USQ AUSTRALIA

FACULTY OF ENGINEERING AND SURVEYING

A PhD Workshop on
Theory-based SDI Research: North and South

FACILITATING SUSTAINABLE CATCHMENT MANAGEMENT THROUGH SPATIAL DATA INFRASTRUCTURE DESIGN AND DEVELOPMENT

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Outline of Presentation

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- Background
- Research Problem, Hypothesis and Aim
- Research Objectives
- Significance and Outcomes
- Research Design
- Study Area and Data Analysis
- Progress

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Background

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Catchment management issues are characterised by multiple stakeholders and multiple goals




- Institutional complexities for catchment management
- Spatial data can assist for many catchment decisions

Photo Source: A/Prof. Kevin McDougall and Internet

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Background
(Spatial Data and Decision Making)

Key Issues	Application of Spatial Data
Biodiversity, Less Native Plant	Biodiversity Mapping, Spatial Decision Making
Community Capacity Building	Community Awareness, Education
Climate Change	Assessment of Vulnerability and Adaptation
Floodplains, Land Erosion, Land Degradation	Flood Modelling, Erosion Zoning, Emergency Management, Future Forecasting
Land Use Planning and Soil Conservation	Land Use Mapping, Soil Mapping
Pest Animal and Weed Management	Weed Mapping, Habitat Mapping
Water Resource Management (including water quality and availability)	Mapping and Modelling of Water Resources, EIA

(Paudyal et al., 2008)

Background
(Complex Jurisdictional Environment)

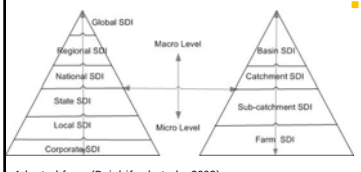
Spatial Data	Data Source		
Topographical Base	Local	State	National
DEM		X	
Cadastre		X	
Soil and Geology		X	
Watershed/ Catchment	X	X	
Infrastructure	X	X	
Land use/Land Cover		X	
Metrology		X	X
Climate		X	X
……			

(Paudyal et al., 2009)

- Three Levels of Governments
- Varying Scale and Data
- Different Custodians
- Multiple Stakeholders

Research Problem, Hypothesis and Aim

- **Research Problem**



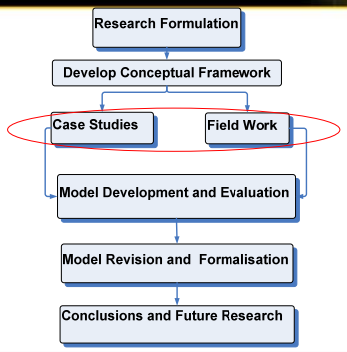
Adapted from (Rajabifard et al., 2003)

- **Research Hypothesis**
  - "An appropriately designed SDI model will improve the spatial data sharing and partnerships between different levels of administrative/ political jurisdictions and catchment hierarchies and hence promote sustainable catchment management".
- **Research Aim**
  - To develop a SDI Hierarchy Model for Sustainable Catchment Management

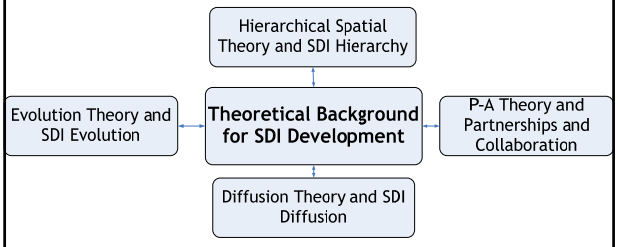
Research Objectives

- To review the SDI theoretical foundation
  - develop conceptual framework
- To identify key issues that facilitate/constraint SDI development at catchment scale
- To develop a SDI model/framework
- To evaluate the SDI model/framework

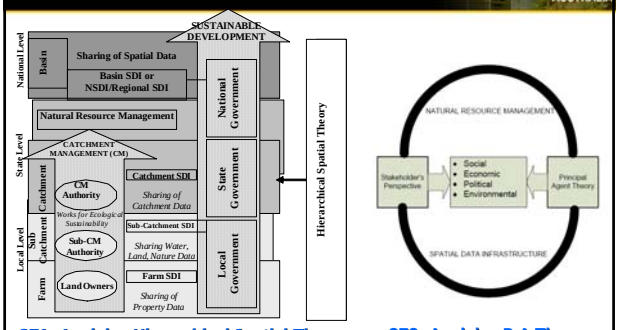
Research Design



Theoretical Background for SDI Development



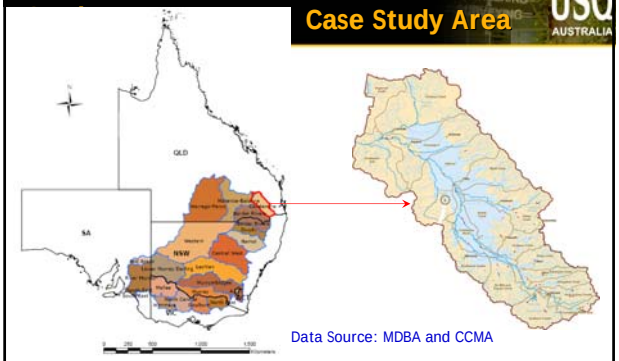
Conceptual Frameworks Formulation



CF1: Applying Hierarchical Spatial Theory

CF2: Applying P-A Theory

Case Study Area



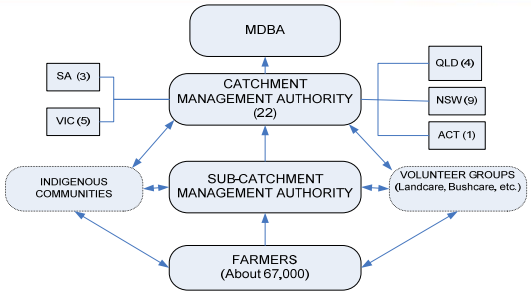
Data Source: MDBA and CCMA

MDB and Condamine Catchment (Queensland), Australia

Case Study Description

- MDB is the Australia's largest drainage divisions and covers one-seventh of the continent
- It is ranked fifteenth in the world in terms of length and twenty first in terms of area
- It falls under the four state jurisdictions and one territory
- Catchment communities and governments are the main stakeholders
- Total 22 catchment management authorities and 67,000 farmers

Case Study Description



Management hierarchies in catchment governance in the MDB

Case Study Analysis

- Cross-jurisdictional Boundaries

Data Source: MDBA

Case Study Analysis

- Cross-jurisdictional Boundaries

STATE (Name)	CMA (Number)	LOCAL GOVERNMENT AUTHORITIES (LGAs)			
		Number of LGAs that fall within catchment boundary	Number of LGAs that straddle catchment boundary (number)	Total	Proportion of LGAs that straddle catchment boundary in each state
QLD	4	9	29	38	76%
NSW	9	30	48	78	62%
VIC	5	10	24	34	71%
SA	3	4	15	19	79%
ACT	1	1	0	1	0%
Total	**22**	**54**	**116**	**170**	

(Paudyal et al., 2009)

Model Development and Testing

- Model Development
  - Triangulation of existing theory, field data and case study results
- Model Testing
  - Local experts and stakeholders
  - Software Testing (Object-Oriented Technology)
  - Another Jurisdiction and research community

Progress and Issues

- Progress
  - Literature Review
  - Conceptual Framework Development and Testing
  - Case Study Areas Selection
  - Collection of Catchment Data from MDB and Condamine Catchment
- Issues
  - Selection of Appropriate Case Study Areas
    - Number and Catchment Hierarchy
    - National or International (for testing)
  - Theoretical Foundation
    - Only Four or More
  - Data Analysis Methodology

Thanks for your attendance

Discussions!