

Ecopolis
**Towards an Integrated Theory for the Design,
Development and Maintenance of
Ecological Cities**

VOLUME 1

Including:

Propositions – Epistemology – Perspectives – Projects

Parts A & B



Ecopolis

Towards an Integrated Theory for the Design, Development and Maintenance of Ecological Cities

Paul Francis Downton

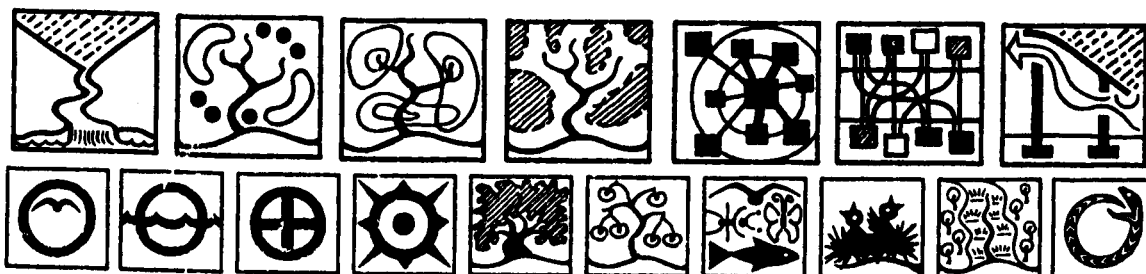
BSc (Hons) BArch (Wales)

Dissertation submitted in fulfilment of the requirements for the
Degree of Doctor of Philosophy (Arts)

in the

Mawson Graduate Centre for Environmental Studies
Department of Geographical and Environmental Studies
Faculty of Humanities and Social Sciences
University of Adelaide

February 2002



Charter of Calcutta¹

We are at a turning point in history.

Our planetary environment is severely damaged.

Desertification is spreading, the globe is warming.

Entire ecosystems are under threat.

And the City is at the centre of the storm of destruction.

But that is the key!

We must cease seeing the City as a problem.

We must see the City as the solution.

For the City is our home.

It is what we make it to be.

It is where we live.

If we fail to seize the Future,

We will be consumed by the Past.

The Future begins NOW!

Let the Charter of Calcutta be simple and clear,

To be heard by all,

And filled with hope and vision -

The City Can Save the World!

¹ 'Proposed by Paul F. Downton (Australia), endorsed by a panel consisting of Dr. Wale Odeleye (Nigeria), Prof. Christine Boyer (USA), Mr. Dean Ackemecht (Switzerland) and Prof. Santosh Ghosh (India) and adopted in the Concluding Session of the International Conference and Exhibition on Architecture of Cities held in Calcutta on the 20th. November, 1990 and organised by the Indian Institute of Architects, West Bengal Chapter.'



TABLE OF CONTENTS¹

CONTENTS	i
LIST OF FIGURES	xiv
LIST OF TABLES	xx
ABSTRACT	xxi
DECLARATION	xxii
ACKNOWLEDGMENTS	xxiii
PREFACE – THE CITY IS MY UNIVERSITY	xxv
CHAPTER 1: INTRODUCTION AND GROUND PLAN	
1.1 The Idea of Ecopolis	1
1.1.1 Projects and Praxis	2
1.1.2 The Propositions	4
1.1.2.1 <i>Proposition 1: CITY-REGION: City-regions determine the ecological parameters of civilisation</i>	4
1.1.2.2 <i>Proposition 2: INTEGRATED KNOWLEDGE: There is an imperative need to integrate extant knowledge</i>	4
1.1.2.3 <i>Proposition 3: CULTURAL CHANGE: Creation of an ecological civilisation requires conscious, systemic cultural change</i>	5
1.1.2.4 <i>Proposition 4: CULTURAL FRACTALS: Demonstration projects provide the means to catalyse cultural change</i>	5
1.1.3 The Three Parts of the Dissertation	6
1.2 Setting Contexts – Places and People	7
1.2.1 Defining Cities	7
1.2.2 Types of Cities	9
CHAPTER 2: AN EPISTEMOLOGY FOR URBAN ECOLOGY	
2.1 An Heuristic Hybrid?	12
2.1.1 Hemisphericism and Sustainability	15
2.1.2 Reconciliation of Urban and Non-urban Epistemologies	15
2.1.3 Architecture, Cross-talk and Points of View	17
2.1.4 City as Ecosystem	19
2.1.5 Defining Urban Ecology	20
2.2 Further Words on Architecture and Ecology	22
2.2.1 Greening the Discourse	22
2.3 Towards Sustainable Human Ecological Development²⁸	
2.4 Romantic Science	31
2.4.1 Picking Flowers	31
2.4.2 Objectivity, Subjectivity and the Third Way	33

¹ The decorated letters that are used to identify each of the three main parts of the thesis are by the author and were first used in the annotated bibliography co-edited by the author and David Munn.



PART A

ECOLOGICAL CITYSCAPES: THEORY & PRACTICE

A.1	People, Places and Philosophies	38
CHAPTER 3: ARCHITECTURE, URBANISM & ECOLOGICAL PERSPECTIVES		
3.1	Points of view	41
3.1.1	Antecedents and Antitheses	42
3.1.1.1	Gardens and Cities	43
3.1.1.2	Conservative or Conservationist	44
3.2	Integration	47
3.2.1	The Second Generation of Ecological Design	47
3.2.1.1	Four Ecological Phases of Human Existence	48
3.2.1.2	Three Urban Phases of Human Settlement	49
3.2.1.3	Mainstream sustainability	51
3.2.2	Which Analysis?	52
3.2.3	Health, Technology and Ecology	53
3.3	A Sense of Place	55
3.3.1	Placing the Architectural Experience	55
3.3.1.1	Critical Regionalism	55
3.3.1.2	Growing from Place	56
3.3.1.3	Being Critical of Regionalism	57
3.3.1.4	Bioregionalism	58
3.3.1.5	Ecological Architecture	59
CHAPTER 4: RELEVANT THEORISTS		
4.1	Picture People – Visionaries and Utopians	62
4.1.1	Soleri – <i>Arcologies and Spiritual Complexification</i>	62
4.1.2	Register – <i>From Vegetable Cars to Ecocitology</i>	65
4.1.3	Fuller – <i>Geodesic Domes on Spaceship Earth</i>	68
4.1.4	Howard – <i>The Garden City</i>	70
4.1.5	Morris – <i>News From Nowhere</i>	71
4.1.6	Callenbach – <i>Ecotopia</i>	72
4.1.7	Wright – <i>Broadacre City</i>	73
4.2	Process People – Understanding the Nature of Cities	75
4.2.1	Geddes – <i>A View from the Outlook Tower</i>	75
4.2.2	Mumford – <i>Cities, Technology and the Green Matrix of Regionalism</i>	78
4.2.3	McHarg – <i>Designing With Nature</i>	79
4.2.4	Hough – <i>Cities as Natural Process</i>	80
4.2.5	Spirn – <i>In the Granite Garden</i>	81
4.2.6	Jacobs – <i>The Death and Life of Cities</i>	81
4.2.7	Chinese and Russian Urban Ecologists – <i>The Green Is Red</i>	82
4.2.8	Fisk and Vittori – <i>Maximising the Potential of Building Systems</i>	83
4.2.9	New Alchemy and the Todds – <i>Bioshelters and Living Machines</i>	85
4.2.10	Biosphere 2 – <i>Off the Planet</i>	88

4.2.11	Berg and Sale – <i>The Bioregional Imperative</i>	90
4.2.12	Papanek – <i>Designing for the Real World</i>	92
4.2.13	Van der Ryn – <i>Ecological Architecture and Intellectual Coherence</i>	92
4.2.14	Yeang – <i>Architect and Bioclimatician</i>	93
4.3	Pattern People – Putting the Pieces Together	95
4.3.1	Alexander – <i>People, Patterns and Process</i>	95
4.3.2	Mollison – <i>The Productive Patterns of Permaculture</i>	99
4.3.3	Frampton – <i>Critical Regionalism</i>	100
4.3.4	Brand – <i>How Buildings Learn</i>	101
4.4	Pragmatic People – Getting from ‘Here’ to ‘There’	103
4.4.1	Newman and Kenworthy – <i>Auto Dependence</i>	103
4.4.2	Engwicht – <i>Calming the Traffic</i>	104
4.4.3	Ted Trainer – <i>Abandoning Affluence</i>	105
4.4.4	Girardet and the Vales – <i>Inspirational Economy and the Global Urban Condition</i>	106
4.5	Principled People	107
4.5.1	Hackney and Charles – <i>Community Architecture</i>	107
4.5.2	Day – <i>Places of the Soul</i>	108
4.5.3	Malcolm Wells – <i>Architecting Gently</i>	109
4.6	Village People and New Urbanists	111
4.6.1	New Urbanism	111
4.6.2	Corbett – <i>Village Homes</i>	115
4.7	Political People – Energy, Structure and Citizenship	116
4.7.1	Invisible Structures	116
4.7.2	Natural Capitalism	117
4.7.3	Energy & Equity	117
4.7.4	Mutual Aid	117
4.7.5	Street Farming	118
4.7.6	The Limits of the City	120

CHAPTER 5: THE AESTHETICS OF ECOCITIES

5.1	Diversity of Form and Expression	124
5.1.1	Hard and Soft Geometries	128
5.1.2	Williams-Ellis – <i>Portmeirion</i>	129
5.1.3	Gaudi – <i>Catalan Gothic</i>	130
5.1.4	Hundertwasser – <i>‘The Straight Line Is Godless, a Tool of the Devil’</i>	131
5.1.5	Albert – <i>European Organic</i>	131
5.1.6	Lynch – <i>The Image of the City</i>	132
5.2	Appearances Do Count	133
5.2.1.	Hideous Mountains	133
5.2.2	A House is Not a Machine – <i>Living Organism</i>	133
5.2.3	Nature Is Good for Us	134

CHAPTER 6: EXTANT ELEMENTS OF THE ECOCITY

6.1	Agenda 21, Environment Plans & Sustainability	136
6.1.1	Local Agenda 21	136
6.1.1.1	Sustainability Indicators	139

6.2	New Urbanism and Sustainable Houses	140
6.2.1	Integral Urban or Sustainable?	141
6.2.2	Los Angeles EcoVillage	142
6.2.2.1	Healthy Beginnings	143
6.2.2.2	LA Eco-Village & LA Housing Department	143
6.2.3	Village Homes	145
6.2.4	Ithaca EcoVillage	146
6.3	EcoUrbanism in Europe	148
6.3.1	New Ecological Settlement Projects in Europe	148
6.3.1.1	Mixed Development in Nuremberg	148
6.4	Bits and Pieces in 'Less Developed' Countries	152
6.4.1	Sustaining the South	152
6.4.2	Colonialism, Compact Cities and the Case of Calcutta	152
6.4.2.1	Colonial Cousins	153
6.4.2.2	Green Calcutta?	153
6.4.2.3	No Room for Eco-burgers	154
6.5	Curitiba, the 'Ecocity'	156
6.5.1	Parana: The Region	157
6.6	Midrand	160
6.7	Rural Urbanism in England	162
6.7.1	Poundbury	162
6.7.2	Beverley	164
6.7.2.1	Beverley & the Later Ecocity Projects	165
6.7.3	Cornish Domes – The Eden Project	167



PART B

URBAN ECOLOGY AUSTRALIA & ECOPOLIS: ECOCITY PROJECTS IN SOUTH AUSTRALIA

B.1	Taking the Long View	170
B.2	Urban Ecology Australia	172
B.2.1	A Brief History of the Organisation	172
B.2.1.1	Changing the Climate of Opinion	174
B.2.1.2	Challenging Negativity	175
B.2.2	Promoting 'Key Developments'	176
B.2.2.1	Three Fractals	177

CHAPTER 7: CASE STUDY I: THE HALIFAX ECOCITY PROJECT

7.1	Beginnings	180
7.1.1	Placing the Project	180
7.1.1.1	Projected Features	181
7.1.2	Initiating the Project	182
7.1.3	A Working Model	183
7.1.4	A Cultural Adventure	184

7.2	Context	186
7.2.1	Regional Context	186
7.2.2	Economic Context	186
7.3	Process	187
7.3.1	The Barefoot Architecture Program	187
7.4	The Built Form	190
7.4.1	Townhouse Environment Strategies	195
7.4.2	Courtyard Block Environment Strategies: Apartments, Offices and Retail	196
7.5	Analytical Diagrams of the Halifax EcoCity Project Design	197
7.6	History & Outcomes	207
7.6.1	History 1992 – 1998	207
7.6.1.1	Letter of Intent	207
7.6.1.2	Management Team	207
7.6.1.2.1	(1) <i>The Halifax EcoCity Land Trust</i>	207
7.6.1.2.2	(2) <i>EcoCity Development Pty Ltd</i>	207
7.6.1.2.3	(3) <i>Residents and Users Group</i>	208
7.6.1.3	Wirranendi Inc.	208
7.6.1.4	Registration of Interest	208
7.6.1.5	Information Meetings & Workshops	208
7.6.1.6	Barefoot Architecture Program	208
7.6.1.7	Option to Purchase	209
7.6.1.8	Roelof's Report	209
7.6.1.9	Letter of Exasperation – October 1994	210
7.6.1.10	Site Remediation – Dec 1994	210
7.6.1.11	Halifax EcoCity Forum – Dec 1994	210
7.6.1.12	Remediation Approved – 22 April – Earth Day 1995	211
7.6.1.13	Pilot Project – May 1996	211
7.6.1.14	ACC Commissions Halifax Report – Oct 1996	211
7.6.1.15	UEA Preferred Developer – Dec 1997	211
7.6.1.16	Shortlist of Developers	212
7.6.2	The Halifax Site Tender – What happened?	213
7.6.2.1	Dancing With the Wolves	213
7.6.2.2	Pentroth Selected as Developers	214
7.6.2.3	Key Objective Abandoned	219
7.6.3	Bite-Size Chunks and the Birth of a Fractal	221

CHAPTER 8: CASE STUDY II: WHYALLA ECO-CITY DEVELOPMENT

8.1	Beginnings	223
8.1.1	Project Brief	225
8.2	Context	226
8.2.1	Regional	226
8.2.2	Economic	226
8.2.2.1	The Land Grant	227
8.2.3	The 'Ecocity' Consultancy	228
8.3	Process	230
8.3.1	Public Meetings	231
8.3.1.1	Whyalla Why Not?	231
8.4	Workshops	233

8.4.1	The Urban Design Workshop	234
8.4.1.1	Typologies	234
8.5	History & Outcomes	241
8.5.1	Community Energy	241
8.5.1.1	Media Coverage	241
8.5.1.2	The Project Team and Liaison with Major Players	242
8.5.1.3	Community Organisations	243
8.5.2	Overseas Volunteer Input	243
8.5.3	Guidelines and goals	243
8.6	The Built Form	244
8.6.1	Critically Regional	245
8.6.1.1	Building design	245
8.6.1.1.1	<i>Transport</i>	246
8.6.1.1.2	<i>Infrastructure</i>	247
8.6.2	Comparison and Analysis of Site Planning	248
8.6.2.1	Urban Design Guidelines and Analytical Diagrams of the Whyalla EcoCity Development Site	250
8.6.2.1.1	<i>Building Morphologies</i>	250
8.6.2.1.2	<i>Colour</i>	250
8.7	Community developers	256
8.7.1	Project Team	256
8.7.1.1	Target Team	257
8.7.1.2	Property Boundaries	257
8.7.2	The Buddhists – Sakya Yigah Choeling	258
8.7.2.1	Mixed Blessing	260
8.7.2.2	Summary of Principles Underlying the Architecture	261
8.7.2.2.1	<i>Building Form and Siting</i>	261
8.7.2.2.2	<i>Construction</i>	261
8.7.2.2.3	<i>Technology</i>	262
8.7.3	The Anglicans	263
8.7.4	Senior Citizens	266
8.7.5	Excel Enterprises	267
8.7.5.1	Summary of Principles	267
8.7.6	The Whyalla EcoCity Information Feature	270
8.7.6.1	Design strategy	270
8.7.7	EcoCity Housing	273
8.7.8	EcoCity Sub-Division Design	275
8.8	Future Prospects	276
8.8.1	Conservational Development	276
8.8.1.1	Whyalla PAR	277
8.8.2	An ‘Ecocity’ Outcome	278

CHAPTER 9: CASE STUDY III: CHRISTIE WALK AND THE WHITMORE SQUARE ECOCITY PROJECT

9.1	Beginnings	279
9.1.1	The Bourne Court Pilot Project	279
9.1.1.1	Contaminated Land	280
9.1.1.2	Research Project	280
9.1.1.3	Community and Optimism	282

9.2	Context	283
9.2.1	Christie Walk	283
9.2.1.1	Climate	284
9.2.1.2	Existing Flora and Fauna	284
9.2.1.3	Infrastructure	284
9.2.1.4	Christie Walk as a Cultural Fractal	295
9.3	Process	286
9.3.1	The Builder	287
9.3.2	Development Approval	287
9.4	The Built Form	290
9.4.1	Design Response	291
9.4.1.1	Plan and Orientation	292
9.4.2	Urban Design and Neighbourliness	293
9.4.3	Artwork	295
9.4.3.1	Community Art Program	296
9.4.4	Design Strategies	297
9.4.4.1	Energy and Greenhouse	297
9.4.4.2	Participation	297
9.4.4.3	Project Team	298
9.4.5	Environmental Strategies	298
9.4.5.1	Lighting	298
9.4.5.2	Heating and Cooling Systems	299
9.4.5.3	Hot Water	300
9.4.5.4	Major Appliances	300
9.4.5.5	Power Generation	300
9.4.5.6	Comfort Issues	300
9.4.5.7	Ventilation	301
9.4.5.8	Windows and Views	302
9.4.5.9	Embodied Energy	302
9.4.5.10	Thermal Mass and Insulation	302
9.4.5.11	Toxicity and Indoor Air Quality	303
9.4.5.12	Resource Conservation	304
9.4.6	Environmental Systems	305
9.4.6.1	Water and Waste	305
9.4.7	Landscaping	306
9.4.7.1	Vegetation	306
9.4.7.2	Health	306
9.4.7.3	Biodiversity	307
9.4.7.4	Resource Use	307
9.4.7.5	Design for a Long Building Life	308
9.4.7.6	Security	308
9.4.8	Specific Buildings	309
9.4.8.1	Brian Callen Community House	310
9.4.8.2	'Green' Office Building	310
9.4.8.3	'The Roman Hut'	310
9.5	Invisible Structures	314
9.5.1	Community and Cultural Identity	314
9.5.2	Building Culture	314
9.5.3	Development Processes	314
9.5.3.1	Funding	315
9.5.3.2	Financial	315

9.5.3.3	Non-Profit Structures	316
9.5.3.4	By-Laws	317
9.6	History & Outcomes	319
9.6.1	Occupation	320
9.7.2	Optimism Again	321
9.8	Future Prospects	322

CHAPTER 10: UEA & THE CASE STUDIES: REVIEW & OUTCOMES

10.1	Social Experiments	323
10.1.1	The Halifax EcoCity Cultural Fractal	325
10.1.1.1	Sustainable Urban Neighbourhoods	325
10.1.1.2	The Shopfront	329
10.1.1.3	Under-Valuing the Community Sector	329
10.1.1.4	Inside Views from Overseas	330
10.1.1.4.1	<i>Laustsen</i>	330
10.1.1.4.2	<i>Jensen</i>	332
10.1.2	Whyalla EcoCity Development	333
10.1.2.1	Community Engagement	333
10.1.2.2	Cultural Impact	334
10.1.3	The Christie Walk Cultural Fractal	335
10.1.4	Communication	338
10.1.4.1	Media and Outreach	338
10.1.5	Community Action	338
10.1.5.1	Leadership	340
10.5.1.2	Community vs. Systematic Indifference	341
10.1.5.3	Human Resources	342
10.1.6	Maintaining the Momentum	342
10.1.6.1	Barriers	343
10.1.6.2	Habits of Competition	344
10.1.6.3	Make Ecocities Not War!	346



PART C

TOWARDS A THEORETICAL SYNTHESIS OF ECOPOLIS

C.1	Rebuilding the Foundations	349
C.1.1	Design Synthesis	349
C.1.1.1	Pattern Pieces	350
C.1.2	An Urbanism of Resistance	351
C.1.2.2	Technology is the Key	351
C.1.2.3	Essentials	351

SYNTHESIS I

CHAPTER 11 : CITY ECOLOGY

11.1	Structures of Life	355
-------------	---------------------------	------------

11.1.1	Little Cities, Big Impact	356
11.1.2	Architecting and Nature	357
11.1.2.1	Skins and Layers	358
11.1.2.2	Constantly Renewing Skins	359
11.1.3	Buildings as Ecosystems	360
11.1.4	The Living City	360
11.1.4.1	What is this Life?	361
11.1.4.2	Dead or Alive	362
11.1.4.3	Life Form?	363
11.1.4.4	City Skins	366
11.1.4.5	Time, and the Art of City Maintenance	367
11.1.4.6	Modelling the Nature of Cities	368
11.1.4.7	Evolving Solutions	369
11.2	Habitats for Non-Human Species	371
11.2.1	Ecological Corridors	373
11.2.2	Urban Wildlife	377
11.2.3	Barriers to Wildlife in the City	377
11.3	Design Guidelines for Non-Human Species	382
11.3.1	Edge Effect	382
11.4	Adaptive Urbanism	384
11.4.1	Food Security	384
11.4.1.1	Equity Corridors	385
11.4.2	Productive Landscapes	387
11.4.2.1	City Farms	387
11.4.2.2	Roofgardens: Architecture, Habitat and Food	387
11.5	Create Compact Cities	390
11.5.1	Density and Disorder	390
11.5.2	Compact, Ecological or Green?	391
11.6	Provide Health and Security	393
11.6.1	The Health of Cities: Holurbanism, Malurbanism & Vital Signs	393
11.6.2	The Reproduction of Cities	395
11.6.2.1	Holurbanism (Urban Spawn)	395
11.6.2.2	Malurbanism (Urban Sprawl)	396
11.6.3	Climate Change	396
11.7	Balance Development	397
11.7.1	Search for Limits	397

SYNTHESIS II

CHAPTER 12: ABC OF ECODEVELOPMENT

12.1	The Power of Limits	398
12.1.1	Planning for Long Now	399
12.2	Invisible structures	401
12.2.1	Geomancy, Scared Space and Feng Shui	404
12.2.2	Gendered Space and the Power of Form	406
12.3	Democracy & Citizenship	408
12.3.1	Colonisation, Consumers and Citizenship	408
12.3.1.1	The Passively Educated	411

12.3.2	Industrialisation and Urbanisation	411
12.3.3	The Politics of the City	412
12.3.4	From the Invisible to the Inspirational	412
12.4	Social Interaction and Some Urban Space Relationships	414
12.4.1	Expropriation of the Public Domain	415
12.4.1.1	Patterns of Space	416
12.4.1.2	Boundary and Edge Conditions	417
12.4.2	The Communal Eye	419
12.4.2.1	Access and Movement	420
12.4.2.2	Access – Land Use and Transportation Planning	421
12.5	Economics	422
12.5.1	The Development Process	423
12.5.1.1	LETS	423
12.6	Architecture	424
12.6.1	Empowerment in the Built Environment	424
12.6.2	Critical Regionalism – Finding Architecture and Place	424
12.6.2.1	Regionalism and Perception	425
12.7	Regionalism	426
12.7.1	The Basic Regional Relationships	426
12.7.2	Bioregionalism and the Search for Limits	427
12.7.2.1	The Same World for a Place and the People Who Live in It	427
12.7.2.2	Regions, Nazism	429
12.7.3	Bioregionalism Versus Balkanisation	429
12.7.4	Placing	430
12.7.5	Finding the Place of Cities	430

SYNTHESIS III

CHAPTER 13: EDUCATION, ADVOCACY & ACTIVISM

13.1	Agents of Change	432
13.1.1	Culture and Sacrifice	432
13.1.2	'Capturing the Transmitters'	433
13.2	Media: Getting the Message Out	434
13.2.1	Education	434
13.3	Exhibitionism: Ecopolis Now!	435
13.3.1	The Power of the Image	442
13.4	The Ecopolis Barefoot Architecture Program	443
13.4.1	Participation	443
13.4.1.1	Successful Examples of Participation	443
13.4.2	Barefoot Architecture	445
13.4.3	Popular Communication Methods	447
13.4.4	Getting the Numbers Right	447
13.4.5	Healthy Builders	448
13.5	Education and Community	449
13.6	Thinking Machines	451
13.6.1	The Outlook Tower	452
13.6.2	Fiction as Education	453
13.6.3	Urban Ecology in Academia	454

13.6.4	INTERNational Outreach and Education	454
13.7	Shadow Plans	455
13.7.1	The Birth of Shadow Planning	455
13.7.2	Shadow Plans of the River Torrens Catchment Tandanya Bioregion	457
13.7.2.1	Other Bioregions	458
13.7.2.2	How the Process Takes Place	458
13.7.2.3	Indicator Species	459
13.7.3	Shadow Plans – Enabling Vision or Hopeless Fantasy?	464
13.7.3.1	Kannenberg	464
13.8	The City as the Basis of Social Action	467
13.8.1	Red Flag	467
13.9	The Ecopolitan Muse	469
13.9.1	California Dreaming and Popular Culture	469
13.9.1.1	Ecopolis Now!	471
13.10	Ecopolis Propositions – The Sound Bite Version	473
13.10.1	Accelerated Climate Change Requires Accelerated Cultural Change	473

SYNTHESIS IV

CHAPTER 14: 'THE SHED' – SUSTAINABLE HUMAN ECOLOGICAL DEVELOPMENT

14.1	Introduction	474
14.2	Charter of Calcutta	478
14.3	The Icons	479
14.4	SHED Navigation Matrix, or Concordance	481
14.5	The Seven Steps of SHEDding	482
14.5.1	Settling in Place: Watershed and Region – A Basis for Process	482
14.5.2	Communitecology	483
14.5.2.1	The Emptiness and the Way	483
14.5.3	SHED 1 <i>Shedding</i>	485
14.5.4	SHED 2 <i>Placing</i>	487
14.5.5	SHED 3 <i>Biozoning</i>	489
14.5.6	SHED 4 <i>Lifelining</i>	490
14.5.7	SHED 5 <i>Proximating</i>	492
14.5.8	SHED 6 <i>Patterning</i>	494
14.5.9	SHED 7 <i>Architecting</i>	496
14.6	The Ecopolis Development Principles	499
14.6.0.1	Minimise Ecological Footprints (Biophysical)	499
14.6.0.2	Maximise Human Potential (Human Ecology)	499
14.6.1	EDP 1 <i>Restore Degraded Land</i>	500
14.6.2	EDP 2 <i>Fit the Bioregion</i>	501
14.6.3	EDP 3 <i>Balance Development</i>	502
14.6.4	EDP 4 <i>Create Compact Cities</i>	503
14.6.5	EDP 5 <i>Optimise Energy Performance</i>	504
14.6.6	EDP 6 <i>Contribute to the Economy</i>	505
14.6.7	EDP 7 <i>Provide Health and Security</i>	506
14.6.8	EDP 8 <i>Encourage Community</i>	507

14.6.9	<i>EDP 9 Promote Social Justice and Equity</i>	508
14.6.10	<i>EDP10 Enrich History and Culture</i>	509
14.7	The Frogstick	511
14.7.1	<i>FROG 1 Air</i>	513
14.7.2	<i>FROG 2 Water</i>	514
14.7.3	<i>FROG 3 Earth (soil)</i>	515
14.7.4	<i>FROG 4 Fire (energy)</i>	516
14.7.5	<i>FROG 5 Biomass</i>	517
14.7.6	<i>FROG 6 Food</i>	518
14.7.7	<i>FROG 7 Biodiversity</i>	519
14.7.8	<i>FROG 8 Habitat</i>	520
14.7.9	<i>FROG 9 Ecolinks</i>	521
14.7.10	<i>FROG 10 Resource Use</i>	522
14.7.11	<i>Frogstick Scoresheets</i>	523

CHAPTER 15: CONCLUSIONS

15.1	The Case Studies	527
15.1.1	Community and Patronage	527
15.1.2	Vision First	529
15.2	Our Cities, Our Selves	530
15.2.1	City-Region	530
15.2.2	Integrated Knowledge	530
15.2.3	Cultural Change	531
15.2.4	Cultural Fractals	532
15.3	Evolutionary Cities	533
15.3.1	Culture and the Art of Lifecycle Maintenance	534
15.3.2	Cities as Extensions of Human Physiology	534
15.3.3	Urban Evolutionaries	535
15.4	After Words	537

APPENDICES

		538
1	Nature, Form, Beauty and Biophilia	539
2	The Charter of the New Urbanism	541
3	Density and Urban Villages	544
4	City Size: the Case of Somerset and Adelaide	547
5	Adelaide, Calcutta and the Western Comfort Zone	549
6	Halifax EcoCity Project – Letters of Support	550
7	UEA Assessment of Pentroth Proposal	553
8	Dream In a Bin	555
9	Halifax Hypotheticals	558
10	Urban Ecology Checklist – The ‘Frogstick’	559
11	Ecopolis Development Principles	561
12	Citations & Publications	539

BIBLIOGRAPHY

575

LIST OF FIGURES

Figure	Title	Page
1	The Halifax EcoCity Project – ‘Southgate’	1
2	Icons for the 3 City Types	9
3	The Particularity of Architecturally Trained Perception	27
4	The Seven Steps of SHED	28
5	Points of View	41
6	Sketch for Urban Rubble Wall	46
7	Arcology Babel IIC	62
8	Vegetable Car Sketch	65
9	The Vegetable Car	65
10	Ecocity Downtown	66
11	Elevated Foot & Cycle Paths in Ecocity Downtown	67
12	Eden Project Domes Under Construction	69
13	The Outlook Tower	76
14	EcoCity Layers & Links	80
15	Advanced Green Builder Demonstration Home	83
16	Max’s Pot Construction Elements	84
17	Biosphere 2	88
18	Editt Tower – The Prototype Ecological Tower	94
19	Jeff Kenworthy Framed by a Curitiba Bus Shelter	103
20	Model Cars Art Installation	104
21	Caution Pedestrians – Typical Urban Signage	105
22	Street Farmers Till Their Land...	118
23	More Provocative Street Farm Imagery	119
24	Ferri’s Pedestrian City	124
25	Arcology Babel IIC	125
26	San Francisco by Richard Register	125
27	European Coastal Town	126
28	Whyalla EcoCity Development Plan/Halifax EcoCity Project Perspective	127
29	Portmeirion	129
30	Sagrada Familia	130
31	Roofgardens of Hundertwasser-Haus	131
32	Gaudi Apartment Façade	135
33	Postcard from Los Angeles	142
34	Ithaca’s First ‘Neighbourhood’	146
34a	Calcutta 2000	155
35	Curitiba Smog	156
36	Curitiba’s Iconic ‘Tube Stations’	157
37	Extensive Pedestrian Streets and Convivial Night Life	158
38	One of Curitiba’s Famous Articulated Buses	159
39	Alan Dawson, Midrand	160
40	Krier’s Planning for Poundbury	164

41	Site Plan of Downton & Pickles Proposal for Beverley	165
42	Perspective Rendering of the Downton & Pickles Proposal	166
43	Eden Project Domes Under Construction	167
44	The Urban Ecology Australia Logo	171
45	City of Adelaide Location of Case Study Sites	179
46	The Halifax EcoCity Project Logo	179
47	An Early Sketch	180
48	CUE Lunch	181
49	Halifax Depot Façade	182
50	UEA Information Stall	183
51	Information Evening at the CUE	183
52	Make EcoCities Not War	184
53	Tandanya Bioregion	185
54	Volunteers Discuss UEA with the Public	187
55	Early Sketch Section for HEP Courtyard Block	187
56	Design Process Diagram	189
57	Early Ecopolis Sketches – Adelaide	189
58	Axonometric of Halifax EcoCity Project	190
59	Early Exploratory Sketches of HEP	191
60	Carrington Street Project Sketch	191
61	Bite Size Chunk Development Diagram	192
62	Early Sketches HEP	192
63	HEP Perspective Schematic	193
64	HEP Final Perspective	193
65	Courtyard Block Original Concept Drawing	194
66	Detail of Model	194
67	Canberra EcoCity Concept Sketch	194
68	Northern Façade of Townhouse	195
69	Townhouse Model	195
70	Apartment Block Model	196
71	Cross-section Diagrams of HEP	196
72	<i>HEP Site</i>	197
73	<i>HEP Site: Building Types and Configurations</i>	198
74	<i>HEP Site: Climate and Energy</i>	199
75	<i>HEP Site: External Spaces</i>	200
76	<i>HEP Site: Movement</i>	201
77	<i>HEP Site: Water and Services</i>	202
78	<i>Urban Patterns</i>	203
79	Construction Lines for Axonometric of HEP	206
80	UEA Youth Contingent for Habitat 2	210
81	Pentroth Directors and Halifax Design	216
82	Developer's Perspective of Revised 'Halifax Adelaide'	220
83	The Last Ecopolis HEP Building Design	221

83a	Perspective of HEP to 'Northgate'	222
84	Author Working in Window of Strawbale Building	223
84a	Model of Whyalla EcoCity Core Site	224
85	EcoChurch Postcard	229
86	Solar Symbols	230
87	Composite of Images from Childrens Workshop	232
88	Icons for 'City Types'	234
89	<i>Urban Design Workshop – 10 minutes</i>	236
90	<i>Urban Design Workshop – 20 minutes</i>	236
91	<i>Urban Design Workshop – 30 minutes</i>	237
92	<i>Urban Design Workshop – 40 minutes</i>	237
93	<i>Urban Design Workshop – 50 minutes</i>	238
94	<i>Urban Design Workshop – 60 minutes</i>	238
95	<i>Urban Design Workshop – 70 minutes</i>	239
96	<i>Urban Design Workshop – designing continues</i>	239
97	<i>Urban Design Workshop – 90 minutes</i>	240
98	<i>Urban Design Workshop – end of workshop</i>	240
99	Main Perspective of Whyalla EcoCity Development	244
100	EcoCity Information Feature Initial Sketches	245
101	Sketch Design for Excel Enterprises & EcoHouse Types B and C	246
102	Councillor Hughes House Extension	247
103	View of Gateway on EcoCity Core Site Model	247
104	Site Plan of Whyalla EcoCity Development Core Site	248
105	Whyalla Planner's Original Site Plan Proposal	249
106	Whyalla Site Plan Detail, Model and Beverley Site Plan	249
107	<i>Whyalla Core Site Diagram – 1 Relating to Landscape</i>	251
108	<i>Whyalla Core Site Diagram – 2 Landmarks, Gateways & Bridges</i>	251
109	<i>Whyalla Core Site Diagram – 3 Vegetation & Habitat Linkages</i>	251
110	<i>Whyalla Core Site Diagram – 4 Courtyards, Public Places</i>	252
111	<i>Whyalla Core Site Diagram – 5 Emergency & Service Vehicle Access</i>	252
112	<i>Whyalla Core Site Diagram – 6 Footpaths & Cycleways</i>	252
113	<i>Whyalla Core Site Diagram – 7 Retail & Commercial Frontages</i>	253
114	<i>Whyalla Core Site Diagram – 8 Solar Street Orientations</i>	253
115	<i>Whyalla Core Site Diagram – 9 Restricted Vehicle Access</i>	253
116	<i>Whyalla Core Site Diagram – 10 Perimeter Car Parking</i>	254
117	<i>Whyalla Core Site Diagram – 11 Infrastructure</i>	254
118	<i>Whyalla Core Site Diagram – 12 Buildings</i>	254
119	<i>Whyalla Core Site Diagram – 13 Trees</i>	255
120	<i>Whyalla Core Site Diagram – 14 Allotment Boundaries</i>	255
121	Project Team Meeting	256
122	Plan of the Buddhist Meditation Centre	258
123	Terbum Ceremony	259
124	Representatives of Aboriginal Community with Monks	260

125	Strawbale Wall of First Buddhist Building under Construction	260
126	Straw and Steel Aesthetic	261
127	Gompa Interior	261
128	Strawbale Workshop Lecture	261
129	Buddhist Volunteers Put Window In	261
130	Detail of Shutters	262
131	West Front of Whyalla EcoChurch	263
132	EcoChurch Cartoon	263
133	Computer Image of EcoChurch Interior	264
134	Computer generated Images of EcoChurch	264
135	Perspective Drawing of EcoChurch	265
136	Sketch Design for Aged-Care Housing	266
137	Excel Enterprises Facility	268
138	Sketch Design Studies for Excel	268
139	Refurbished Railway Carriage	269
140	Sign on EcoCity Information Feature	270
141	Model of EcoCity Information Feature	270
142	Model of EcoCity Information Feature – under construction	271
143	Model of EcoCity Information Feature – ‘flowforms’	271
144	Model and Actual EcoCity Information Feature	272
145	Model and Actual EcoCity Information Feature	272
146	EcoCity Information Feature from South West	272
147	Generic Whyalla EcoHouse Drawing	273
148	EcoHouse Computer Images	273
149	EcoHouse Computer Images	274
150	Study for Sub-Division Road Design	275
151	EcoCity Information Feature – detail	276
152	Buddhist Meditation Centre Perspective	278
153	Bourne Court Model	279
154	Christie Walk Site	283
155	Christie Walk Site	284
156	Site from Russell Street – ‘Before and After’	285
157	Sturt Street Frontage	286
158	Mass Walls Under Construction/Roman Hut Being Painted	288
159	Site Plan Stages 1 & 2 Christie Walk	290
160	Roman Hut – Site before and after Construction	291
161	Roofgarden Computer Image/Perspective Drawing	293
162	Interior Views of Bay Windows in Roman Hut	294
163	Volunteers Cleaning Bricks & Fossicking	296
164	South Side of Townhouses under Construction	297
165	Kitchen in Roman Hut	298
166	Cross Section Diagram of Airflow in Townhouse	299
167	Community Garden View Computer Image	302

168	Window Assembly	303
169	Look No Waste!	305
170	Stage 1 Computer Image	306
171	Christie Walk Stages 1 and 2 Final Perspective	309
172	Roman Hut Design Drawings and Construction Photos	311
173	Views of Roman Hut	312
174	Views of Roman Hut	313
175	On-Site Consultation	314
176	T-Shirt Slogan	314
177	View of Urban Ecology Office	318
178	Pouring First 'Earthcrete' Wall	318
179	EcoCity Core Site Whyalla	333
180	Organic Nature of Christie Walk	336
181	Media at Christie Walk	338
182	Conventional Townhouse Construction in Adelaide	346
183	Stewart Brand's 'Shearing Layers of Change'	359
184	Ecological Building: An Ecosystem for Thinking	360
185	Vascular Street Patterns	369
186	Nest by Paper Wasps	371
187	Early Sketch of Ecopolis Regional Planning Concept	374
188	Concept Plan for 10,000 Population New Town	375
189	An Early Ecopolis Concept Drawing	376
190	The Many Contributions of Trees	379
191	Urban Ducklings	381
192	Ecotones & Edge Effects Diagram	382
193	Diagrammatic Comparison of Development Patterns	383
194	Graph and Tabular Comparison of Development Patterns	383
195	Human Society Integral to Ecosystem Diagram	384
196	DenseCity Project Model	391
197	Detail from Ecopolis 'City Cancer' Panel	393
198	The Attempts Humans Make to Breach Limits	399
199	'But You Run Things!'	409
200	One Person's Amenity Is Another Person's Barrier	418
201	Perceptions of Place	420
202	<i>Ecopolis Now! Panel 1: Ecopolis Now!</i>	436
203	<i>Ecopolis Now! Panel 2: City Cancer</i>	436
204	<i>Ecopolis Now! Panel 3: Your Planet Needs You!</i>	437
205	<i>Ecopolis Now! Panel 4: Beware the Technical Fix!</i>	437
206	<i>Ecopolis Now! Panel 5: Ecopolis vs. Technopolis</i>	438
207	<i>Ecopolis Now! Panel 6: A Sense of Place</i>	438
208	<i>Ecopolis Now! Panel 7: Desert Power</i>	439
209	<i>Ecopolis Now! Panel 8: Going Bush</i>	439
210	<i>Ecopolis Now! Panel 9: Going Home</i>	440

211	<i>Ecopolis Now! Panel 10: Street Life</i>	440
212	Salisbury EcoHousing Perspective Drawing	441
213	Inner-Suburban EcoHousing Perspective Drawing	441
214	Roman and Dylan Newspaper Clipping	442
215	People Place Work	451
216	An Ecocity Strategy for Berkeley	455
217	Intern Creedman & Shadow Plan	459
218	<i>Adelaide Shadow Plans 1836</i>	460
219	<i>Adelaide Shadow Plans 1996</i>	461
220	<i>Adelaide Shadow Plans 2076</i>	462
221	<i>Adelaide Shadow Plans 2136</i>	463
222	Sellars and Woolcock at Christie Walk	468
223	CD Cover of 'Ecopolis Now!'	472
224	<i>Shedding</i>	485
225	<i>Placing</i>	487
226	<i>Biozoning</i>	489
227	<i>Lifelining</i>	490
228	<i>Proximating</i>	492
229	<i>Patterning</i>	494
230	Street Relationships (After Appleyard)	495
231	<i>Architecting</i>	496
232	Synergy of Multiple Functions	497
234	EcoCity Fantasy	510
235	FROG 1: Air – Roman Hut airflow diagram	513
236	FROG 2: Water – HEP layered analysis	514
237	FROG 3: Earth – Straw waste	515
238	FROG 4: Fire (Energy) – Solar panel location on Christie Walk	516
239	FROG 5: Biomass – Site planning analysis diagrams	517
240	FROG 6: Food – Community garden location	518
241	FROG 7: Biodiversity – Possum	519
242	FROG 8: Habitat – Paper Wasp nest	520
243	FROG 9: Ecolinks – Whyalla Core Site planning	521
244	FROG 10: Resource Use – Recovering concrete & bricks	522
245	Metropolitan Adelaide and Somerset, England	547

LIST OF TABLES

Table	Title	Page
1	Four Ecological Phases of Human Existence	48
2	The New Alchemy Emerging Precepts of Biological Design & The Hannover Principles	87
3	Van der Ryn's Design Principles	93
4	Ecosystems Hierarchy and Design Strategy	94
5	Wells' Wilderness-Based Checklists	110
6	Summary Table of Theorists	122
7	New Ecological Settlement Projects in Europe	149
8	Halifax EcoCity Project Greenhouse Showcase	204
9	'Green Spec' Environmental Performance Requirements	289
10	Turner's Barriers	344
11	Ecological Settlement Projects—Halifax EcoCity Project & Christie Walk	347
12	Layers in Ecosystem Function	359
13	Characteristic Life Forms	365
14	Holurbanism and Malurbanism Comparative Table	394
15	Invisible Structures	403
16	Public-Private Interface	418
17	The Development Process	423
18	Proposed New Structure for Integrated System of Planning	465
19	Key to the Icons	480
20	The SHED Sequence	483
21	Frogstick 1: Wilderness	523
22	Frogstick 2: City of Adelaide	523
23	Frogstick 3: Halifax EcoCity Project	524
24	Frogstick 4: Whyalla EcoCity Development	524
25	Frogstick 5: Christie Walk	525

ABSTRACT

This thesis is about creating and maintaining 'ecological cities'. It contains four sets of propositions about the necessary conditions for making ecocities. It sets the creation of human settlement in an ecological context and demonstrates through case study analyses that practical approaches to urbanism can be made with a theory of city-making grounded in principles of direct democracy and cooperative community processes.

It is argued that these principles are inherent in theories and practices that have produced, or are intended to produce, urban settings that are ecologically responsive and socially successful. Part A of the thesis identifies theorists, practitioners, places and philosophies in support of this contention.

At the heart of this academic work lies an abiding concern with implementation. The author has been an advocate, activist and architect in the three inner-urban ecological development projects described in Part B of the thesis. This empirical action research into 'what was planned' and 'what happened' contributed to the construction of knowledge in the 'Ecopolis' theory.

Part C describes selected material pertinent to the synthesis of the Ecopolis propositions and sets out design and planning tools for achieving Sustainable Human Ecological Development (SHED). Indications are given as to how those tools relate to the implementation of the Part B case studies. SHED is about the totality of human decisions and choices made in order to provide and maintain conditions for human habitation within the biosphere. Linkages rather than barriers, commonality rather than difference, integration rather than separation and mutual aid rather than competition describe this totality.

The thesis concludes that allied understandings of buildings, cities and living systems can be placed in a framework that facilitates creation of 'urban systems consciously integrated into the processes of the biosphere in order to optimise the functioning of the biosphere for human purposes', and that the role of community patronage is central because of its intimate relationship to the nature and intent of those human purposes.

Finally, if cities are a form of extended phenotype for the human organism, then further research is urgently needed into the evolutionary role of city-making.

DECLARATION

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.

Figures, Tables, Diagrams, Icons, Drawings, Photographs, Plans, Architectural Designs and other illustrative material are all by the author unless otherwise stated.

I give consent to this copy of my thesis, when deposited in the University Library, being available for loan and photocopying.

Signed

Date 8 MARCH 2002

ACKNOWLEDGMENTS

Now I sit by the window and watch the cars
I fear I'll do some damage one fine day
But I would not be convicted by a jury of my peers
Still crazy after all these years.
(Paul Simon 1974)

During the past decade I have found myself in the role of either advocate, client, architect, developer, builder, educator¹, researcher, theorist or potential resident in relation to one or another of the ecocity projects that are the subjects of the case studies in this thesis. The entire experience has conditioned and invaded my private life beyond the point where I have felt that I have any real choice about it and it has required a good deal of tolerance and understanding on the part of those people most close to me – to all of you, my heartfelt thanks.

I want to acknowledge and thank all those members of Urban Ecology Australia, volunteers and interns, who have had energy and courage to give to the task of testing these ideas in the real world of the living community, especially: Emilis Prelgauskas, whose enthusiasm for the ideas of Ecopolis and Urban Ecology in the early years helped to sustain our collective momentum and get things to move beyond rhetoric; Sharon Ede whose constant questing after knowledge and information and determination to share it remains an inspiration; and David Munn, Urban Ecology Australia's first Life Member, who has been responsible for introducing me to more literature than anyone else – ever! David is the single biggest reason that the Centre for Urban Ecology has such a wonderful library and without him there would have been no Urban Ecology Bibliography. Over the years David has given me an almost complete library of the works of Lewis Mumford, works which remain a touchstone for my own endeavours as a researcher and writer on cities.

My special thanks to Richard Register, for demonstrating that non-professional, activist organisations can be effective vehicles for testing the strength and value of ecocity ideas, and to Richard and his cohorts for convening the First International Ecological City Conference where they had the courage to, unwittingly, launch that part of my career that has put me on a number of national and international conference platforms since 1991.

¹ I am obliged to thank the University of South Australia for providing part-time study leave for writing up this thesis.

Thanks are also due to Dr. Jeffrey Cook for supporting my efforts in researching architectural regionalism, Pliny Fisk for his inspiration and Dr. Steven Szokolay for his role in bringing me to the shores of Australia, the place that has provided the opportunities for taking the Ecopolis idea from theory into practice.

Thanks to Henry Penninkilampi, Computer God, for rescuing my mind and saving data when the Macs crashed (Macs *never* crash, they're just fussy about their software) and to Dr. Effie Best, for her invaluable editorial assistance, general encouragement and stimulating conversations. Thank you Peggy and Frank Downton for bringing me onto this fabulous planet and for giving me the genetic predisposition and intellectual arrogance to believe that my work was of worth. Dad, I'm sorry you're not around to see me finally complete this dissertation!

Thanks to Dr. Tim Doyle for being just the kind of supervisor I needed.

Our children, Dafydd, Seren and Rhiannon have put up with enormous intrusion on their lives over the many years that I have pursued this ecopolitan obsession. They have grown up with these ideas and have seen my time taken away from them. Thanks for your patience kids.

My partner in life, Chérie Hoyle, has supported my ambitions and suffered the consequences; she has been the essential organisational force behind the creation of Urban Ecology Australia and its ecocity projects. She has lived the pleasure and pain of these ecopolitan experimentations as much as I have and quite simply, without her, this thesis and the projects that spawned it would not exist. Words don't say it well enough, but - thank you, Chérie.

Paul F Downton

Adelaide, February 2002

PREFACE

THE CITY IS MY UNIVERSITY

‘Many of the radicals of 30 years ago, burning with fervor for fundamental change, have since withdrawn into the university system they once denounced, the parliamentary positions they formerly disdained, and the business enterprises they furiously attacked.’

(Bookchin 1995 p.229)

vivendo discimus
(By living we learn)²

Preamble

In the last few years there has been increasing interest and a rising tide of published material concerning the idea of ‘green’, ‘sustainable’, ‘compact’, ‘environmental’ and ‘ecological’ cities. The evolution of Ecopolis as a theory is clearly influenced by particular writers and theorists but it has also been a product of life experience.

The genesis of this thesis can be traced back to the a preoccupation with regional identity and individual expression in architecture which began with the author’s personal discovery of Frank Lloyd Wright’s ‘organic’ philosophy of architecture circa 1968. At the age of seventeen, before entering university, the author developed a strong environmental awareness and was a founding member of an environmental organisation in Wells, Somerset called ‘Abacus’.

The radical politics of the time was informed by reaction against the Vietnam War, the ubiquitous threat of instant annihilation from global nuclear war, and the so-called ‘Oil Crisis’. The author’s awareness of the political dimension of architecture evolved through exposure to the politically charged environment of Wales in Cardiff where he undertook undergraduate degrees in architecture, wrote ‘The Politics of Aesthetics’ (Downton, 1976), got involved in student politics, and invited a group called Street Farm to present their experiments in autonomous, anarchist housing to the students of architecture in Cardiff. Regional awareness has always been very strong in the islands of Britain, and for this Englishman it was reinforced by the years spent in Wales. The difference in the form of urban settlement in the regions of industrial South Wales and rural South-west England is very marked, despite the short distance between them, easily spanned over the Bristol Channel by the Severn Bridge.

² Patrick Geddes’ motto (see Chapter 4).

As a student of architecture the author tried to design environmentally appropriate buildings and became active in community organisations fighting against the apparently universal forces which threatened to turn the old residential areas of cities like Caerdydd (Cardiff) and Abertawe (Swansea) into ghettos of high-rise office blocks. It was then that work began on projects in which one can find the beginnings of this present thesis, in particular the final year joint project with David Peace Pickles cited in Chapter 5 which proposed the redevelopment of a factory site in the medieval town of Beverley in Yorkshire using local materials, traditional architectural and urban form and construction, with the re-establishment of local craft and building skills as part of the development process. This project was later exhibited and published (Downton and Pickles, 1976). Other early forays into investigating strategies for ecological building included an unpublished paper on 'Zero Energy Building' (circa 1977) which set out a methodology for creating resource and location-limited architecture for long-term ecological sustainability.

In September 1982, just when the Palestinian camps of Sabra and Shatilla in Beirut were being pounded into rubble and the infamous massacres of civilians took place, the author arrived in Jordan to teach architecture at Yarmouk University. The two years spent with his family in that country taught much about both the ephemeral and eternal nature of building. Ephemeral, because things get blown up; eternal, because ancient classical architecture still stands there in biblical landscapes.

It was during the time in Jordan that the author began to sense more deeply the ebb and flow of history and its relationship to the physical dependency of architecture on a resource base, in turn determined by culture, economics and politics. Architecture, it seemed, belonged to its time and place and the choice of these was consequent upon human decisions. Perception of these relationships was sharpened by observing the manipulation of people, politics and resources as the Israeli state created 'facts on the ground' and used architecture as a weapon of war on the West Bank.

Learning more about Islam and the history of the three great monotheistic religions of the region (Judaism, Christianity and Islam), it was possible to identify the central role of the natural climate in shaping human affairs and in the development of culture and politics. The author had always seen that architecture was clearly linked to climate - a building envelope, after all, is essentially a climatic modifier - but the new realisation was that the cultural component of architecture was also conditioned by the climate.

Regionalism

Arriving in South Australia in July 1984 the author was struck by the general absence of climatic response evident in the architecture. This again underlined the power of the cultural imperative in making buildings by demonstrating how it could over-ride other considerations. When it came to formalising an initial research topic for pursuing a higher degree, all the above were subsumed in the proposed topic of architectural regionalism.

An initial aim to generate 'a theory of architectural regionalism' has been turned into continuing academic and practical work on ideas of 'urban ecology', tested in practice by the ecocity projects that form the case studies in Chapters 7, 8 and 9, and related activities. These programs owe much of their intellectual underpinning to this thesis and both point the way towards further productive research. Research must have practical application in the practice of architecture and the creation of human settlement which belongs to its place, people and region. This author's architectural and urban planning concerns simultaneously inform, and are informed by, the idea of 'dwelling' as a cultural, social and technological response to the fact of being alive in a living universe.

All this has been given further impetus by the discovery of so much congruence and converging energy in the diversity of information and ideas in the various fields of endeavour that combine in the field of ecological cities. The hope is that this thesis will in some small way contribute towards, and amplify, the synergies and synthesis that come from the bringing together of academic research, visionary dreamings and political activism so that 'ecological cities' do not remain a chimera, nor end up on the scrapheap of capitalist assimilation.

For good or for ill, a city amplifies the activities of the human organism. If those activities undermine the basis for the continued existence of that organism they are inherently dysfunctional, if they sustain or recreate the conditions for its continued existence they are ecologically viable. This thesis seeks an understanding of what is viable and how to design human settlement to create and sustain that viability.

The global environmental crisis is a crisis of civilisation. Over its 10,000 year history, city making and its coevolved cousin agriculture, has changed the face of the planet. Since industrialisation the pace has quickened, partly due to an exponentially increasing population and partly because of the rapacious nature of industrial development. Cities may have started as human scale creations but their impact on the environment was limited only by the available technology and a pre-fossil fuel energy

base. Once cheap energy started to fuel the engine of civilisation, cities grew fast and furious and the phenomenon of urbanisation measured development against the scale of mega-machines rather than people. The author's Ecopolis concept of development is a response to this history. It is an attempt to return to the human scale in city making, to return to the idea of city as community, and to make the city the centre of restorative activity rather than destruction. That kind of city is an ecological city - a city in dynamic balance within itself and with the nature of the land which supports it.

The concept of 'ecological corridors' was inspired by knowledge of revegetation programs being undertaken by Trees For Life in South Australia when the author's partner, Chérie Hoyle, was working as their office manager in 1988-90. The story of *The Man Who Planted Trees* and the campaigns of Richard St. Barbe Baker did much to inform the idea that revegetation could restore ecosystem function with multiple, synergistic benefits. The other two key 'lessons' from this vicarious experience of Trees For Life was that the community was a powerful source of energy as a workforce able undertake ecological projects with very little in the way of financial resources. The linkage between county and city folk was fundamental to the TFL program and inspired confidence in the idea that the two were not only functionally inter-related, but that the two communities could be brought together through shared purpose focussed on ecological restoration. Trees For Life continues to provide a sharply defined illustration of the strength of community resolve in the service of nature.

Much of the information and inspiration for this thesis has come from outside the walls of academe. Taking cues from Patrick Geddes and Lewis Mumford, two men who made enormous strides towards understanding what was required for the design of ecologically integrated urban systems (Kitchen 1975, Miller 1989) and in whose footsteps he is happy to try and tread, this author regards the city itself as his university.

Words

This PhD is about identifying things that work through the analysis of case studies, relating them to extant theories, supplementing with additional material as appropriate, and integrating the whole if possible. Any appearance of linearity in the structure of this dissertation is a consequence of the need to organise material in a literary format and is not necessarily implicit in the theory.

As a child of the fifties and victim and perpetrator of the radicalism of the 1960s and 70s, the author learned that language is powerful, and that it could be damaging, undermining the capacity for clear thinking with its capacity for conveying two or more meanings by surreptitious means. Since at least 1975 he has consciously sought to

avoid the thoughtless use of the male pronoun and irrelevant inflections of gender. When quoting a text that has failed to do the same, though it may strike some readers as tedious, the traditional method of calling attention to textual oddities (sic) has been employed because the job of creating gender-neutral language is far from done.

The author has tried to avoid obfuscation, believing it to be a kind of obscurantism that is the refuge of intellectual scoundrels.

Weaving the Thesis

This thesis may be seen as the picking up of several threads of thought in an interweaving of ideas and experiences drawn from various realms. The warp of social and cultural ideas and activities are given shape, pattern and form by the weft of construction, manufacture and design. This thesis then, is the fabric created by the weft of creative consciousness crossing the warp of society. It is a tapestry, a coat of many colours, a carpet or a wall hanging³. In any case, it represents an effort to find viable patterns in the making of human settlement that can be comfortably fitted on the body of Gaea.⁴

THE WARP ('the threads stretched lengthwise in a loom to be crossed by the weft.'⁵)

- Strands of Environmentalism
- Strands of Community Politics
- Strands of Libertarianism

And from the built environment:

THE WEFT ('the threads woven across a warp to make fabric.')

- Strands of Green Urbanism
- Strands of Green Architecture
- Strands of Green Design

The warp is made by the longest threads. The length of those threads can be taken as representative of time for, taking Stewart Brand's metaphor, cultural and social

³ Van der Ryn and Cowan also employ the imagery and metaphor of weaving in a similar fashion in their introductory chapter to 'Ecological Design'. This would seem to be another instance of the unconscious convergence of ideas that seems to accompany the way of thinking precipitated by ecological philosophising.

⁴ Spelt 'Gaea' as it is the more correct spelling than the commonly used 'Gaia'. Kirkpatrick Sale uses Gaea.

⁵ Unless otherwise stated, the word definitions employed in this dissertation are taken from The Australian Concise Oxford Dictionary, Second Edition 1992.

change happen slowest. The weft of making and doing are the shorter, 'busier' threads representing the quicker changes associated with self-conscious creative endeavour.

The weaving can also be seen in terms of the warp of biophysical reality supporting the weft of human society – an intersection of 'natural' and human environments. These thematic metaphors are combined in the Ecopolis Development Principles, a set of precepts that, in one form or another, have informed the developing theory and practice of Ecopolis for the best part of a decade.

Building the SHED

In attempting to describe the synthesis, such as it is, of the Ecopolis theory, the author has used the organisational device of 'The SHED' (Chapter 14). A series of steps take us from one kind of shed, a watershed, to another, the shed as a building. In using 'shed' as label and metaphor in this way, there is a return to the theme of weaving, for the shed is also the opening between the warp threads in a loom through which the shuttle carries the weft.

Spirituality is not one of the great strands of the warp or the weft. But neither is it neglected in this dissertation, because to do so would be to neglect the most powerful manifestation of human mindfulness through the millennia. Rather, spirituality is dealt with as an emerging property of civilisation, and it is up to the individual reader whether they wish to see its patterns as intrinsic to the tapestry of human affairs, as evidence for the beauty of a divine purpose, or merely an interesting, colourful excrescence on the body politic.

There are two major agenda in the discourse that follows. One is the reason for the dissertation, which is to begin the construction of a credible and usable theory for the design, development and maintenance of ecological cities – this is strongly represented in the 'weft' of the writing. The other is to describe a field of action in which the struggle for social justice can be sustained in the face of globalising forces that are eroding the power of the state whilst reducing the role of citizens to that of mere consumers. The author contends that the ecocity proposition regarding 'ecological culture' is inherently libertarian in its scope and content and hopes that this dissertation goes some way towards establishing the veracity of this proposition. The idea that effective long-term environmental responsibility can only be guaranteed by the creation of an ecological culture is explicit in the Ecopolis idea – it is the 'warp' that, hopefully, is made visible in the fabric of this thesis. Such a culture can only come about as the result of systemic social change. The quality of that change depends on informed individuals being able to act effectively and to do that they need an appropriate power

base, or field of action. The theme underlying the development of this theory is that if we can fully understand the historical and potential role of the city as the place where we make and shape economic, social, cultural (including spiritual) and *ecological* reality, we will have the base from which to engage in the praxis of evolving an ecological culture.

From Rhetoric to Reality

It has been nearly twelve years since the author stood on a platform in Berkeley, California in the opening plenary session of the First International Ecological City Conference and said, 'An ecocity has never yet existed. Before it can be made it needs people to make an ecological culture. We are those people. We must build now as we need to live, and live to build the ecological future, for what we build now is the future, and every moment counts.' (Canfield (ed) 1990 p.19). Earlier, in a keynote presentation, this author made the claim that 'I believe every single attempt at anything which works towards achieving an ecological city is worth trying. There is no single solution, because it is about a way of life, and it is a situation in which everyone can make a difference.' (Canfield (ed) 1990 p.12)

The author has been responsible for a good deal more rhetoric in the meantime, but has also tried to find ways to live up to those exhortations by working with some truly marvelous people on the task of making ecocities a reality. It has been an exhausting but rewarding time during which it has been impossible not to be continually conscious of the need to record our collective experiences in these experiments with ecocity-making. A resulting conviction is that it is imperative for the collective success of 'every single attempt at anything' for there to be at least the hint of a coherent theoretical framework, for even the most libertarian models of social change need structure. This is directly analogous to the role of the city itself, that is, to provide a well structured framework within which individuals become citizens in order to fulfil their greatest potential whilst simultaneously supporting, and being supported by all the other individuals that make up its citizenry.

This thesis was not inspired by previous academic examples, however illustrious and apt. It was inspired by the radical visions of architects, designers and dreamers who dared to insist that it really was possible to make ecological cities. This is reflected in the author's preoccupation with implementation and advocacy that provides a major theme for the structure of this thesis. It was driven by a deep personal conviction about the way we live and the way we might live (to paraphrase William Morris) that found

the work of these other dreamers and researchers resonating strongly with the author's own experience as an urban and environmental activist since 1970.

Although this thesis represents a determined attempt to maintain sufficient 'distance' from the issues to aspire to a degree of *relative* objectivity and to write from an academic viewpoint, this is inevitably written as an architect and advocate as well as an academic.

It may be suspected that this thesis has been constructed in a similar manner to the way its author designs buildings. Thus there are those things to which there was an aesthetic attraction; there is an underlying belief system that is brought to bear in the process and outcomes of analysis; there are things 'known' through experience and training about how different elements 'should' be put together; and there is a sense of obligation, or duty, to the people who will use and have some kind of relationship with the whole assemblage.

Cities are simultaneously the most vulnerable and powerful of human institutions. This thesis is dedicated to their sustenance and evolution as the agents of change for creating a world in which humans have learned to live at peace with themselves and as, ecocity pioneer Richard Register would say (in an etymologically disputable manner), 'in balance with nature'.

Paul F Downton

May 2000/May 2001/February 2002