UNIVERSITY OF SOUTHERN QUEENSLAND

SPATIAL INFORMATION SHARING FOR CATCHMENT MANAGEMENT IN AUSTRALIA

A Dissertation Submitted by

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CERTIFICATION OF DISSERTATION

I certify that the ideas, experimental work, results, analyses, software and conclusions reported in this dissertation are entirely my own effort, except where otherwise acknowledged. I also certify that the work is original and has not been previously submitted for any other award, except where otherwise acknowledged.

Parts of this work were published in refereed conference proceedings, journals and book chapters as listed page number xvii.

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ENDORSEMENT

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A/Professor Kevin McDougall, Principal Supervisor Date

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A/Professor Armando A Apan, Associate Supervisor Date

ABSTRACT

Spatial information plays an important role in many social, environmental, economic and political decisions and is increasingly acknowledged as a national resource essential for wider societal benefits. Natural Resource Management (NRM) is one area where spatial information can be used for improved planning and decision-making processes. Traditionally, state government organisations and mapping agencies have been the custodians of spatial information necessary for catchment management. Recent developments in Information Communication Technology (ICT) tools and spatial technology have provided community groups and grass-root citizens with no prior experience in spatial technology with a new opportunity to collect and manage spatial information. With these opportunities, regional NRM bodies in Australia are collecting a significant amount of property and catchment scale spatial information. The access and sharing of spatial information between state government agencies and regional NRM bodies is therefore emerging as an important issue for sub-national spatial data infrastructure (SDI) development.

The aim of this research is to identify key factors which influence spatial information sharing between state government organisations and regional NRM bodies/catchment management authorities within Australia and to formulate strategies to facilitate spatial information sharing and hence support SDI development. The hypothesis is that the spatial information sharing in natural resource management needs to be improved and that a networked based spatial data infrastructure model may be an appropriate approach.

This research explored the theoretical foundation for SDI development and utilised social network theory to explore spatial information sharing arrangements between regional NRM bodies and state government organisations. A mixed method research approach was utilised where a survey and the case study data were collected and analysed sequentially (i e in two phases). The findings from the national survey of NRM bodies and the case study were integrated and interpreted to identify the key factors influencing spatial information sharing and catchment SDI development in Australia.

A national survey of regional NRM bodies investigated the spatial information access, use and sharing arrangements between regional NRM bodies and state government organisations. The results of the survey indicate that the spatial data access policy of state government organisations impacts on spatial information sharing across NRM bodies. The regional NRM bodies have a strong spatial capacity and are emerging as key players in spatial data infrastructure development in the natural resource management sector. An ongoing issue is the difficulty to locate which organisation holds each type of spatial data and accessing these datasets. Data sharing and spatial information management is a key area of collaboration and is based on the partnerships with state government organisations or community organisations. An emerging area for collaboration in the NRM sector is knowledge sharing.

The case study explored the effectiveness of the Knowledge and Information Network (KIN) project in promoting spatial information sharing arrangements between regional NRM bodies and state government organisations. It identified the role of intermediary organisations and professionals such as the Regional Groups Collective (RGC) and knowledge coordinators as being critical to improving the communication and spatial information sharing across catchments.

Using the mixed method design framework, the key factors which influence spatial information sharing between state government organisations and regional NRM bodies/catchment management authorities were classified into six major classes as organisational, economic, policy, legal, cultural and technical. Major strategies were formulated and it is suggested that the adoption and implementation of these strategies can facilitate spatial information sharing and hence SDI development across the natural resource management sector.

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LIST OF ACRONYMS

AANRO	Australian Agriculture and Natural Resource Online
ABARES	Australian Bureau of Agricultural & Resource Economics Sciences
ACT	Australian Capital Territory
ALIC	Australian Land Information Council
AND	The Australian Bibliographic Database
ANRII	Australian Natural Resource Information Infrastructure
ANT	Actor-Network Theory
ANZLIC	Australian New Zealand Land Information Council
ASDD	Australian Spatial Data Directory
ASDI	Australian Spatial Data Infrastructure
AusGOAL	Australian Governments Open and Access Licencing
BRS	Bureau of Rural Sciences
CANRI	Community Access to Natural Resources Information
CAP	Catchment Action Plans
CGDI	Canadian Geospatial Data Infrastructure
CMA	Catchment Management Authority
CSIRO	Commonwealth Scientific and Industrial Research Organisation
DAF	Department of Agriculture and Food
DCDB	Digital Cadastral Data Base
DEC	Department of Environment and Conservation
DEM	Digital Elevation Model
DENR	Department of Environment and Natural Resources
DERM	Department of Environment and Resource Management
DIKW	Data, Information, Knowledge and Wisdom
DNRW	Department of Natural Resources and Water
DPIPWE	Department of Primary Industries, Parks, Water and Environment
DoW	Department of Water
EPA	Environmental Protection Authority
ERIN	Environmental Resources Information Network
EU	European Union
EUROGI	European Umbrella Organisation for Geographic Information
FGDC	Federal Geographic Data Committee
FIG	International Federation of Surveyors
FTP	File Transfer Protocol
GI	Geographic Information
GII	Geographic Information Infrastructure
GIS	Geographic Information System
GSDI	Global Spatial Data Infrastructure

GSEC	Government Spatial Executive Committee
HRIC	Herbert Resource Information Centre
HSR	Hierarchical Spatial Reasoning
ICM	Integrated Catchment Management
ICSM	Intergovernmental Committee on Survey and Mapping
ICT	Information and Communication Technology
INSPIRE	Infrastructure for Spatial Information in Europe
IOR	Inter-organisational Relationship
IPR	Intellectual Property Rights
ISO	International Organisation for Standardisation
IT	Information Technology
IQ	Information Queensland
KIN	Knowledge and Information Network
KM	Knowledge Management
LGA	Local Government Authority
LWA	Land and Water Australia
LIDAR	Light Detection and Ranging
LIS	Land Information System
LIST	Land Information System Tasmania
MDBA	Murray Darling Basin Authority
MOU	Memorandum of Understanding
NAP	National Action Plan
NHS	National Health Service
NHT	Natural Heritage Trust
NIE	Neo-Institutional Economics
NII	National Information Infrastructure
NRC	National Research Council
NRM	Natural Resource Management
NRETAS	Natural Resources, Environment, the Arts and Sport
NSDI	National Spatial Data Infrastructure
NSW	New South Wales
NT	Northern Territory
NTLIS	Northern Territory Land Information Council
NTSDI	Northern Territory spatial data infrastructure
NVIS	National Vegetation Information System
OGC	Open GIS Consortium
OMB	Federal Office of Management and Budget
OMG	Object Management Group
OO	Object Oriented
OSDM	Office of Spatial Data Management
P-A	Principal-Agent

PCGIAP	Permanent Committee on GIS Infrastructure for Asia & The Pacific
QGIS	Queensland Government Information Service
QLD	Queensland
QLIC	Queensland Land Information Council
QMDC	Queensland Murray Darling Committee
QSIC	Queensland Spatial Information Council
QSIIC	Queensland Spatial Information Infrastructure Council
RAVI	Dutch Council for Real Estate Information
RGC	Regional Groups Collective
SA	South Australia
SDI	Spatial Data Infrastructure
SDS	Spatial Data Sharing
SEDAC	Socioeconomic Data and Applications Center
SI	Spatial Information
SIS	Spatial Information System
SLIP	Shared Land Information Platform
SNT	Social Network Theory
TAS	Tasmania
TAMS	Territory and Municipal Services Directorate
TCM	Total Catchment Management
UK	United Kingdom
UML	Unified Modelling Language
UN	United Nations
USA	United States of America
USGS	United States Geological Survey
VGI	Volunteered Geographic Information
VGIS	Victorian Geographic Information Strategy
VIC	Victoria
VRO	Victorian Resource Online
VSIS	Victorian Spatial Information Strategy
WA	Western Australia
WALIS	Western Australia Land Information System

OPERATIONAL DEFINITIONS

The following brief operational definitions of terms which are used throughout this dissertation are provided to clarify the context in this research.

Catchment: A catchment is a discrete geographical area of land whose boundaries are derived primarily from natural features such that surface water drains and flows to a river, stream, lake, wetland or estuary.

Catchment Management: Catchment management refers to the practice of managing natural resources using river catchment systems as the unit of management. From a theme perspective, catchment management is about management of land, water, biodiversity, coast and marine themes.

Catchment Management Authorities: Catchment management authorities (CMAs) are the natural resource management bodies responsible for management of land and water resources in the catchment. All states/territories have some form of catchment management authority or natural resource management group within their jurisdiction. There are 56 regional NRM bodies/CMAs responsible for catchment management in Australia. In particular, they called catchment management authorities in New South Wales and Victoria.

Knowledge Sharing: Knowledge sharing is defined as the process of exchanging knowledge (skills, experience, and understanding) amongst stakeholders. For the purpose of this thesis, stakeholders includes government agencies, regional NRM bodies, community organisations, private sector and academia.

Regional Groups Collective: The regional groups collective is a representative body for natural resource management in Queensland which provides a single, strong voice for its members. It supports regional NRM groups to deliver sustainability outcomes by coordinating statewide programs, providing mentoring and leadership, advocacy for improved investment in natural resource management, and identifying areas for training and improvement

Spatial Information Sharing: Spatial information sharing is the exchange or transfer of spatial information between two or more organisations.

PUBLICATIONS

Papers Published from this Dissertation

1 Paudyal, Dev Raj, McDougall, Kevin and Apan, Armando (2012) *Exploring the Application of Volunteered geographic information (VGI) to Catchment Management: A Survey Approach,* XXII ISPRS Congress, 25 August - 1 September 2012, Melbourne (accepted for ISPRS Annals of Photogrammetry, Remote Sensing and the Spatial Information Sciences).

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