

**Environmental Amenities and Local Development in Australia: Spatial  
Hedonic Pricing and Regional Economic Models**

by

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Submitted in fulfilment of the requirements for the degree of

Doctor of Philosophy at The University of Adelaide

28 February 2012

*To my beloved parents, Nasser and Betty*

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## Abbreviations

2SLS	Two-stage Least Squares
ABS	Australian Bureau of Statistics
ASD	Adelaide Statistical Division
AU\$	Australian Dollar
BOM	The Australian Government Bureau of Meteorology
GIS	Geographic Information System
GM	Generalised Moments
GS3SLS	Generalised Spatial Three-Stage Least Squares
GWR	Geographically Weighted Regression
i.i.d.	Independent Identically Distributed
IV	Instrumental Variable
LGA	Local Government Area
LM	Lagrange Multiplier
ln	Natural Logarithm
MDB	Murray Darling Basin
NDVI	Normalised Difference Vegetation Index

MLE	Maximum Likelihood Estimation
NSW	New South Wales
OD	Origin Destination
OLS	Ordinary Least Squares
QLD	Queensland
RESET	Regression Equation Specification Error Test
RP Data	Residential Property Data
SA	South Australia
TOM	Time on Market
Vic	Victoria

## ABSTRACT

Many Australian cities are under pressure to preserve open spaces and limit suburban sprawl while still providing affordable and desirable housing and encouraging economic growth. In their efforts to preserve open spaces, public policy decision makers, require reliable information on the dollar value of open spaces. Moreover, the Millennium Drought (1997-2009) in regions across Australia, coupled with poor water allocation decisions, has seen a dramatic increase in the share of water diverted to the agricultural and urban sectors, leaving less water to flow into the natural environment. This has led to degradation of wetlands and water-dependent environment in some regions (e.g. Murray Darling Basin (MDB)). The present study provides evidence on the local economic role of environmental amenities in urban and rural areas of Australia from two major strands of empirical research, respectively, hedonic pricing and regional economic models. Only economic analyses relying on well-established statistical techniques, reliable and extensive data and well-framed research methodologies can provide evidence about the economic value of environmental amenities.

As part of the development of a methodology to estimate the value of environmental amenities in Adelaide, the capital city of South Australia (SA), we review the literature of hedonic price models with reference to the theoretical foundations and empirical developments of the hedonic price method. The hedonic price model is commonly applied to estimate environmental attributes. The hedonic models are constructed using real estate data on property characteristics and selling prices. Spatial data on environmental amenities and locational attributes are also incorporated into hedonic pricing models. This literature suggests there is economic value on open spaces in urban areas. However, estimated values vary widely across studies which in turn create complexity to generalise results from this vast literature on open space valuation. Policymakers at all levels of government may find it difficult to use the extant literature for assigning a specific dollar value to a particular open space project. We estimate a spatial hedonic pricing model with fixed effects, to produce unbiased

and consistent estimates of the value of environmental amenity in Adelaide, SA. Such estimates will be important in placing a value on the economic benefits of residential and environmental amenity and provide support to planners and add quantitative values to the public policy debates.

The results indicate that the value of a property increases in proximity to green space sporting facilities, golf courses or the coast, (adding \$1,580, \$540 and \$4,990 per kilometre closer respectively). The large urban Parklands in Adelaide add \$1,550 to a property's value for each additional kilometre closer. This translates to an increase in the tax base associated with the Parklands given the number of properties within close proximity to the Parklands. We also present evidence of the importance of maintaining open space in a green and healthy condition in the current climate of water restrictions.

The presence of environmental amenities has also been shown to have a positive effect on people's quality of life in suburban and rural areas. We use a regional economic development in particular a generalised spatial three-stage least square procedure to evaluate the effect of environmental amenities on percentage changes in population, employment and income of 153 local government areas (LGAs) in the MDB, Australia. Estimates from the structural parameters, after accounting for spatial dependencies, show that environmental amenities have a significant role in enhancing economic development in the MDB. Areas closer to rivers experience more population increase over the period of 2001-2006 and LGAs closer to forests and lakes experience more employment and income growth. Additionally, rapid employment and income growth occur in areas with more rainfalls and higher temperature.

## **DECLARATION**

I, Parvin Mahmoudi certify that this work contains no material which has been accepted for the award of any other degree or diploma in any university or other tertiary institution and, to the best of my knowledge and belief, contains no material previously published or written by another person, except where due reference has been made in the text.

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## **ACKNOWLEDGEMENTS**

This study is funded by the Commonwealth Scientific Industrial Research Organisation (CSIRO) Water for a Healthy Country (WfHC) Flagship Research Program.

I would like to acknowledge the valuable guidance and comments that I received from my supervisors, Dr Darla Hatton MacDonald, Associate Professor Ralph Bayer, Dr Jeff Conner and Dr Nadya Baryshnikova. In particular, I would like to express my gratitude to Dr Darla Hatton MacDonald for providing me with such a great opportunity to work on researches funded by CSIRO Water for a Healthy Country Flagship and Dr Jeff Connor for his consistent support throughout my studies.

I gratefully acknowledge David Summers and Darran King for the construction of the GIS data and Dr Cast for editing assistance and teaching me on how a draft report is generally structured. Furthermore, I would like to express my appreciation to Dr Sorada Tapsuwan for her valuable guidance and suggestions towards the second empirical study in this thesis. All remaining errors remain my responsibility alone.

I would like to take this opportunity to thank my family especially my parents for their true love and support through my entire PhD candidature.