biodiversity and threatened species network for community, conservation, education and government. It has been operating in South-west Victoria with the support of the Victorian Department of Environment, Land, Water and Planning (DELWP) since 2004, reaching over 60 different organisations and groups through video and internet knowledge sharing. SWIFFT facilitates engagement and knowledge sharing among biodiversity stakeholders, for the purpose of enhancing biodiversity planning. SWIFFT is currently undergoing re-development into an interoperable knowledge management portal, which will underpin the design of a broader information system, Visualising Victoria's Biodiversity (VVB).

AIMS

Collectively, the aim of the NRMPP and SWIFFT is to encourage and facilitate the acquisition of citizen science information and enable rapid dissemination of citizen science findings through publically-accessible knowledge management systems. The objectives of these web portals is to empower communities to collect and manage their own data, to provide readily accessible knowledge repositories and 'decision useful' information and to provide these resources using open data standards and open source systems. Ultimately, the combined aim of the projects is to facilitate practice change through improved access to relevant data and knowledge sharing.

APPLICATIONS

NRM Planning Portal

An interoperable web GIS application was developed to create a public access spatial portal for accessing relevant NRM data and information for the Corangamite region in South Western Victoria.

The portal uses the Victorian Government's VicMap API to deliver baseline topographic layers and high resolution imagery. The Corangamite CMA provided regional NRM data from their spatial library to display in the portal. Other relevant environmental spatial datasets served by a range of data repositories such as data.vic.gov.au, data.gov.au, NationalMap and Geoscience Australia are displayed on the portal through Web Mapping Services (WMS) and Web-feature Services (WFS) connections where available.

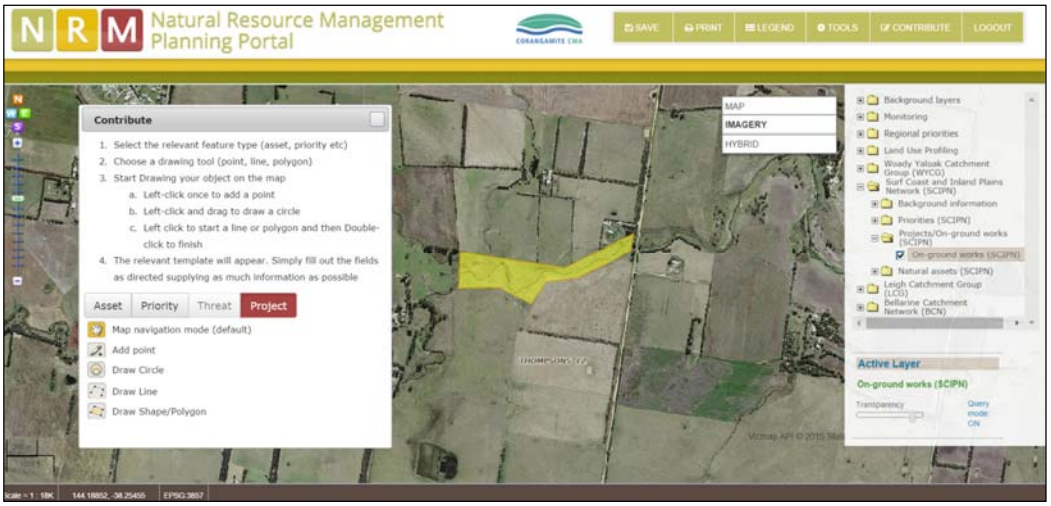

Figure 1. NRMPP spatial portal and data entry tool

Landcare networks submit and display local information using custom mapping tools built into the spatial portal (see Figure 1). These tools allow the user to create spatial features and enter attribute information within a web browser environment. The mapped features represent local NRM project activities, environmental assets, threats or priorities. Data contributed using the portal's mapping tool are directly submitted to a MySQL database and served back to the spatial portal through the open source Geoserver platform.

Where local (Landcare) and regional (CCMA) priorities spatially overlap, opportunities for partnership and co-investment in natural resource management activities are highlighted.

SWIFFT

The SWIFFT platform is comprised of three interlinked elements (1) the website, (2) video-conferencing, and (3) Visualising Victoria's Biodiversity (VVB) web GIS portal. Geospatial biodiversity information will be made freely available on this portal through the VVB, allowing users to view and query all data simultaneously using an interactive mapping tool. This will include spatial data from sources like the Department of Environment, Land, Water and Planning, Atlas of Living Australia (ALA), BirdLife Australia and the Victorian Biodiversity Atlas (VBA).

The VVB will also provide tools for the submission of data and observations from the community. This will be implemented within an interoperable framework that will allow sharing of data to state and national data repositories such as the VBA and ALA.

Knowledge sharing also occurs through video conferencing but options for supplementing the current video conferencing model with webinars are proposed, which will make the material presented more widely available. The SWIFFT website will also be designed to display and link to other relevant resources that cannot be spatially represented, for example, biodiversity monitoring reports, threatened species profiles and summaries, species management information and media or news articles.

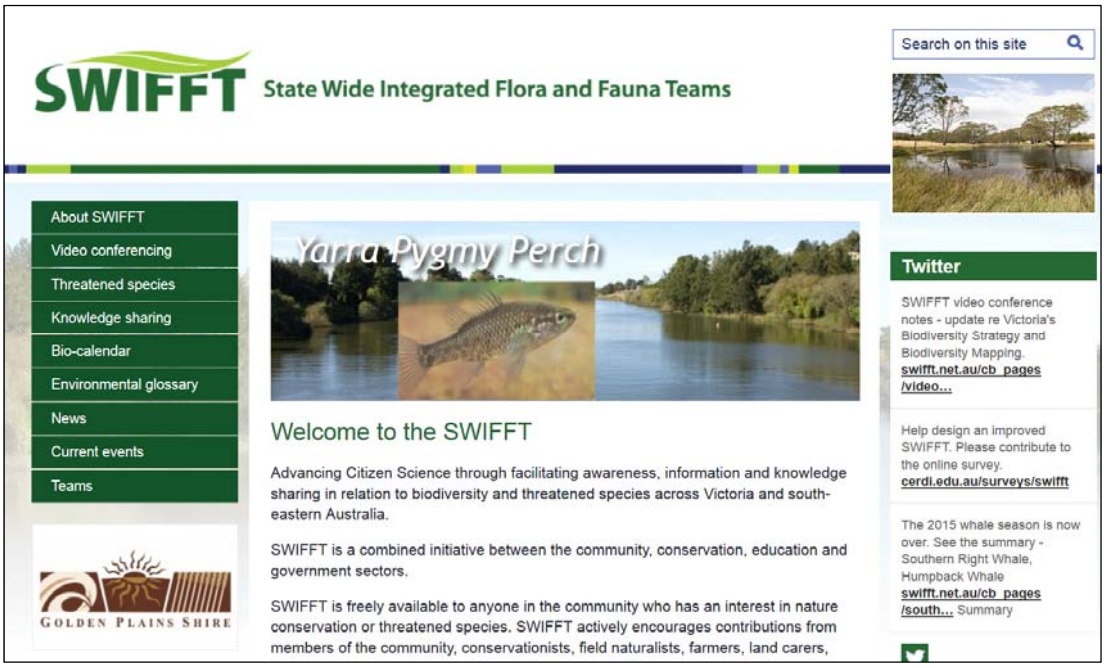

Figure 2. SWIFFT web portal

DISCUSSION

Community engagement

The NRMPP and SWIFFT projects are demonstrating that online spatial technology and systems can be used to create linkages and collaboration between multiple stakeholders through improved access to knowledge and data. Spatial web applications developed for the projects support local communities to record, display and share their knowledge, values and priorities. This facilitates greater awareness and acknowledgement of community activities and their priorities for future efforts in addressing local issues. The NRMPP and SWIFFT spatial platforms are providing a new process for identifying partnership opportunities in catchment management and biodiversity conservation by spatially overlaying local and regional values and priorities.

Four landcare networks – Woady Yaloak Catchment Group (WYCG), Surf Coast and Inland Plains Network (SCIPN), Leigh Catchment Group (LCG) and Bellarine Catchment Network (BCN) – are participating in the NRMPP project and using the NRMPP web applications to submit historical on-ground NRM works data and identify priorities for future works. This provides an open access online platform for the networks to more easily share local information to their members and stakeholders. It also allows organisations, such as the Corangamite Catchment Management Authority, to share regional, state and national biodiversity information and priorities with landcare networks and the local community.

SWIFFT has established a network of individuals, community groups, government bodies and conservation organisations who use the site to submit and share knowledge on native flora and fauna throughout Victoria. In addition to biodiversity information submitted by the community, SWIFFT also provides a platform for sharing information on regional initiatives such as the South-West Victoria Brolga Research Project, the Regent Honeyeater Captive Release project, Southern Right Whale South Eastern Australia Monitoring Project, South Australian Sea Turtles and the Eastern Barred Bandicoot Release at Churchill. The Visualising Victoria's Biodiversity map portal provides an interactive platform for sharing, visualising and interrogating spatial data submitted by members of the SWIFFT network and the general community.

Knowledge repositories, legacy data and data standards

Effective storage, management and maintenance of locally generated information and data is a common issue for community based groups and organisations. Organisational change and staff turnover can result in the loss of data when using unstructured local information management systems. Creation and storage of data in non-standard or proprietary formats can impede access and sharing of information.

Creation and storage of content in centralised spatial systems based on open standards and formats delivers greater data compatibility and opportunities for sharing information to other systems. Centralised and standardised systems can also provide a platform for community groups to deliver reporting and monitoring commitments required by funding agencies. Through the use of web enabled mapping and data capture, NRMPP is providing a standard format for documenting local NRM information and knowledge in the Corangamite region.

The NRMPP currently contains relevant regional baseline datasets, community monitoring information from the WaterWatch and EstuaryWatch programs, regional priorities on soils, waterways and native vegetation developed by the Corangamite CMA and data layers from the participating landcare networks representing on-ground NRM works and priorities for future projects.

The Woady Yaloak Catchment Group and the Leigh Catchment Group have migrated spatial datasets from local desktop systems to the NRMPP spatial repository that represent a range of on-ground works such as re-vegetation, pest plant and animal control, waterway protection, land protection and remnant vegetation protection. This process has converted numerous individual datasets with varying structure and format into a single table within a standard database schema. Surf Coast and Inland Plains Network do not currently have a local system for capturing, storing and managing spatial data. The Network is using the online mapping tools and data forms in the NRMPP to directly capture and display projects and on-ground works. This provides an alternative to establishing, managing and learning conventional desktop based GIS systems.

"Decision useful" content/resources

A large amount of data and information can easily be delivered through spatial platforms such as web mapping portals, particularly with current trends in providing open access to large data repositories. Information overload can quickly lead to disengagement with the technology. Building specialised reporting and querying functionality within spatial web applications is needed to deliver information in a form that can be used to implement planning or management decisions, or for reporting purposes. This ensures that the developed applications are quick, easy and useful for the end user.

The NRMPP provides the ability organise, visualise and query multiple datasets for cooperative decision making and planning between multiple stakeholders. For example, the Woady Yaloak Catchment Group and CCMA have used spatial tools on the portal to identify and spatially represent joint NRM priorities for potential co-investment and partnerships. Local weed control, erosion and revegetation priorities identified and mapped by the Woady Yaloak Catchment Group were spatially overlayed with CCMA regional waterway strategy priority waterways using the NRMPP. Areas of overlap between the local and regional priority layers represented potential locations for future on-ground NRM works. Polygons representing the identified joint priorities were created by the CCMA and Woady Yaloak Catchment Group using the NRMPP mapping tools.

The SWIFFT website, in combination with VVB, also provides opportunities to assemble flora and fauna data from multiple sources and data custodians for use by local communities and land managers. For example, combining data from state and national repositories such as the Victorian Biodiversity Atlas and Atlas of Living Australia with community contributed observations and information within a single online application provides a more comprehensive record of natural values that may occur at a location or area of interest. Users can then access summary lists or reports on flora and fauna recorded or potentially occurring at a site using specifically developed querying and information display tools that process and re-present the source data in a more user friendly form.

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