

DESIGNING FOR
HOPE

PATHWAYS TO **REGENERATIVE SUSTAINABILITY**

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CHRISNA DU PLESSIS

Designing for hope: Pathways to Regenerative Sustainability

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We dedicate this book to Tasman McKee and all young people who feel they face a hopeless future in a world that seems intent on committing species suicide. We want you to know that there is hope, and that your energy, creativity and enthusiasm for life can make an essential contribution to creating a bright future. You are what give us hope.



PHOTO: R DU PLESSIS

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Preface

“To be truly radical is to make hope possible, rather than despair convincing.”

Raymond Williams

We are entering a time of change, a time when many tipping points will be passed, resulting in unexpected consequences for our way of life. Yet it is a time of great opportunity, a time when it is possible to open up a thriving, if different, future.

This book is a hopeful response to the sense of doom that pervades so much of the sustainability discourse and the feelings of hopelessness and powerlessness that come with facing challenges that seem insurmountable. As individuals we have followed a journey familiar to many sustainability advocates and practitioners – alternating between optimism, cynicism and outright despondency, yet always searching for a message of hope, a future vision of a flourishing world. Dealing on a daily basis with the increasingly dire predictions of science about climate change, ecosystem service degradation, and the eventual fall out for human society, is depressing and emotionally exhausting. As teachers we are also confronted with the difficult task of instilling an awareness of humankind’s negative impacts and a sense of urgency about the need for change, while countering this distressing message with a positive view.

The great responsibility that comes with teaching this message was brought home by the suicide of a student who could not face the overwhelmingly negative vision of the future that is so much part of the sustainability narrative. This tragic event provided the impetus for this book. We needed to find hope, not just for the sake of the next generation, but also as redemption for our part in creating this mess.

For many years, as we met on the conference circuit, we have been talking about developing a more positive vision of the future, about mapping a regenerative development path rooted not in fear and scarcity, but in love and abundance. In the process we have met many others who were struggling with the same question: finding a path that would go beyond the irrationality of attempting to reduce consumption while providing more goods and services to an ever-growing, ever-wealthier and ever more materialistic



global population. This book is a tribute to all those positivity pioneers, and to put it together we relied greatly on this international network of what Pamela Mang terms the regenerates. We interviewed more than fifty people in the United States, Australia, New Zealand and South Africa. Their enthusiastic support inspired and encouraged us every step of the way.

The result is a book that is meant to provide not just hope, but also inspiration to all kinds of designers, whether they are designing spaces and places, systems and processes, or simply new ways of being in the world. It is not a technical 'how to' book. In it you will not find instructions on installing systems or choosing materials or planting gardens. Instead, we want to show the reader what is possible when we come to the design problem with a different mindset, a different vision, a different worldview.

We firmly believe that there is hope; that we can choose to contribute to the creation of a thriving and abundant world. And we are not alone. There has been a subtle but marked shift in the global conversation, a shift from negative to positive, from despair to hope. Going beyond the language of mere sustainability, words such as abundant, thriving, and flourishing are being bandied about. We are striving not just for modest resilience, but for the superpower of anti-fragility.

This is no Polyanna optimism, but a sober understanding that change is necessary, if uncomfortable; that out of adversity comes strength; and that we do have a role to play in what can only be described as a global healing. As Maddy Harland and William Keepin proposes in *The Song of the Earth*¹:

We are called to serve in two distinct capacities: as hospice workers to a dying civilization, and as midwives to an emerging civilization. We are called to move through the world with open hearts – being present to the grief and decay of a waning civilization – while at the same time maintaining heartfelt enthusiasm as we focus our energies on visionary inspiration and building unprecedented new forms of human community that will serve the future evolution of humanity.

We have everything we need to contribute to such an emerging civilization, we only need to open our hearts. For the key is love. Not passionate Eros or virtuous Agape, but Philia – love expressed through affinity. We need to rediscover and embrace the affinity we have with all the communities of life to which we belong. This book argues that vital to this is an active, contributive engagement with the world. To illustrate what this means, we use case studies from the built environment to answer questions such as: 'How can projects focus on creating a positive ecological footprint and contribute to community?'; 'How can we as practitioners restore and enrich the relationships embodied in our projects?'; and 'How does design focus hope and create a positive legacy?' We hope that the stories we tell will show how others are doing it, and inspire you to find your own way of contributing to the creation of a thriving future.

ENDNOTE

- 1 Harland, M. and Keepin, W. (2012). *The Song of the Earth: a synthesis of the scientific and spiritual worldviews*. East Meon, Hampshire, UK: Permanent Publications.

Chapter 1

Why do we need regenerative sustainability?

“It’s the end of the world as we know it, and I feel fine”

REM, 1987

The world as we know it is coming to an end. Some would say this is not necessarily a bad thing. As the world hurtles headlong towards what Paul Gilding, with great understatement, calls the Great Disruption, there is a growing movement intent on not wasting a good crisis and the opportunities for renewal it brings. These are the thinkers and designers who believe that current approaches to sustainable building are merely rearranging the deckchairs on the Titanic; that to create a future in which humans will thrive, and not just survive the calamities we have created, a different approach is necessary. Whether they call such an approach regenerative design or positive development or biophilic design, it is based on one common idea: transforming the way we create the built environment so that it contributes to the well-being, nourishment and regeneration of the world and all its communities. With this book we explore the various practices being developed to go beyond contemporary notions of sustainability and green design to create a world in which humans and their ecosystems can flourish.

Redefining ‘the problem’

If we allow ourselves an honest look, the future looks very scary. The operating parameters of our environment are changing in unpredictable and unprecedented ways. If we are lucky, these changes will be relatively slow and linear and we shall have time to adapt. However, the odds are



against this. By now we are well aware that the tenancy of humans on Planet Earth is rapidly pushing the planet past certain limits. The world has already exceeded a number of critical operating boundaries in the ecosystem services provided to humanity (and other living beings) and is falling short of meeting important quality of life indicators.¹ In 2005 the Millennium Ecosystem Assessment released the results of a four-year global study into the state of global ecosystem services and the possible consequences of anticipated ecosystem change on human wellbeing. The assessment found that nearly two-thirds of the essential services provided by nature to humankind are in decline worldwide, and in many cases we are literally living on borrowed time. The scientists concluded that the protection of these services can no longer be seen as an optional extra, to be considered once more ‘pressing’ concerns, such as human development and wealth creation, have been dealt with. They end with the warning that “the results of human activity are putting such a strain on the natural functions of Earth that the ability of the planet’s ecosystems to sustain future generations can no longer be taken for granted”.²

A 2009 study³ identified nine planetary systems boundaries that should not be crossed if the planet is to continue providing a safe operating space for humans. Three of these boundaries (biodiversity, the nitrogen cycle and climate regulation) have already been crossed, despite many early warnings by scientists. Consider this: as early as 1896, Svante Arrhenius⁴ warned that the Industrial Revolution’s carbon dioxide emissions may eventually result in global warming and climate change. After four Intergovernmental Panel on Climate Change Assessment Reports and 17 Convention of Parties meetings, this warning has moved from the realm of the possible, through that of the probable, and finally to certainty. What was the international response to this? Instead of reducing global greenhouse gas emissions, global emission rates continue to increase at a growing rate and so do temperatures. Average global surface temperatures were 0.8°C warmer during the first decade of the 21st century than during the first decade of the 20th century. If emissions continue to grow, it is highly probable that large regions of the planet will exceed a 2°C increase in average annual temperatures by 2040,⁵ with devastating consequences not just for the global economy, but for all life on the planet.



PHOTO: C DU PLESSIS

It is easy to get caught up in the distress caused by these changes and the threats they pose to current human systems. There will certainly be many painful and heart-breaking transitions and system collapses. But there is also a wonderful opportunity in this period of change to create an alternative model of development that will lead to a thriving future. However, to harness this opportunity we need to think differently about how we see the world, how we define the problems to be solved, and how we can contribute as designers.

The first step is to move away from present fear-based narratives. Currently, the predominant narrative of

sustainability is that of scarcity, negative impacts and disruptive change in the face of growing socio-economic needs. The subtext is that of uncertainty and sacrifice, which in turn engenders resistance to change. We see this thinking clearly in the international discourse on climate change. As the planet is already experiencing the effects of global warming, scientists are pushing for lower 'safe limits' of emissions and atmospheric greenhouse gas concentrations, while governments, intent on rescuing a flailing world economy, argues for increasing these limits to politically acceptable levels. Thus we see that, despite the many published warnings of scientists and professional risk analysts about the probable perils of overshooting planetary boundaries and the dire social and economic consequences of such overshoot, the majority of humans are still trapped in denial, and in the case of the developing countries, also anger at losing out. To move forward it is necessary to develop a narrative of positive impacts leading to an abundant and flourishing world.

Central to this book is the idea that the problems of climate change, biodiversity loss and dysfunctional ecosystem services are not the real problem, but merely the symptoms. The real problem lies in the stories we tell ourselves to justify why we dither and procrastinate, and those we tell about sustainability and how strongly they are still being influenced by the worldviews and value systems that created the problem.

The stories we tell each other

There are two stories we use to avoid accepting both the scientific evidence for the need for change and the ethos required to change our behaviour and aspirations and take action. The first is the story that we cannot change the system, that we cannot fight the enormous systemic inertia of what has become a global system of interdependent economies and increasingly shared consumerist value systems driven as much by philanthropy as by the media. The second story is that there is no clear vision of what a viable alternative may look like. This is not true, there are many theorists and practitioners who are re-inventing the way economies can work, rethinking agricultural and industrial practices, and redesigning the way we live. The people whose work we discuss in this book are developing such a vision for the way we design and build our human habitats and they show how it is



PHOTO: C DU PLESSIS

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possible for individuals and small groups to start effecting change at a much larger scale.

However, the dominant discourses of sustainable development remain trapped in fear-based narratives grounded in a mechanistic and reductionist worldview which limits the efficacy of sustainable development as a means of addressing the very issues it aims to resolve, especially as it concerns the creation of human habitats. It is worthwhile sidestepping for a moment to look closer at our current sustainability stories.

The [flawed] stories of sustainable development

One of the central narratives of modernity is that the role of science is to control nature for the benefit of mankind, leading to the two guiding principles of the past two centuries: modernization and development. These principles manifested as large-scale urbanization, industrialization and increased focus on the rights and freedoms of the individual. This has led to vastly improved standards of living in those countries which have managed to successfully modernize. However, during the second half of the twentieth century it had become clear that there are limits to the modernization project. The most influential of these came from the Club of Rome who published *The Limits to Growth* in 1972.⁶ Their World Model painted a stark picture of the consequences of unchecked economic and population growth in a finite world, and started a global dialogue about the future of the developmental model espoused by modernism.

In 1974 a team of scientists and policymakers presented the *Cocoyoc Declaration* to the General Assembly of the United Nations. This document highlighted the fact that not only had it been “impossible to meet the ‘inner limits’ of satisfying fundamental human needs” since the establishment of the United Nations, but that “environmental degradation and the rising pressure on resources raise the question whether the ‘outer limits’ of the



PHOTO: C DU PLESSIS



planet's physical integrity may not be at risk".⁷ The report called for a new development model, based on alternative consumption patterns, technologies and institutional frameworks, that would be capable of meeting basic human needs for all the world's people, without exceeding the 'outer limits' of the planet's resources and environment.

The *Cocoyoc Declaration* outlined the basis of what became the central theme of sustainable development: we need to find a path that would allow the millions of people currently living in the so-called developing world, as well as future generations, to achieve the same quality of life enjoyed by people living in the industrialised world, while conserving and protecting our natural resource base and the services provided to humans by the natural environment. Forty years later the conclusions of those early thinkers remain relevant and the message is even more urgent. However, once the need for sustainable development was placed on the negotiating tables, another set of conditions was introduced. Any actions that set out to achieve these goals should be achieved in a cost-efficient manner and not in any way hamper economic growth or upset any political apple carts. Furthermore, any required changes to our social, technical or economic systems need to be slow and incremental, based on consultation and negotiation.

This is the version of sustainable development found in the model proposed by international authorities such as the World Commission on Environment and Development (WCED), the United Nations Development Programme (UNDP) and the United Nations Environmental Programme (UNEP) and fleshed out in the successive rounds of World Summits (Rio, Johannesburg and Rio again). This model sees sustainable development as an ultimate goal to be achieved through solving a series of separate problems in a reactive manner, often by means of technology. Furthermore, the need to develop consensus-based global action plans that would have buy-in from many different stakeholders with often conflicting agendas (e.g. big business, emerging economies and the poor) has seen the early sense of urgency to deal with a coming crisis disappear, to be replaced by proposals reflecting the lowest common denominators, returning the interpretation of sustainability to what is in essence the standard human development plus economic growth agenda of the past 50 years, with some token environmental components tacked on.

Sustainable development in the 21st century, therefore, continues to advocate a development model based on economic growth through resource consumption, even if this is done more efficiently using new technology and frameworks such as cleaner production. The result is approaches that are mainly making small adjustments to what is, in essence, a flawed development model, based on an imperfect understanding of how the world works outside of economic models, scientific experiments and the drawing boards of engineers. This understanding is a result of modernity and its handmaiden, the scientific method, which holds that problems can best be understood and solved by breaking them down into their component parts, and that problems, their causes and their solutions can be clearly and accurately defined. Although this understanding is increasingly challenged, it still informs a number of our stories about sustainability. Three of these are discussed below.

The Utopian end state

The first story is that sustainability is seen as a change from a current 'unsustainable' to a future 'sustainable' state, defined in terms of measurable goals and targets, which can be achieved by following specific recipes and rules designed to optimize and increase the efficiency of our systems. This will allow us to balance the 'triple bottom line' of people, planet and prosperity. Once achieved, it is a matter of maintaining this imagined optimal state.

There are a number of flaws in this narrative. The first is that we still cannot agree on what this sustainable state should look like, and how best to achieve it.⁸ For some it is a return to a simpler life and a restored natural environment; for others it will only be achieved when there is electricity, a

flush toilet and an internet connection in every home, child mortality is almost zero and everyone can live for a healthy, happy and productive hundred years. Neither of these visions is possible in our currently dominant value systems, the business practices they give rise to, and the technologies and models of urbanization we have created, and from our current viewpoint, they are fundamentally incompatible. While there is a global movement of people opting for voluntary simplicity, it is still a negligible percentage of the world that opts for a simpler life. And people who do choose to downsize usually come from a place of relative privilege. They have lived the comfortable life and enjoyed the benefits of conspicuous consumption, only to find that it left them feeling empty, disconnected and unhappy. On the other hand, for those who aspire to achieve this standard of living, calls for a simpler life is reinforcing their feelings of oppression and disempowerment. Yet, using current technologies and practices to improve living conditions for the almost seven billion people on the planet to a point where they can achieve standards of living



PHOTO: C DU PLESSIS

seen as a basic minimum for a good life, while increasing both population growth and lifespan, will ensure that we cross those planetary operating boundaries sooner rather than later.

The second weakness in our Utopian steady state vision, as is pointed out by a number of critics,⁹ is that while optimization and efficiency may be laudable goals when designing a motor car or a computer, for living systems they can be fatal. The very steps we take to optimize and increase efficiency in the system reduces its resilience. By cutting out redundancy and developing tight protocols for behaviour, a living system loses its ability to adapt to sudden crises or to release the pressure built up through slow changes. The notion of an optimal state is also out of touch with the reality of a world that is not in a steady state. Climate, population, ecosystems, resource levels, economies, political ideologies and so forth are all in constant flux and our systems need to be able to respond creatively to these changes. Our cities are created in a dynamic and ever-changing world, yet mainstream approaches to sustainability are failing to acknowledge this, even if they are increasingly couched in systems language. The need to measure, manage and control that is characteristic of the reductionist worldview that underpins modernization, still shapes the tools with which we are trying to solve the wicked problems of sustainability, as can be seen in the next story.

The panacea of measurement

Following from the above is the second main narrative: the comforting fable that sustainability can be measured and therefore managed. This led to a plethora of rating and assessment systems for cities, buildings and products. In the built environment the uptake of the ‘Big Three’ – LEED, BREEAM and Green Star – has shown an exponential growth rate.¹⁰ While these systems have proved immensely useful in generating public awareness of issues such as energy efficiency and the need for a more environmentally conscious approach to building and construction, they also face increased criticism. As they have become more widely used, some weaknesses and unintended consequences are surfacing.

Firstly, these systems are accused of reinforcing existing building types and practices, trying to improve on flawed ‘best practice’ through aggregate technical solutions,¹¹ or even worse, deteriorate into mere “accounting games” that reward point-mongering but not integrated design or innovation.¹² As Ray Cole¹³ points out:

The way that building environmental assessment methods identify discrete performance requirements often translates into design as a series of isolated design gestures to meet them rather than encouraging creative synergies, closing loops, and responding appropriately to the local ecological and social contexts.

Secondly, the basic premise of these tools is that they are based on predicting building performance according to a set of technical criteria designed to allow comparison across geographical areas. However, in practice the actual

Sustainable development in the 21st century therefore continues to advocate a development model based on economic growth through resource consumption, even if this is done more efficiently using new technology and frameworks such as cleaner production.

performance of these buildings does not always match the intentions of the designer or the predictions of the computer models.¹⁴ This can be because of the mismatch between user behaviour and the way the building or development was designed to be used, but also because new untested technologies or systems proved unsuitable, unworkable or simply too much trouble to maintain (see Sidebar for examples). This is often the case with features such as green roofs or walls, and integrated renewable energy solutions, especially where these features were added as ‘green bling’ – to score innovation points or to brand a building as ‘green’ rather than as integral functional components of the building system. Computer models also have limitations in as far as they can accommodate finer grain simulation of local micro-climates, the complexity of buildings, range of anticipated uses and occupancy rates, and other operational factors.

Thirdly, these efficient buildings are often designed to be optimal within themselves and do not consider the broader environmental or social context within which they are positioned. As a result one may get an efficient air-conditioning system in a building with windows that cannot be opened in an environment where 80% of the time the outside conditions are within comfort parameters. While the building may perform better than a ‘baseline’ scenario with a less efficient system, and the possible influence of occupant behaviour is managed, this still

When green becomes too much trouble

In our first example, the CH2 building in Melbourne, the iconic wind turbines proved too heavy to turn and thus do not contribute to the energy produced by the building as originally intended, although they still assist with ventilation. While the intention was authentic, the technology was not yet able to deliver the required performance.

In our second example, the Kohinoor Hospital in Mumbai, the green roof plays a prominent part in the promotional material extolling the leadership of the building as a LEED Platinum building. However the area is badly maintained and one cannot help but wonder whether its sole purpose was to generate the necessary points and that it is now considered obsolete after the rating was achieved.



Figure 1: Oversized wind turbines, CH2, Melbourne. PHOTO: C DU PLESSIS



Figure 2: ‘Green’ Roof of LEED Platinum Kohinoor Hospital, Mumbai. (Architects: SSA Architects) PHOTO: C DU PLESSIS



PHOTO: THINKSTOCKPHOTOS.COM.AU

means that 80% of the energy used to control indoor temperature is unnecessary. It further makes the building more vulnerable to power cuts (a reality in many developing countries) and, depending on the system, may require expensive fossil fuel-based back-up systems.

Being isolated from the larger system also means that economies of scale, opportunities and synergies are missed. For example, water treatment or trigeneration systems are often integrated into a building to achieve better performance and a higher building rating. However, these systems are mostly installed with no knowledge of or possible linkage to similar systems in neighbouring buildings. The consequence is a district of individual treatment and energy production units where a great deal of synergy and efficiency could have been achieved through a combined system, and social and environmental opportunities for creating a thriving urban system are missed.

However, the greatest weakness in this story is in the underlying assumption that sustainability is an aggregate of a number of independent factors, when it is actually an emergent property of the characteristics of and relationships between a large number of visible/knowable/explicit and invisible/unknowable/implicit factors. In trying to get to neutral (zero energy, zero emissions, zero waste) we can end up needing so much technology, innovation and money that it is no longer feasible to proceed. Which brings us to the third narrative.

It is a technology issue

Technology is the foundation on which traditional green and sustainable building approaches are based. Whether we are talking assessment systems, policy and regulation or design criteria, it is all about how we use technology, what allowances we make for it, and how to choose the best technological solution. However, the fixation on technological performance, combined with the problems inherent in current rating systems discussed above, can lead to some aberrant (and at times abhorrent) behaviour receiving the green stamp of approval. Two very different examples in two very different countries serve to illustrate this point.

The first is the Menlyn Maine development in Pretoria, South Africa. One of 17 projects worldwide forming part of the Clinton Foundation's Clinton Climate Initiative (CCI) Climate+ programme, this new urban node aspires

Menlyn Maine



Figure 3: Nedbank Falcon Building
(Architects: Boogertman and Partners)



Figure 4: Menlyn Maine billboard
showcasing the 'New Urbanist'
design of the precinct



Figure 5: The ultimate in green bling
– Africa's highest green wall (to
date), Nedbank Falcon Building.
PHOTOS: C DU PLESSIS

to meet both South African Green Star ratings for its individual buildings and the LEED Neighbourhood Development rating for the precinct as a whole. Its website¹⁵ claims that Menlyn Maine is designed according to New Urbanism principles that introduce “traditional neighbourhood communities, quality architecture, savvy urban design, and tree-lined streets”. However, while the first of its buildings (the Nedbank Falcon Building and the Sage Building – also known as the Softline VIP Menlyn Maine Epsilon building) were both awarded a 4-star rating from the Green Building Council of South Africa, a more detailed look at what is there and what is planned leaves one with an uncomfortable feeling of cognitive dissonance. Both current buildings, and the artist impressions on the billboards, show very little of the finer grain streetscapes and mixed use buildings characteristic of traditional neighbourhood communities. The residential component of the project is squeezed into two tower blocks, while the commercial buildings present dead facades to the street. In fact, what is proposed draws more on the Le Corbusier ‘building as object in the landscape’ school of urban design than on new urbanism or any of the other sustainable neighbourhood models, and is set to recreate the soulless central business districts that is the hallmark of post-war urbanism. Trees and the odd ‘green’ feature like the roof garden on the Sage building and the Nedbank Falcon Building’s 17m high green wall, will not turn this development into a pedestrian friendly traditional neighbourhood (whatever that may mean). In fact, the green wall is the ultimate in cynical manipulation of public perceptions; it serves no purpose other than to proclaim the ‘greenness’ of the building. The individual buildings may very well have low VOC finishes and save on energy and water, but while the development is designed and managed as a whole by the same professional team, apart from a natural storm water management system, there is no attempt to develop neighbourhood-scale infrastructure solutions such as district heating and cooling, distributed power generation or on-site black water treatment. Yet this development claims to be Africa’s first green city and has all the ‘green’ credentials conferred by systems such as Green Star and LEED.

The second project is the Palais Royale in Mumbai, one of India’s LEED Platinum buildings. At 295m above ground (and a total structural height of 325m) it is also the tallest building in India. Its construction made use of a number of innovations to reduce material and water use, while its green features include vermicomposting to treat the organic waste generated by the building. The first 90m of the building is taken up by seven parking levels (with roof space that can accommodate modern SUVs) and three amenity levels which include the expected swimming pool and tennis courts, as well as a garden “with tall real trees”.¹⁶ The kicker is that this model of sustainability with a total volume of over two million cubic metres, provides only one hundred apartments to the super rich elite who will call it home.

That both these projects are achieving a green rating is an indictment of current rating tools and illustrate how the combination of a checklist approach and a fixation on technology and efficiency can be used to provide credibility to projects of which the underlying values fundamentally conflict with those

of sustainability. The developers of Menlyn Maine demolished a tree-lined medium density neighbourhood, and are replacing it with a tree-lined street of hostile corporate facades and high-rise shoeboxes to which it refers as a 'traditional neighbourhood'. In the case of the Palais Royale whatever energy and water savings the designers managed to achieve, can never compensate for the per capita ecological footprint of the building's inhabitants and the rather heartless message it sends to its very poor neighbours. As William McDonough says: "Doing a bad thing less bad, does not make it good".

Somewhere along the lines the emphasis on measurement led to indicators that could be measured, such as technological achievement, and the immeasurable factors that would lead to thriving and liveable neighbourhoods that restore social and ecological relationships, the very ethos of sustainability, fell by the wayside. The values that are currently driving green building have more to do with ego and expediency than with any of the values and ethics of sustainability, and the result is a movement that, like the Tin Man, has lost its heart.



Figure 6: Palais Royale, Mumbai, India (Architects: Talati & Panthaky Associates).

PHOTO: C DU PLESSIS

A different approach

This book offers a different approach to the sustainable development of human habitats: an approach built on an alternate, ecological worldview that sees humans as part of a larger community of life. Central to this view is the idea that humans do not need to be only consumers, but that we can have a positive role in this community: we can also be producers of resources (or even ecosystem services) for other species. Section 2 provides the conceptual underpinnings and ethos of this approach. Chapter 2 discusses this worldview and the guidance it provides on how to engage with the world. Chapter 3 argues that it is possible to move from a narrative of fear to one of love through the conscious re-integration of humans with nature and acceptance of our innate need for that connection, as proposed by the Biophilia Hypothesis. An acceptance that we are part of nature forces us to act as if we are part of nature, following its laws and designs. Biophilic design taps into natural processes, patterns and ways of place-making to facilitate this re-integration with nature. In Section 3 we discuss how it is possible to move from scarcity thinking to abundance thinking through design processes based on a contextual understanding of the story of place and partnerships with nature that integrate natural and social systems. Chapter 4 describe various approaches to working with nature, such as biomimicry and permaculture. Chapter 5 discuss the principles of Positive Development, while Chapter 6 introduces the processes of regenerative design and development. Throughout these chapters case studies present concrete examples from across the world to illustrate how these concepts are used to develop an alternative vision of an irresistible future. Section 4 discuss a number of frameworks that can be

used as tools to guide the design process and assess the contribution it makes to the creation of an abundant world. Chapter 7 presents new tools such as REGEN and integral thinking that helps us to guide design processes in a holistic manner and Chapter 8 introduces the *Living Building Challenge* as an example of a tool for the built environment. Finally, Section 5 brings the theory and practical examples home to the individual. In Chapter 9 we discuss what it means to be a reflective practitioner and the personal development work that is required; while Chapter 10 discusses the possibilities open to everyone for contributing to the creation of a better, more hopeful world through small, individual actions.

ENDNOTES

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Chapter 2

An ecological worldview

“No problem can be solved from the same consciousness that created it.”

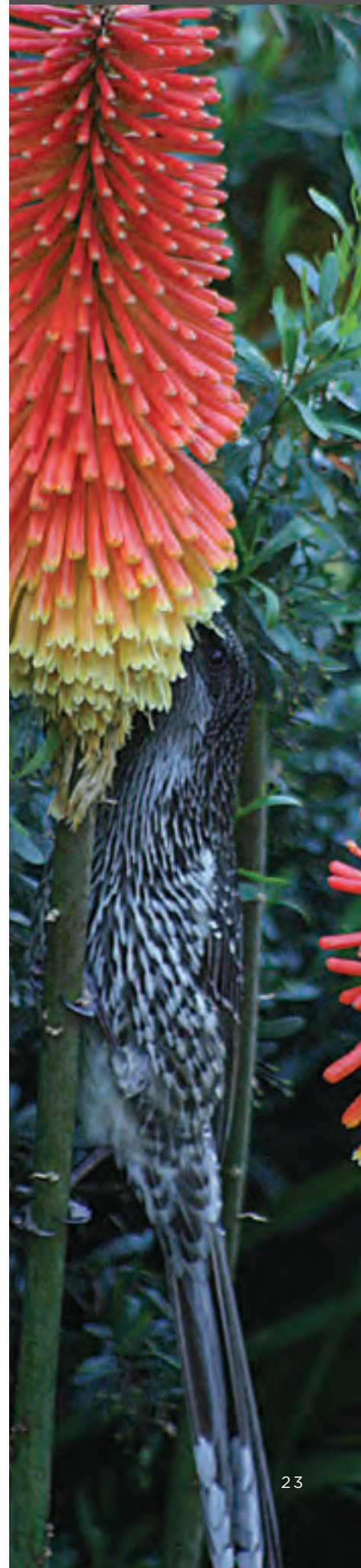
Albert Einstein

Changing is a matter of choice – or is it?

Why is it that, even though we know how bad things are going to get very soon, and we know what needs to be done to prevent, or at least mitigate this, the entire global society still prevaricates and finds excuses not to make the changes we know we should? The answer is very simple. We won't act, because the choices we have to make fly in the face of everything we have been told we need to be and do, not only to survive, but to be happy and successful.

We know our choices shape our world, but we rarely recognize that these choices are themselves shaped by our beliefs about the world. These beliefs – taught by our parents, promoted by the cultures in which we grew up, shaped by our lived experiences – form what is called our worldview. A worldview can be described as the stories we tell ourselves about how the world is created, what it is made of, how it is structured and how it functions. These stories in turn allow us to construct a value system that informs our ideas of what is good and true, what constitutes ethical action, and how we define concepts such as happiness and success. It also defines the paradigms we use to discover and structure knowledge.

However, no single worldview can describe the full complexity of the world. It can only reveal to us the world that is made visible through its particular lens. This implies that our perspectives on, and solutions to, problems are also limited to what is possible from within a particular worldview. As the limitations of one worldview become apparent, it is eventually replaced by another.¹ It is suggested² that the development of worldviews is itself a process of evolution, in which any new worldview builds on the knowledge



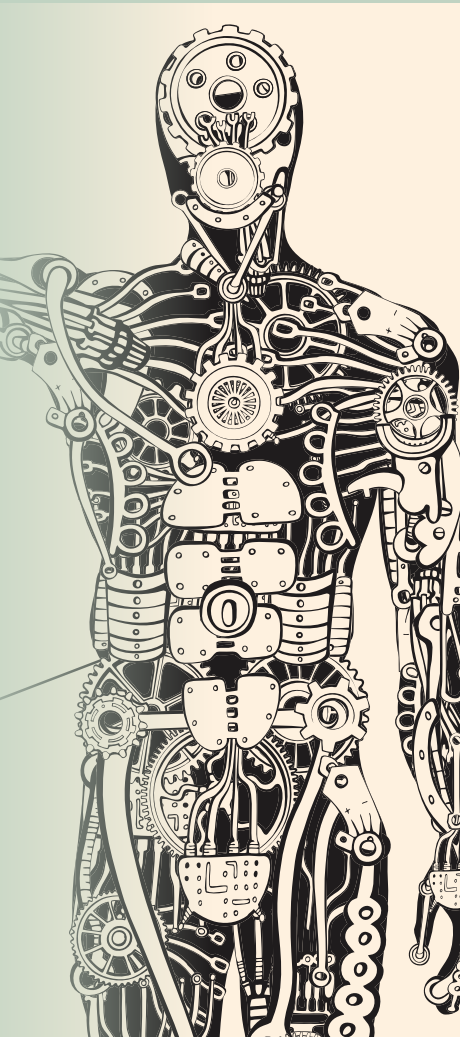
and insight accumulated through numerous preceding worldviews, but adds its own insights to increase the scope and coherence of the picture being unveiled.

Over the past 500 years the world has gradually become dominated by a worldview that is powerfully seductive, but ultimately treacherous. During the Renaissance a number of scientific discoveries, especially that of Copernicus and Galileo, put paid to the preceding view of a world governed by divine purpose. The game changing influence of their work lies in the fact that their discoveries were based on what they could observe, not on what the church said they should observe. René Descartes took this train of thought further by separating mind from matter, and the subjective from the objective. Henceforth the only true knowledge was to be that what could be objectively observed and measured. Add to this Newton's mechanics and the call from Francis Bacon that the purpose of science is to invent useful things for the improvement of the human condition and its estate, and we have a worldview that tells us some interesting stories. The first of these is that we live in a universe that functions like a very sophisticated mechanical system, governed by universal laws (such as the laws of physics, mathematics and chemistry) that can be used to predict and thus determine the behaviour of the parts (from atoms to galaxies) that constitute the universe, based on the properties of these parts – in essence a clockwork universe as Gottfried Leibniz described it. Once we have discovered these laws, we can not only explain all phenomena, but ultimately, through scientific and technological development, replicate and control them, thus placing us in control of nature to create all kinds of useful things to improve life for humans.

The second story this worldview tells, is that living systems and mechanical systems can be approached in the same way – as a collection of parts that could be studied (and fixed) in isolation. This view influenced how we approach adversity: analyzing it into isolated problems each with their own solution or means of control.³ The third, and possibly most dangerous story of this worldview, is that not only can growth, development and progress continue indefinitely, only limited by our imaginations and technological sophistication, but that unfettered growth is something for which we should strive.

This worldview ultimately led to a social value system focused on that which would serve the individual and the fulfilment of his or her needs in a competitive environment, in which truth and value can only be deduced from observable and measurable evidence. In a world where only that which can be measured counts, concepts such as success, wealth and happiness came to be defined by the ability to consume. Measuring our self-worth in terms of the possession of material goods is one of the reasons why modern society finds it so difficult to move to a more sustainable way of living. This value system also allowed us to separate humans from nature, and then place humans above nature, with the right to use its resources and change its processes to provide maximum benefit for the human species.

While this worldview was extremely successful in furthering technological



Living systems are not mechanical systems.

IMAGE: RYGER / SHUTTERSTOCK.COM

development, thus improving human wellbeing, it has limitations. During the past century the flaws have become more apparent. New fields in science, such as quantum physics, complexity science, ecology and neuroscience are finding that, while the scientific paradigm underpinning this worldview is very effective when dealing with mechanical systems, it cannot adequately explain all of reality, especially when it comes to living systems and the sub-atomic realm. It has also become clear that the mechanistic approach to responding to some of the world's critical problems is failing because the linear, reductionist methodologies used to develop strategies, cannot foresee or address the unintended consequences inherent in the complex dynamic systems that constitutes life on Earth. But probably the most damning aspect of this worldview was the psychological separation it created between humans and nature. This allowed the development of an economic model that ignored the limits to growth posed by the reality of a finite and interconnected planet, and which now threatens vital planetary functions such as climate regulation.

It is becoming increasingly clear that it is not technology, or the economy, or politics that presents us with the biggest challenge in creating a sustainable world, but escaping the trap of this mechanistic worldview. Consciously changing our worldviews is not an easy task, if at all possible. However, if we really want to leave the children of this and centuries to come a legacy of abundance, it is our only choice. We need to shift to a worldview that is more relevant to the complex and living systems of which we form part; a worldview that would open solutions to us that are simply not possible using the thinking of the worldview which created the challenges in the first place.

Fortunately an alternate worldview has been gaining ground. While referred to as a new worldview, in reality it is emerging from an amalgamation of ancient worldviews and the findings from both classical and new sciences. This worldview has been labelled respectively as ecological,⁴ evolutionary,⁵ reflective/living systems⁶ and integral.⁷ We will use the term ecological both in homage to the wisdom of the first to identify it, and because the term reminds us that we, as humans, are part of a much larger web of life. We may bring to that web abilities such as self-reflection and what Ken Wilber⁸ calls “the ‘software’ of philosophy and the ‘transcendental ware’ of mystical-spiritual religion”, but we are first and foremost part of a living system and all that comes with such systems, such as flows, relationships, interdependence, and evolution.

There have been numerous attempts at outlining aspects of this ecological worldview by scholars in fields as diverse as theoretical physics, cosmology, ecology, transpersonal psychology, indigenous knowledge systems, and even religion and spirituality.⁹ All these descriptions can be structured around two key themes: wholeness and change. In this chapter we discuss how these two themes influence the way we look at the world; the value system that flows from these themes; and the guidelines for action provided by these values. Lastly we discuss what the practical implications of this worldview are for how we generate and use knowledge, our interpretation of sustainability and our approaches to design.¹⁰

The current mechanistic worldview cannot adequately explain all of reality, especially when it comes to living systems.

“Things derive their being and nature by mutual dependence and are nothing in themselves.”

Nagarjuna

Everything that exists, including humans, while appearing to be separate entities, is in fact fundamentally connected through being part of the quantum field.

“Essentially everything that exists, including humans, while appearing to be separate entities, is in fact one indivisible whole.”

This observation has some interesting philosophical implications. It suggests a transpersonal point of view that makes no distinction between the Self and Non-Self (defined by Cobern¹² as the human environment or society, the physical environment or nature, and the supernatural or God) – the oneness of all implying that there is only self and that what we perceive as the Non-Self is just an extension of the self. This puts a new perspective on concepts

such as self-interest, self-esteem and self-respect, and on our notion of community. In the cosmologies of Africa¹³ and the Australian Aborigines,¹⁴ each individual person is seen as the focus of shifting forces, changing as they change, existing only as part of the different relationships that bind them together. As such, a person exists only in relation to others. It is therefore inconceivable for an individual to fully separate his or her existence from that of the community. And the community includes the entire universe with all its seen and unseen realities.¹⁵ In the section on values below, we discuss the implications of this insight for our values and ethics.

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Seeing the whole world

One of the main differences between the mechanistic and ecological worldviews is the shift in emphasis from understanding the parts to understanding the whole. The term ‘whole’ can be interpreted in two ways: as ‘entire’, meaning undivided and unreduced; and as ‘intact’, meaning in an unbroken, functioning and healthy state. Only once we see the whole in its entirety, will we be able to understand how to keep it functioning and healthy.

Therefore, our first challenge is to understand what is meant with ‘the whole’ – the undivided and unreduced cosmic system. The theories of quantum physics suggests that at the fundamental level of material reality, there is only a field of energy which is present everywhere. What is perceived as solid matter, are merely dense patterns of energetic vibration in this field. Everything that is, is part of and therefore connected through this quantum field, and is “but transient manifestations of an underlying fundamental entity”.¹¹ Thus, in its quest to find the most elementary building blocks of the universe, science discovered that essentially everything that exists, including humans, while appearing to be separate entities, is in fact one indivisible whole.

Jan Smuts, originator of the term ‘holism’, argued that the whole is not something additional to the parts: it is “the parts in creative synthesis” – the whole being more than the sum of its parts.¹⁶ He further suggests that the inherent tendency to create ever more highly organized and complex wholes is the main creative principle of the universe. We can see this principle in action no matter at what scale we look.

As the waves in the quantum field interact with each other, they create patterns of coherence, which give rise to particles or matter.¹⁷ These particles then start organizing themselves into systems with distinct properties to form atoms, which in turn form the basis of all matter. Thus, at the subatomic level the material world appears as emerging from a complex web of relationships, in which material objects are not distinct entities, but part of their environment in such a way that “their properties can only be understood in terms of their interaction with the rest of the world.”¹⁸

At each level the interacting entities self-organize into structures and processes that allow for the emergence of the next level of complexity. This process holds true for all systems,

including social systems. As Stuart Kauffman¹⁹ describes it:

Molecules of all varieties join in a metabolic dance to make cells. Cells interact with cells to form organisms; organisms interact with organisms to form ecosystems, economies, societies.

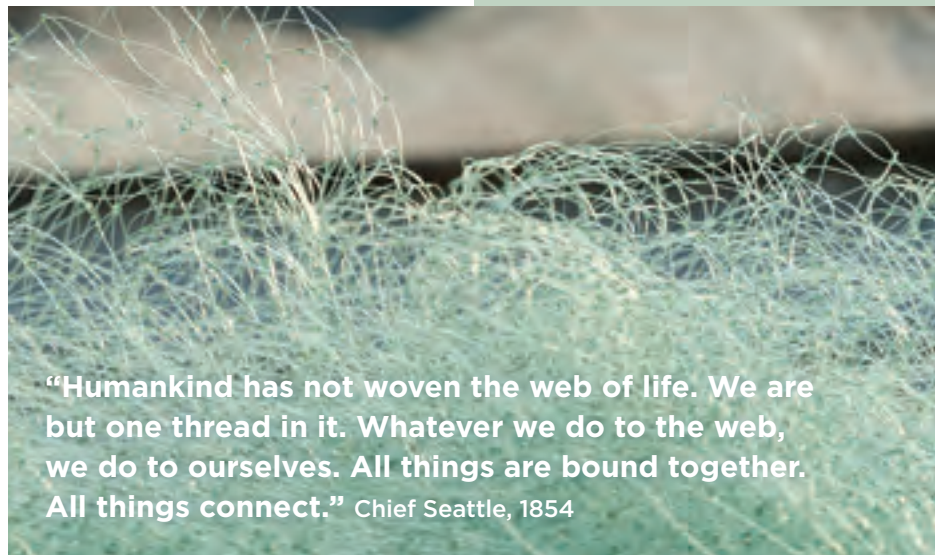
Understanding the power of these processes of self-organization and emergence is one of the most hopeful aspects of the ecological worldview, as it suggests that the collective actions of a group of individuals can change the overall behaviour of the system. A concept we explore in more detail in Chapter 10.

The understanding of the whole as consisting of many nested systems holds another important lesson for how to look at problems and solutions. To understand the design problem at hand, we need to not only look at the scale at which the problem is situated (object, building, city), but also at the systems in the scales above and below it, as these systems contribute to the problem and will be impacted by its eventual solution. For example, when designing a neighbourhood storm water management project, it is necessary to understand the water catchment in which it sits, as well as the kind of surfaces found on the various properties comprising that neighbourhood.

The science of ecology further emphasizes the interconnectedness of organisms and their organic and inorganic environment. This web of relationships forms what is known as an ecosystem. One of the critical lessons ecology is teaching us, is that humans are not separate from nature, but members of the web of life. The perception of a closely interdependent relationship between humans and nature is a common theme in the knowledge traditions of indigenous peoples across the world,²⁰ and has become the basis for studying what is now called social-ecological systems.

The global social-ecological system we call the world is made up of three distinct but nested and interpenetrating spheres or domains of existence: the geo/physiosphere (matter), the biosphere (life), and the noosphere (mind).²¹ These spheres represent a continuum of increasing complexity and consciousness, with matter as the first (lowest) level, life as the next

Social-ecological systems are far more than coupled human-nature systems in which humans rely on 'ecosystem services'. Instead, social-ecological systems represent the combination of the 'exterior', as created by biogeochemical processes and activities (in which humans and their technologies have come to play a disproportionate part), and the 'interior', as created by, and experienced through, processes of thought and shared cultural phenomena.



"Humankind has not woven the web of life. We are but one thread in it. Whatever we do to the web, we do to ourselves. All things are bound together. All things connect." Chief Seattle, 1854

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Key concepts

- **System:** A system is a set of interacting components and relationships that combine to form an integrated whole.
- **Emergence:** This is the process through which novel complex systems and behaviours at a larger scale arise from the collective behaviour and properties of systems at a lower scale and lower level of complexity.
- **Self-organisation:** This is a process whereby order or coherent behaviour arise from the spontaneous local interactions of elements in a system. This organization is decentralized and distributed through the system.



PHOTO: C DU PLESSIS

“We talk about living systems, rather than natural systems and human systems, because they are all living systems.”

Pamela Mang

level emerging from (and thus including) matter, mind as the next level emerging from life, and possibly spirit as the last (highest) level emerging from mind. Thus life requires matter in order to exist and mind requires life and therefore matter for its own existence. As elements of the system or systems themselves become more complex they inhabit ‘higher’ levels of development, while still containing all the properties of the lower levels. They also become more conscious, their behaviour becomes more complex, and the laws that guide this behaviour become more normative.

Philosopher Arne Naess, the father of Deep Ecology, suggests that human beings are “but a juncture in a relational system ... [which] connects humans as organic systems with animals, plants, and ecosystems conventionally said to be within or outside the human organism”.²² Not only are we an intrinsic and increasingly integral part of the global ecosystem, but our bodies are themselves ecosystems, consisting of more bacteria than cells with human DNA. However, this connection goes further than just a functional or utilitarian interdependence, it is an innately spiritual and emotional affiliation – a concept biologist Edward O. Wilson terms biophilia.²³

Most systems in which we live and work, consist of not only tangible ‘exterior’ biophysical aspects, but also intangible, ‘interior’ aspects found in



Buddhist scholar and monk Sogyal Rinpoche²⁴ links the message of interconnection in both the sub-atomic and ecological sciences to the Buddhist notion of emptiness. Emptiness, he suggests, means that “all things, when seen and understood in their true relation, are not independent but interdependent with all other things”. He illustrates this through the examples of a wave which arises out of the ocean as “something made temporarily possible by wind and water and dependent on a set of constantly changing circumstances”, and of a tree which “dissolves into an extremely subtle net of relationships that stretches across the universe” with the elements, sunlight, starlight and moonlight, as well as the soil in which it is planted, all contributing to make the tree what it is.

PHOTO: SHUTTERSTOCK.COM

the sphere of thought or 'noosphere'. These include individual motivations, thoughts, feelings, ideals and worldviews, as well as collective motivations, cultural norms, value systems, and identities shared within communities. A whole systems perspective would therefore also include these noospheric systems. This view allows us to consider how the relationship between our interior (feelings, values, thoughts), and our exterior (our physical reality), create the conditions for health and well-being for the individual as well as its ecosystems.

The importance of this understanding is that it allows us to overcome the duality of mind and matter created by Descartes. In Chapter 1 we discussed how, even though we know how bad the future can get, our current best efforts are not enough to get us out of trouble. One of the reasons for this is that many of our solutions remain trapped in the mechanistic worldview which operates mainly in the exterior, observable part of the world. By focusing on the matter part of the system, these solutions are not working with the full potential of the whole social-ecological system. When we engage with the world from an ecological worldview, we consider the 'human' aspects of our context (e.g. values, aspirations, legislation, economic systems) in relationship to the biophysical context (including the environments created by humans), and how our planned interventions in this system of relationships contribute to the healthy functioning of this system. The many examples in this book illustrate how this can be done to regenerate and maintain the wholeness of the system throughout the inevitable changes brought by time.

This theme of wholeness describes an interconnected and interdependent world that is continually created through relationship. The dynamic and constantly shifting interactions within these relationships, lead us to the next important understanding of the world: impermanence and change are inescapable conditions of existence.

Change is the only constant

The notions of impermanence and the continuous cycles of creation, embodiment, preservation, destruction, and release of the universe, are well established in most religious and philosophical traditions. As Greek philosopher Heraclitus proposed: "though things may appear to be stable, they are actually in an endless process of becoming, in a state of constant flux".²⁵ Medical science has shown that the human body is changing all the time as



PHOTO: C DU PLESSIS

cells renew themselves according to regular cycles. Geology studies how the surface of the earth is constantly changing, as rocks, mountains and continents are born and erode to dust. Astronomy studies how the cosmos itself changes as stars are born and die, and galaxies spin further from the centre of the universe. Thus even seemingly permanent phenomena are undergoing constant change at both a micro and macro scale of existence.

The new field of resilience theory uses the metaphor of the Adaptive Cycle to describe the recurring cycles of rapid growth, conservation, release, and reorganization found in nature.²⁶ While the adaptive cycle is not a fixed cycle, as research has found numerous examples of variations on the cycle that have bypassed phases or even returned to previous phases, it still provides a valuable tool for understanding change in living systems.²⁷

In essence, the adaptive cycle consists of four phases controlled by four functions: exploitation, conservation, release and reorganization. The exploitation phase (r-phase) is characterized by rapid growth and high environmental variation. It is the phase in which pioneers, opportunists and entrepreneurs thrive, as they exploit new opportunities and niches in a system with weak internal regulations and connections. During the Conservation phase (or K-phase), components become more strongly interconnected, energy is stored, and materials (or potential) accumulated. The internal state becomes more strongly regulated and more efficient; new ways of doing things are excluded, and capital becomes tied up in unavailable forms.²⁸ The system becomes more rigid, and resilience decreases as flexibility and redundancy is replaced by efficiency. During this stage “the competitive edge shifts from opportunists to specialists who reduce the impact of variability through their own mutually reinforcing relationships”.²⁹

As systems become more rigidly tied up in certain structures and patterns of behaviour, they become ripe for collapse.³⁰ Such collapse can be catastrophic, destroying the entire system, or it can be a small release of potential that relieves the pressure. The longer a system is in the conservation phase, the more vulnerable it becomes to even small shocks and the greater the chance of total collapse.³¹ One way of avoiding catastrophic collapse is through a series of small, controlled releases. This strategy is used, for example, to manage wildfire risk through controlled burns.

During such a release (omega phase), regulatory controls are weakened and resources are released, resulting in chaotic dynamics.³² Following rapidly on the release phase, is the reorganization or alpha phase. During this stage, the system is open to innovation and invasion, novelty thrives, unlikely agents can combine and form new entities, and small chance events have the power to shape the future. The reorganization phase begins to order the chaos of the release phase. The release and re-organization phases of the cycle present the greatest potential for destructive or creative change in the system.³³

The Adaptive Cycle helps us understand that change is necessary, and that the occasional collapse of a system may be beneficial to the overall health of the system, as it allows for different, possibly better conditions to emerge.

When collapse bring benefits

On the 1st of June 2011 a tornado devastated the town of Springfield, Massachusetts. In the aftermath members of a youth drama group³⁴ wrote a poem entitled *To Our Mother Tornado*, in which they describe the tornado as a beneficial force that “came to clean up a disaster”. In this destruction, they saw hope for a better life now that the structures which have kept them in fear and despair have been broken open, and people were forced to work together to rebuild not just their city, but their community.

“Our Mother, helping her children
The North and the South make peace.
Work together like they should
to help our city be reborn.
She gave us a blank page
So we can draw colourful streets
Full of lights,
clean and beautiful.”

Another town destroyed by a tornado, Greensburg, Kansas, decided to use the opportunity to rebuild as one of the greenest towns in the United States. In the city of Detroit, successive economic disasters have created the space for a city once known for its industrial wastelands and violence to slowly rebuild itself as a functioning and regenerative social-ecological system. The youths from Springfield realized what few adult disaster managers do: that disaster brings opportunity for renewal and reinvention that should not be wasted. A lesson to remember as we come to terms with the challenges of climate change and global recessions. Greensburg and Detroit remind us that we do not have to rebuild in a way that supports the old paradigms. We can choose how to respond to disaster, and our choices can be regenerative, not degenerative.

In all systems, change is caused by the interactions between the different components of that system. These interactions are governed by positive and negative feedback that can be initiated by events quite distant in time and/or space from where the effect becomes visible. Furthermore, the increasing returns provided by positive feedback loops can get magnified into outcomes that are historically irreversible,³⁵ or at least totally disproportionate to the initial event that triggered the feedback. Newtonian science (underpinning the mechanistic worldview) assumes that if we have approximate knowledge of a system’s initial conditions and an understanding of natural law, it is possible to calculate the approximate behaviour of the system, and therefore predict changes in this behaviour.³⁶ However, 20th century scientists realized that linear prediction was only a simplified viewpoint applicable to relatively few systems, most of them created by humans, whereas the world is a complex, adaptive and dynamic system governed by non-linear dynamics.

The difference between complicated and complex systems is that the former can be reduced to their parts, whereas complex systems cannot be reduced without destroying or fundamentally altering the system. For example, one can take a complicated system like an engine apart, replace some of the parts, and put the engine together again. If one was a competent mechanic, the engine would work perfectly again. However, if one was to take apart a complex system such as a flower (or Humpty Dumpty), it will no longer function, even if one was able to put the parts together again. Complex adaptive systems are further characterized by the dynamic interactions between the elements that make up that system.

Complex adaptive systems have a number of features influencing how we look at their functioning. The following are the most important:

- They are more than the sum of their parts – i.e. they show emergent properties not found in the properties of the individual parts.
- The interactions between simpler elements allow self-organization into more complex structures.
- They have histories, with past behaviour and experience influencing current behaviour, allowing agents to learn from experience and anticipate the future.
- The dynamics within these systems are non-linear, which implies that small causes can have large results.
- The system operates far from equilibrium and exhibits irreversible behaviour – i.e. it may resist change up to a threshold at which it flips irreversibly into a different state.
- Complex adaptive systems are constantly unfolding and in transition and are characterized by perpetual novelty, calling into doubt the idea that the behaviour of any agent can be optimised.³⁷

We are connected to the consequences of our actions.

The study of complex systems such as the weather, stock markets and even traffic jams shows how sensitive these systems are to even small variations in initial conditions, with a small change in input somewhere in the system causing a profound effect at another point (in both space and time) in the system. For example, the hypothetical butterfly flapping its wings in Brazil causing a storm in Texas two weeks later;³⁸ a slightly braking car causing a traffic jam a few kilometres back up the road; or the assassination of an archduke triggering the First World War and an end to the feudal social order in Europe and Russia. This means no act happens without influencing the system within which it happens, thus also changing the conditions within which the actor operates. We are therefore connected to the consequences of our actions.

Climate change is a good example of how a relatively small set of transactions (e.g. use of fossil fuels and agricultural processes by the organism *Homo sapiens*) can influence a range of relationships between the biotic and abiotic elements of the biosphere. These relationships have managed to maintain the planetary atmosphere within a certain range of conditions supportive of mammalian life for millions of years. Yet, a relatively small change in the concentration of greenhouse gasses appears to be causing major changes in weather patterns, the acid levels of the oceans and the health of entire ecosystems. Furthermore, these initial changes then interact with the other planetary processes, eventually creating positive feedback loops that increase the amount of these greenhouse gases, for example the release of the potent greenhouse gas methane as a result of melting permafrost.³⁹ In this way, the small, individual actions of humans have set in motion a train of climate change events that will, in turn, have consequences for each individual.

This has major implications for views built on predictability and control. First, the non-linear dynamics of real world systems are almost impossible to quantify; and second, sensitivity to initial conditions (the so-called Butterfly Effect) means that accuracy in long-term predictions is almost impossible.⁴⁰ Non-linearity also makes it difficult to predict when systems will reach critical ‘tipping points’ or bifurcation points, where linear behaviour suddenly becomes non-linear, and it is no longer possible to predict the future behaviour of the system from the properties of its parts.

Rather, the behaviour of the system “now emerges out of the system as whole and new and unexpected effects may suddenly appear”.⁴¹ Further, as small-scale changes reach certain critical thresholds, they introduce changes in the organization of the system (or phenomenon) at larger scales. Eventually the changes brought about by the fluctuations at smaller scales will cascade up the scales and transform the identity of phenomena at even the largest scales. An example is the gradual loss of tree species and the fauna that depended on these trees that eventually change a forest into grassland, or overgrazing that turn grassland into desert.



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Then there are what Nassim Taleb⁴² calls Black Swan events: inherently unpredictable, large deviations in randomness that carry extreme impact, but are left out of predictive models because: a) the necessity to simplify models and the limitations to our knowledge that shape these models; and b) there is no way to conceive of these events before they happen.

If we understand the world as a complex adaptive system, we realize that we have to act with a lot more caution, as our actions will have consequences we did not intend and could not predict. We also see that change does not have to come from above, but can be brought about through the interactions of many agents between themselves. In the last chapter, we talk more about how this property can be used to bring about social transformation through the actions of individuals or small groups.

This view of the world further allows us to recognize the fact that nothing is permanent and that we need to be able to let go not just of physical entities, but also of ideas, values and practices that are no longer relevant to present conditions in the system. For example, climate change will create weather and temperature conditions far outside the norms that we are used to. Historical regional responses may no longer be appropriate, and modern, highly glazed buildings may become downright dangerous. Clinging to a specific architectural language will only make our cities less resilient. Thus, while understanding the history of a place allows us to identify opportunities and potential that may have remained invisible, as explained in the Regenerative Design chapter, we should also build in features that strengthen the ability of the place to adapt to the unpredictable changes of the future – to build its adaptive capacity. One way of doing this is to arrange services into distributed networks (renewable energy solutions work well for this). Another is to re-introduce functions such as food production, rain water harvesting and water purification back into the city. As illustrated in Section 3, this can be done in an individual building, at a neighbourhood scale or even larger.

- **Resilience:** While there are many different interpretations of resilience, it can be described simply as the capacity of a system “to experience disturbance and still maintain its ongoing functions”.⁴³ This can be achieved by bouncing back, adapting or transforming.
- **Adaptive capacity:** This is the capacity of a system to adapt or transform in response to a crisis or other perturbation to the system. It is determined by features such as diversity of options, the degree of connectedness within the system, and the tightness of feedback – in other words, how fast and strong the consequences of change spread through the system.⁴⁴ Adaptive capacity is one of the main requirements of resilience.

To conclude: by introducing this theme of constant change, Science destroyed our illusions of an immutable, eternal and ultimately predictable universe, leaving us with a world in which accurate prediction and certainty are elusive goals at best. In such a world, resilience, and with it the ability to respond and adapt to perturbations and fluctuations, becomes a critical quality to cultivate. Add to this the growing acceptance that our knowledge of the world is uncertain, constantly changing and relative to the viewpoint of the observer, and we are left with at best hunches and probabilities to guide our decisions. With no clear guidance from science, it is imperative that we embrace a set of values that support the wholeness of our global social-ecological system, to guide our decisions and actions. The question we aim to answer in the next section, is whether the ecological worldview can provide this guidance?

Values of the ecological worldview

From the narratives of wholeness and change underpinning the ecological worldview, themes of interconnection, interdependence, co-creation and co-evolution, change, unpredictability and integration, emerge to define a value system based on how nature works. Values can be defined as “expressions of, or beliefs in, the worth of objects, qualities, or behaviours” that “define and direct us to goals, frame our attitudes, and provide standards against which the behaviour of individuals and societies can be judged”.⁴⁶ It must be noted that there is a large body of research dealing with environmental/ecological values and ethics.⁴⁷ The ten values we identify in this section draw on some of this work, but also flow from a simple question:

What would be the appropriate values for an interdependent, constantly changing and unpredictable reality in which our main goal is the continued well-being and healthy functioning of the whole?

The values below are therefore based on an understanding of a) wholeness anchored in the idea of an interconnected, interdependent and integrated world; b) the importance of relationships and the idea that the world is co-created through those relationships; and c) the world as constantly changing, inherently unpredictable and ultimately impermanent. Furthermore, they shift us from a centric basis of assigning value (whether anthropocentric or ecocentric) to a relational basis of valuing.⁴⁸ The key points of this interdependent set of values are summarized below.

“To be viable, the human community must move from its present anthropocentric norm to a geocentric norm of reality and value.”

Thomas Berry⁴⁵

- **Value 1 – Integrity:** To maintain the wholeness of a system, it is necessary to maintain its structural integrity (its intactness), as well as its functional integrity. That is, its various parts should be integrated into a harmonious and intact whole, which behaves according to an internally consistent framework of principles defining its identity. For example the integrity of an ecosystem, say a coral reef, requires that its structure (the set of relationships that creates it) is intact and the system is functioning as it should.
- **Value 2 – Inclusivity:** To be able to interact with the world in its entirety, and maintain its integrity, requires an approach that engages and integrates all dimensions and levels of existence. The value of inclusivity requires the integration of humans and nature, the different dimensions of existence (matter, mind, life, and spirit), different hierarchical levels, as well as different domains of knowledge and ways of knowing.
- **Value 3 – Harmony:** To maintain healthy and mutually beneficial relationships, it is necessary to maintain harmony through respectful relationships with all aspects of our extended self. Harmony means that, just like in an orchestra, all elements in a system, while each adding its own ‘voice’ and melody, cooperate in a manner which avoids dissonance and create a world in which the parts are congruent to their whole and each other.
- **Value 4 – Respect:** A key characteristic of the ecological worldview is that it extends the boundaries of the self so that there are no boundaries (and no differentiation) between the self and the non-self. Thus, in the ecological worldview, the value of respect requires that all of existence be treated with regard, esteem and consideration, not only because each part of the world has intrinsic worth (as suggested by Naess⁴⁹ and Wilber⁵⁰), but as an extended form of self-respect, as all existence is part of the extended self, and therefore an integral part of the self.
- **Value 5 – Mutuality:** The extended awareness of self as part of an interconnected whole that is also part of the self, gives rise to the value of mutuality, which represents the idea that we are in this together, and what happens to the ‘other’ will also have an effect on the self. It is the root of practices such as compassion, which aims to consciously place oneself in the shoes of the other, and to treat others as one would treat oneself.
- **Value 6 – Positive reciprocity:** We, and everything we know, are products of relationships created through reciprocal exchanges of energy, matter, information, or emotion, and the qualities and quantities of these exchanges can strengthen or weaken the entire network of relationships. When reciprocity is seen in the value context of mutuality, it requires that the exchange be not only fair, but also to mutual benefit. Positive reciprocity is thus not just about reciprocating in kind, but about reciprocating in a way that is of benefit to and advances the relationship between self and extended self.⁵¹
- **Value 7 – Fellowship:** We are actively in relationship with our world; we participate in its creation and it reciprocates by participating in our



“What benefits the whole can’t harm the parts, and the whole does nothing that doesn’t benefit it... So by keeping in mind the whole I form part of... and because of my relationship with other parts, I will do nothing selfish, but aim instead to join them, to direct my every action toward what benefits us all and to avoid what doesn’t.”

Marcus Aurelius⁵³



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“Taking impermanence truly to heart is to be slowly freed from the idea of grasping, from our flawed and destructive view of permanence, from the false passion for security on which we build everything.”

Sogyal Rinpoche⁵⁶

creation. This requires a co-operative relationship between entities sharing a mutual interest – in other words, a fellowship. When fellowship is seen as a value, it requires that interactions should be to the benefit of the whole. As such, fellowship is an extension of mutuality and positive reciprocity. However, it recognizes that this is a co-operative partnership. Therefore, in co-creating the world, humans are in partnership with nature, which implies a more egalitarian (and humble) relationship than that of dominion or stewardship. It further implies that humans have to take on a duty of care with respect to the well-being of the whole.⁵²

- **Value 8 – Responsibility:** A distinct feature of humans is that they are morally responsible agents because of their capacity for decision.⁵⁴ This places a burden on them to act responsibly as part of the community of life, and holds them morally accountable for the consequences of their actions. What constitutes responsible behaviour in the ecological worldview is determined not only by the values discussed so far, but also by the last two values that build on the view of the world as uncertain and impermanent.
- **Value 9 – Humility:** The ecological worldview describes a world where change is a constant and in which we cannot know the true consequences of our own best actions. Humility is a necessary response to an inherently unpredictable and unmanageable world, and it is a necessary value to counteract the hubris and ego that may lead to actions that are neither respectful or responsible, nor supportive of positive reciprocity and harmony, and which may threaten the integrity of the whole system.
- **Value 10 – Non-attachment:** The realization of our own impermanence and of the impermanence of all around us leads to the last, and possibly most difficult, value to uphold – that of non-attachment. Non-attachment does not mean uncaring detachment. Instead, it means realizing the impermanence of both the self and the object, as well as the futility of trying to hold on to anything in an ever-changing world, including ideas, dogmas and strategies.⁵⁵ Attachment to ideas and outcomes limits one to the possibilities in hand, and thus reduces the ability to adapt to changing circumstances. Attachment to specific situations, specific arrangements or accumulated potential can eventually destroy much more than just that which is being grasped.

These values are by no means the only ones that underlie the ecological worldview, but they are some of the most important, and they provide a solid and coherent base from which to develop a normative framework for action.



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How should we act?

Our notions of what would constitute responsible, effective and efficient actions are informed by our worldview and its values. The ecological worldview provides the following guidelines for action.

- Actions should be guided by the values of the ecological worldview and a holistic process of reflection that takes into consideration all interests and the impact of actions on all system levels.
- Decisions and actions are iterative and collaborative processes which necessitate negotiation and partnership with all interested parties, including nature.
- Effective action should follow the laws of nature, cooperate with and participate in the processes of nature and learn from nature.
- The outcome of actions should contribute to the well-being, nourishment and regeneration of the world.
- To be effective in an ever-changing world, actions should be guided by principles of precaution, adaptation and non-attachment.⁵⁸

“Remind yourself your task is to be a good human being; remind yourself what nature demands of people. Then do it, without hesitation... but with kindness. With humility. Without hypocrisy.”

Marcus Aurelius⁵⁷

How shall I know whether my actions are consistent with the values of the ecological worldview? Here are a set of questions you can ask yourself.

- **Mutuality:** If this action would be returned to me, will it benefit my life? Am I prepared to live with the consequences of this action?
- **Positive reciprocity:** If I were on the receiving end of this action, how would I feel? Would I consider it a fair and just action? Will this action result in a positive outcome for all parties considered and, if not, is there a different way to proceed? Will this action add value to and improve the relationship between the parties involved?
- **Inclusivity:** Are all points of view considered? Are we considering the impacts of this action on all spheres of existence in the system in which we are working? Are we privileging or excluding certain types or levels of knowledge?
- **Integrity:** Is this action consistent with my core values and with the laws/principles that guide existence at the level(s) on which we are operating? Is this action threatening the functional integrity of the system within which it is planned?
- **Harmony:** Is this action creating harmony or dissonance?
- **Respect:** Does this action acknowledge the intrinsic worth of all that it affects? Does it consider the other parties involved, or are these parties treated as mere means to an end? Does it respect the laws of both humans and nature?
- **Humility:** Do I understand the possible consequences of this action? What is my motivation for this action? Is this motive for my own benefit or does it also consider the benefits for my extended self, i.e. the rest of the community of life?
- **Non-attachment:** Am I prepared to let go of this idea if it is no longer relevant or if a better one is presented? Am I keeping an open mind? Does this point of view continue to benefit the greater good? What am I holding on to that is holding positive change back?⁵⁹

“One can have the clearest and most complete knowledge of what is, and yet not be able to deduct from that what should be the goal of our human aspirations.”

Albert Einstein

What does this mean?

Unpacking the ecological worldview can be seen as merely an interesting philosophical exercise if we do not ask how such a worldview will change what we do. In the final section of this chapter we look at how the ecological worldview changes our theory of knowledge, our interpretation of sustainability and our approaches to design.

The integration of knowledge and a return to the pursuit of wisdom

The themes of integration, interdependence, relationship and emergence characteristic of the ecological worldview, also shape the theory of knowledge (or epistemology) informing our actions. A perspective that demands we include all of reality, forces us to acknowledge that there are many ways of knowing and many sources of knowledge, each with its own way of validation, all of which are needed to make sense of the world.

This calls for an integrative and transdisciplinary epistemology that recognizes that knowledge is continually evolving through the interplay of different kinds of knowledge. These include the knowledge we derive from perceptive, empirical data and discursive reasoning (which we call science); knowledge arrived at through contemplation (insight); intuitive knowledge derived from cumulative experience and the immediate data of consciousness (intuition);⁶⁰ instrumental knowledge (how to do things); ethical knowledge (values, beliefs, norms, etc. determining what is right and wrong); and aesthetic knowledge (those experiences that help to define what is beautiful or ugly). Knowledge in this paradigm is furthermore co-produced through a collaboration of scientists, practitioners, civil society and the public and private sectors.⁶¹ However, each of these sources of knowledge provides only a partial reflection of reality that is relative to the viewpoint or frame of reference of the observer. Moreover, knowledge itself is seen as evolving and changing as it is revealed through the relationship between object and subject and between different knowledges. The ecological worldview therefore holds major implications for not only the production of knowledge, but also for its application. The biggest of these is probably the re-introduction of the pursuit of wisdom.

The split between knowledge and wisdom during the Middle Ages resulted in the relentless pursuit of scientific knowledge that dominated Western society for the past few hundred years. The result is the current Information Age, in which information is available at the click of a button, and we are rapidly increasing our rational knowledge of the world and our ability to turn this knowledge into economic advantage. It can be argued though that we have not developed the wisdom necessary to use this knowledge to create a healthy and thriving world. Given the understanding that our knowledge of the world and of the consequences of our actions are uncertain at best, and that this imperfect knowledge, applied without wisdom, could lead to a future without humans, the wisdom to guide the development and

application of all other levels of knowledge is vital to the kind of future we are creating.

Wisdom can be defined as not only the ability to make good (or wise) judgements about the actions we should take in a specific context, but also to act in a manner consistent with our judgement, in order to transform self and society towards a better whole.⁶² As such, wisdom requires reflectiveness and judgement.⁶³ Being at the highest level of knowledge,⁶⁴ wisdom is a property that emerges from the interactions between [scientific] knowledge, experience, understanding, common sense, insight and intuition. For us, as a society, to develop wisdom therefore requires three things: a) the integration of all kinds of knowledge and recognition of the value of each; b) the willingness to reflect on our use of this knowledge and its consequences for the well-being of the world, and c) the conscious cultivation of the qualities of wisdom in ourselves and our social structures.⁶⁵

A new interpretation of sustainability

The ecological worldview also offers an alternative interpretation of sustainability and sustainable development that is based on the idea of an interdependent and interconnected living world, in which humans are an integral part of nature and the processes of co-creation and co-evolution that shape the world. In this view, environmental sustainability is seen as foundational to any other sustainability considerations, just as a life-supporting and life-enhancing biophysical context is essential to quality of life, however this may be defined. In other words, it is the foundation on which the pillars of social, economic, technical or institutional sustainability are constructed, not just another pillar. Ecological sustainability is therefore a survival imperative, whereas social and economic sustainability (and the definitions thereof) are ethical issues, the resolution of which can support or destroy ecological sustainability. Within this worldview, three key themes direct the interpretation of sustainability – relationship, change, and reflection.

As described above, the concept of relationship is a foundational principle of the ecological worldview. The objective of sustainability from this perspective would be to cultivate relationships that sustain the ability of the global social-ecological system to provide not just life-supporting, but also life-enhancing conditions for the global community of life. To achieve this, it would be necessary to align human efforts with those of nature, resulting in activities, technologies, and human habitats embedded in and contributing to natural processes of creation, evolution and regeneration.

As explained in Chapter 1, sustainability is generally envisioned as a change from a current ‘unsustainable’ state to a future ‘sustainable’ state that can be achieved by following certain recipes and rules. The human development enterprise would then focus on maintaining this imagined optimal state. However, such an optimal state cannot be seen as a steady state that allows no further change. This would be an untenable position in a world that is an ever-changing, impermanent and inherently unpredictable set of

“Across cultures the qualities of a wise person are described as: good judgement, reflectiveness, insight, ability to deal with difficult and complex problems, openness to experience, relativistic thinking, critical thinking, self-knowledge, knowledge of limits, humility, self-control, broad and deep knowledge and experience, benevolence, empathy, compassion, a concern for the common good, a reduction of self-centeredness, and increased transpersonal awareness.”

Richard Trowbridge⁶⁶



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processes. The objective of sustainability could not be to reverse change or resist it once an optimal state has been achieved, but would rather be to accept change as inevitable and adapt to and evolve with the changes. These changes could come about through a changing environment (e.g. natural disasters), the consequences of previous actions (e.g. climate change), or new knowledge (leading to new technologies) and understanding (leading to new value systems).

However, certain levels of change can tip local and global social-ecological systems into a different state with different operating parameters where conditions may not be favourable for human life. Sustainability would thus lie in maintaining the resilience of these systems, that is, their ability to absorb shocks, adapt to change and transform when necessary, while keeping the overall system within life-enhancing parameters. This is especially important when dealing with changes in the biosphere, as [human] life depends on a very specific and narrow set of biogeochemical parameters. Outside these parameters, though, the notion of some set of ideal ‘sustainability’ conditions that should be sustained is meaningless, and against the basic developmental processes of life which feed on change and novelty.

A key concern of sustainability is therefore learning how to respond and adapt to, and evolve with, change and surprise, while avoiding changes that would move global and local social-ecological systems into a state that would threaten the life-supporting and life-enhancing capacity of these systems. This interplay of change and persistence requires reflection, firstly to learn from both failures and successes, and secondly, to achieve sufficient understanding of the workings of global and local social-ecological systems to be able to learn from, work with and anticipate the dynamics in these systems.⁶⁷

These points describe an interpretation of sustainability that is substantially different from that which is currently dominant in the sustainable development discourse. Table 1 provides a brief comparison of the differences between the currently dominant model of sustainable development, and the new sustainability model derived from the ecological worldview.

Table 1: Comparison of current and whole systems sustainability models⁶⁸

Current sustainability models	Whole Systems Sustainability
Goals	
Meet socially negotiated goals/ conditions of sustainability across three spheres of development.	Maintain resilience and integrity of local and global social-ecological systems
Strategies	
Command and control, manage, measure, fixed/static.	Cooperate, participate, adapt, learn, understand, flexible, dynamic.
Measure	
Progress towards goals.	Distance from thresholds.
Approach to problem solving	
Reductionist – Solve individual, tightly scoped problems and add solutions to solve large problems.	Holistic – Understand big picture to solve problems of relationship and emergence.

The biggest difference in these two approaches is that whole systems sustainability is not necessarily about how to make ‘correct’ choices of technology, or social or economic ideologies, or find solutions to a range of pre-determined and often perennial problems (e.g. poverty, crime, waste). Instead, it is about understanding the dynamics that give rise to desirable and undesirable phenomena, so as to participate most effectively in the natural evolution of the planet as a healthy social-ecological system. This requires a different attitude to how we approach design: one that moves design out of the mechanistic worldview, into the ecological worldview.

A different approach to design

In the following chapters we discuss a number of design approaches that express the principles and values of the ecological worldview. Biophilic design aims to re-integrate humans with the greater community of life, biomimicry teaches us how to learn from nature, and permaculture demonstrates us how we can collaborate with nature. Positive Development illustrates positive reciprocity between human-created environments and natural environments can result in conditions that are better than they were before development. Regenerative design emphasizes the need to be open to all the ways of knowing a site, so that solutions can be developed that will enhance the potential and regenerative capacity of the site. The *Living Building Challenge* and other tools, such as REGEN, require that we look at projects as more than just the efficiency of the building, but also at a project's relationship to other systems at different levels and both the interior and exterior aspects of these systems, as well as qualities such as beauty. Lastly, we bring it home by looking at the development of wisdom as the basis of reflective design practice and how, through the power of self-organization and emergence, seemingly insignificant actions by individuals or small groups can set in motion a chain of events that can change the world, bringing hope and joy.

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Chapter 3

Reconnecting with nature, re-learning to be natural

“Nature is a part of our humanity and without some awareness and experience of that divine mystery man ceases to be man.”

Henry Beston¹

As discussed in the previous chapter, one of the main premises of the ecological worldview is that the separation between humans and ‘nature’ is an illusion and that we (humans) are nature too. However, through our increasing reliance on technology, and the pathological pursuit of control over nature and its less pleasant aspects, we have forgotten this fundamental truth. If we are to find a way of development leading towards a thriving future, it is essential that we reconnect to nature, that we re-learn to be natural. But how do we achieve this?

In this chapter we discuss the need for reconnection – not just as an intellectual response to our problems of environmental degradation, but as a vital step in restoring physical and psychological health to human society and accepting our true role and responsibilities in the co-creation of our environment. The biophilia hypothesis explains why this reconnection is so important, while biophilic design provides some guidelines for the design of our built environment to restore and support our connection to nature.

The Biophilia Hypothesis

Harvard biologist Edward O. Wilson² proposed that humans have an evolutionarily based affinity for nature and an innate need to affiliate with life and lifelike processes – a concept he termed *biophilia*. This tendency is not a mere sentimental or utilitarian appreciation of nature. It is an emotional response to life and other living organisms rooted in the co-evolution of humans and their environments, and can include both attraction (for example, to specific landscape qualities) and aversion (for example our deep-seated fear of snakes).³ The Biophilia Hypothesis was developed from



“Biophilia: the innate tendency to focus on life and life like processes.”

Edward O. Wilson

The research shows that connection to nature supports the following:

- Enhanced healing and well-being
- Fewer social problems when living near open space
- Improved productivity
- Improved concentration and memory
- Healthy maturation and development
- Improved intuition and connectedness
- Greater ‘quality of life’ – connection to community, neighbours, sense of place environmental awareness.¹²

this initial formulation by Stephen Kellert in collaboration with Wilson, and suggests that over millennia of evolution our species has internalized certain ‘learning rules’ that helped us negotiate relationships with our environment to our advantage, which created a deep need for intimate association with the natural environment and other living beings.

Biophilia is therefore more than just the positive physical experience of green space in a city or building. It is the feeling of rejuvenation, connection and wellness we experience when in environments allowing us to connect to those learning rules embedded in our psyche during our evolution as a species. These physical and psychological effects from connection to nature have been documented in medical and psychological research and, Wilson speculated,⁴ go back to our primeval brain. He suggested that, because much of our brain developed before buildings and cities existed, the evolutionary traits that allowed our species to thrive are still present and influence our wellbeing. These traits resulted from the need for food, water and refuge. He showed, as have others after him, that providing links to these survival instincts result in people feeling happier, safer and more content; even if subconsciously. Our need to connect stems from primal needs of safety, security, access to food, light, water and shelter. These needs evolved before humans left the savannahs of Africa, some even before we left the trees. Once these basic fears are allayed, that part of the brain which is wired for survival can be at peace, letting the higher levels of thought – creativity, concentration, innovation, learning, and so forth – occur. The Biophilia Hypothesis makes two important contributions to our quest for a thriving future. Firstly it provides a strong motivation for why cultivating an ethic based on the workings of life and encoded in our very genes⁵ is so important. Secondly it explains why the reconnection between interior and exterior aspects of our existence is so necessary for the health of the individual and the global community of life.

The work of Wilson,⁶ a biologist, and Kellert,⁷ a social ecologist, has been developed further by among others, Roger S Ulrich,⁸ a behavioural scientist, and Judith Heerwagen,⁹ a psychologist. Between them they have developed the medical and psychological evidence that supports the biophilia hypothesis and the design strategies for its application, discussed later in this chapter. Their work has discovered countless physical and psychological benefits of a closer connection to nature. A summary of some of the benefits was provided by Vivian Loftness and colleagues,¹⁰ who identified sixteen international case studies linking access to the natural environment to improved health outcomes, including reductions in headaches, colds, Sick Building Syndrome (SBS) and patient length-of-stay. Beyond the health benefits, ten international case studies demonstrate that access to the natural environment increases individual productivity between 3 and 18% and reduce absenteeism between 9 and 71%. These studies indicated that the reduction of stress occurring through the provision of aspects that placate the primal brain, results in increased effectiveness, efficiency, healing, and concentration. Conversely, the absence of connection to nature causes what was termed by Richard Louv in his 2005 book *Last Child in the Woods* as “Nature-Deficit Disorder”.¹¹

Lastly there is evidence that biophilic features foster an appreciation of nature, which, in turn, leads to greater connection to and protection of natural areas. However, these ‘biophilic’ features go beyond mere access to parks, plants or daylight and are sometimes not that obvious, like the dappled shade provided by the cable structure at the Lebone II School in Rustenburg, South Africa (Fig. 1), or the pattern of light in the Circa Gallery in Johannesburg (Fig. 2). At the building scale biophilic design can inspire, it can awe, and it can build connection to the emotive aspects of connection to nature. Yet it may be more subtle. Biophilic design elements can produce a symphony of stimuli resulting in people being comfortable and able to perform at their most effective. That is fundamentally what connecting people to nature achieves. Sometimes the design of the built environment can satisfy the need for connecting to nature in surprising ways, as the following first person accounts illustrate.



Figure 1: Lebone II School, Rustenburg (Architects: Activate Architects), South Africa. PHOTO: C DU PLESSIS



Figure 2: Circa Art Gallery, Johannesburg (Architects: Studio MAS). PHOTO: C DU PLESSIS

Story 1: Biophilia in Melbourne

This is a story about the experience of visiting two Robin Boyd homes by Dominique Hes and her Masters students. It is a story of the power of a building's design to connect and celebrate the aspects of biophilia, specifically prospect and refuge, natural materials and colours, view, scale, liminal space and natural elements.

Context:

Robin Boyd was an architect working in Australia, predominantly in Melbourne, between 1940 and 1970. He is best known for his house designs. Philosophically he was a modernist, using a limited material pallet, simplified forms with limited decoration and often exposed structure.

Story:

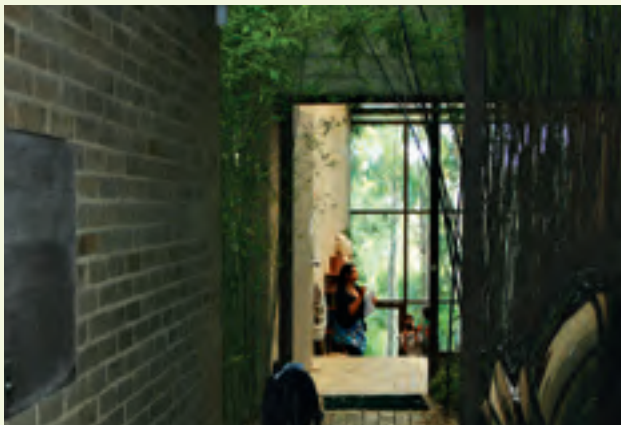
I often take students to visit the Boyd houses as part of the subject that I teach. We begin by having a one hour lecture on the principles of biophilia with the evidence of its benefit. We then travel by train or tram to the location. Gathering at the entrances of the homes, the students look around doubtfully. At the Featherston home we stand before a garage, a beautiful location, but from the street completely unremarkable.



Featherston home entrance, Melbourne.



PHOTOS: M FEATHERSTON



Walsh Street house, Melbourne.



PHOTO: D HES

The students ask: 'What is biophilic about this? Where is the building? Where is the object of architectural fame?' We walk through the garage at the Featherston home, through a screen of bamboo – a narrow entry into the home. There is a gasp, a collective sigh, a couple of 'ohs' and silence; a lot of silence then excited chatter – they get it. It is not often my gaggle of students exhibit such levels of engagement. This particular example of Boyd's work has the greatest such effect.

At the Yarra home we face a tall, ivy-covered, rough timber fence with an enticing bright red, full sized door. The entry is equally choreographed, but coming into a less expansive space results in a lesser initial reaction. However, in 5 minutes the students have felt the effect of many of the biophilic design elements: environmental features, natural shapes and forms, natural patterns and processes, light and space and place-based relationships; and attributes such as the use of liminal space, generous height, view, design with the natural context, the concepts of refuge and prospect and many others.

Featherston home

PHOTOS: D HES



Walsh Street house

PHOTO: D HES

PHOTOS USED COURTESY OF THE BOYD FOUNDATION



Story 2: Biophilia at Yale

When visiting Stephen Kellert, he took us walking around Yale campus, pointing out many biophilic elements found in the gothic architecture, and in the use of natural, local materials, the details of the paths, and the use of intimate courtyards encompassing areas of greenery and ancient trees. Stephen spoke about the importance of pattern and the sense of time that weathering brings, and how all these elements allow humans to connect with their ancient savannah-based instincts even though they are in a modern city. What Kellert argued was that this campus, through its buildings and landscape design, created a sense of connectedness, wholeness and engagement.



Courtyards, retreats, protected places to be in nature, human scale elements, local and natural materials. PHOTO: D HES



Natural forms and details, concepts of canopy and protection. PHOTO: D HES



Colonnades, secure protected path, connection of spaces PHOTO: D HES

Use of natural materials and motives and repeated patterns. PHOTO: A MELCK



Dappled sunlight, natural wood, green furnishings and stalactites hanging from the ceiling brings nature inside.

PHOTO: C DU PLESSIS



The most poignant experience of our time with Kellert was when we visited the Beinecke Rare Book and Manuscript Library (BRBL) designed in 1963 by Gordon Bunshaft. Externally the building's cellular façade brought to mind barnacles on a stone by the beach. The walls looked pristine and white, glowing in the after rain sunshine, but really I felt no emotional connection to this white box.

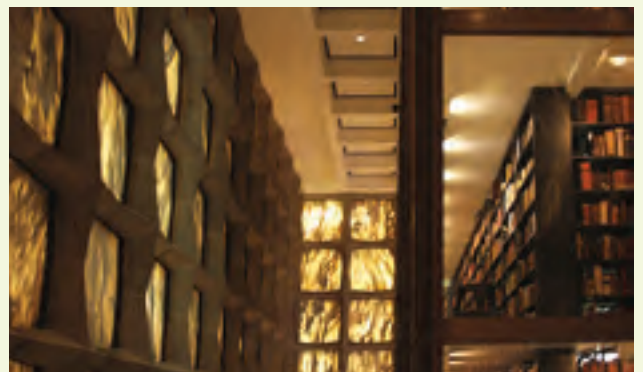


PHOTO: SHUTTERSTOCK-817814



External façade of the Beinecke Rare Book and Manuscript Library (BRBL) (Architect: Gordon Bunshaft). PHOTO: A MELCK

We entered and I, like my students in the Boyd home, gasped and just stared. The light filtered through the marble in subtle shades of green and orange, slowly changing to a more yellow orange as the sun dried the moisture off the façade. To me it was beautiful; it was like being in a magical cave of ethereal light. It was breathtaking. – Dominique



Internal space of the Beinecke Rare Book and Manuscript Library (BRBL) (Architect: Gordon Bunshaft). PHOTOS: A MELCK

The security guards, seeing our engagement with the building, came up to us with a piece of the granite and spoke about how much they loved working in this building, that it made them feel good. Eyes shining with pride, they named the architect and described the colours they experience over the seasons of the year, pointing out the changing from greens to orange as the walls dried.

Built in the sixties, when there was little discourse on thermal efficiency, the building will not win any green prizes today. As a rare book library, specially controlled storage areas made up the core of the building, with a large part of the collection in the basement where conditions are easier to control. This building uses more energy than any other on campus, conditioning the air between the marble and books to ensure that comfort for the occupants could be maintained while avoiding condensation in the inner core housing the books. While one cannot but question whether this almost religious experience could have been achieved with greater attention to the logistics of thermal efficiency, the magic of the space was undeniable, its ethereal light and shifting shades of colour reminding one of a walk in a forest.

Biophilic design – connecting people to nature through the built environment

Using nature in the built environment should be approached from the view of an ecosystem of many layers and complexity. The integration, celebration and lessons of nature in design are not new: natural buildings,¹⁵ ecological design¹⁶ and biomimicry¹⁷ are all examples. Building on Wilson's work, Stephen Kellert has developed six dimensions of biophilic design encompassing seventy principles (see Table 3.1). As in nature, these principles interrelate and should not be taken in isolation.

Environmental features *Color Water Air Sunlight Plants Animals *Natural materials Views and vistas Facade greening Geology and landscape Habitats and ecosystems Fire	Natural shapes and forms *Botanical motifs *Tree and columnar supports *Animal (mainly vertebrate) motifs *Shells and spirals *Egg, oval, and tubular forms *Arches, vaults, domes *Shapes resisting straight lines and right angles *Simulation of natural features *Biomorphy *Geomorphology *Biomimicry	Natural patterns and processes *Sensory variability Information richness *Age, change, and the patina of time Growth and efflorescence Central focal point *Patterned wholes Bounded spaces Transitional spaces Linked series and chains Integration of parts to wholes *Complementary contrasts Dynamic balance and tension Fractals Hierarchically organized ratios and scales
Light and space Natural light Filtered and diffused light Light and shadow Reflected light Light pools Warm light Light as shape and form Spaciousness Spatial variability Space as shape and form Spatial harmony Inside-outside spaces	Place-based relationships *Geographic connection to place Historic connection to place Ecological connection to place Cultural connection to place *Indigenous materials Landscape orientation *Landscape features that define building form Landscape ecology Integration of culture and ecology Spirit of place Avoiding placelessness	Evolved human-nature relationships Prospect and refuge Order and complexity Curiosity and enticement Change and metamorphosis Security and protection Mastery and control Affection and attachment Attraction and beauty Exploration and discovery Information and cognition Fear and awe Reverence and spirituality

Table 3.1: Six dimensions and seventy elements of biophilic design, adapted from Kellert¹⁸

The next sections discuss the six biophilic design dimensions, touching on some of the elements found under each. As in any ecological system, there is a great deal of overlap, for example an element such as the use of light is relevant to all six dimensions.

“Biophilic design is an approach to sustainable development that incorporates the needs of humans to affiliate with natural systems and processes into the design of the built environment.”

Stephen Kellert¹⁴

Environmental features

This element is the most easily understood and incorporated of the elements. It includes attributes such as colour, water, air, internal and external plants, vistas and potential for animals connecting to the local ecosystems, natural materials, geology and fire. The Lebone II School in Rustenburg, South Africa (Fig. 3) demonstrates the integration of these attributes.



Figure 3: Lebone II School, Rustenburg, South Africa (Architects: Activate Architects).
PHOTO: B SCHEELINGS

Plants also fall under the biophilic design element of *environmental features*. This is more than just external green features such as courtyards, water features, trees, grass, flowers and bushes; it also includes green roofs, walls (such as the green wall at the Musée du Quai Branly, Paris, Fig. 4) and facades and importantly also internal plants. There is a significant body of research showing the benefits of these external botanical features, both through biophilic impacts and in reducing problems such as the urban heat island and atmospheric pollution. Similarly, plants in buildings have biophilic benefits as well as an air ‘conditioning’ effect. Tove Fjeld and colleagues¹⁹ showed, in a crossover study over several months, that people working in an office with plants had a 23 per cent reduction in neuropsychological symptoms (tiredness and fatigue) and a 24 per cent reduction in dry throats and coughs. The work of Ronald Wood and his colleagues²⁰ further showed that plants inside will result in a reduction of toxins and particulates, while increasing oxygen and the mediation of humidity.



PHOTOS: SHUTTERSTOCK.COM

Plants that should be considered for maximum benefit in internal environments are²¹ the Weeping Fig, Peace Lily, Aglaonema or Silver King, Kentia Palm, Dracaena deremensis or Janet Craig and the Areca Palm. For maximum formaldehyde removal research suggests in descending order of toxin removal potential: the Dwarf date palm, Bamboo palm, Janet Craig, English ivy, Weeping fig, Peace lily, Areca palm, Corn plant and the Lady palm.²²



Figure 4: Green wall at Musée du Quai Branly, Paris (Architect: Jean Nouvel).
PHOTO: C DU PLESSIS

Natural shapes and forms

The design initiatives described above intersect with the biophilic design element *natural shapes and forms*. The first aspect of this element described by Stephen Kellert,²³ references botanical and zoological motifs, for example trees, through the detailing of columns; motives such as shells, spirals, or leaves; rounded shapes such as ovals, vaults, and domes; or simulation of natural features such as spiderwebs or waves. More abstractly, Kellert talks about the role of biomorphy – like the Sydney opera house – which has natural shapes if not mimicking a specific animal or plant; geomorphy – embracing a geological feature; and biomimicry – as the mimicking of a natural structure such as a crystal, web, or hive.

Columns as trees – from ancient to modern interpretations

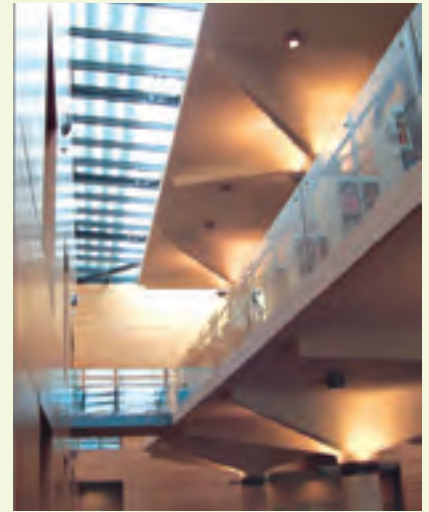


Neo-gothic tree-like roof support, Cathedral, Bath. PHOTO: C DU PLESSIS



Johnson Wax Building, Wisconsin. Main room with lily-pad/tree like columns providing a sense of canopy (Architect: Frank Lloyd Wright)

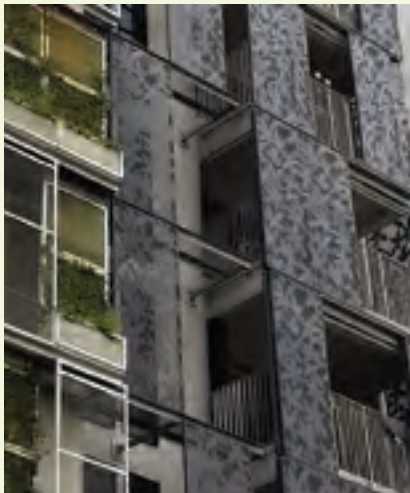
PHOTO BY JOHNSON ARCHITECTURAL IMAGES, AJ1506. © ARTIFICE, INC.)



The merest suggestion of tree still resonates. Jubilee Library, Brighton.

(Architects: Bennetts Associates)
PHOTO: BENNETTS ASSOCIATES

Natural motives and features



Leafy sunshades at Kent Vale Apartments, NUS, Singapore (Architects: MKPL Architects).

PHOTO: C DU PLESSIS



Fractal webs, Federation Square, Melbourne (Architects: Lab Architecture Studio and Bates Smart).

PHOTO: C DU PLESSIS



The undulating waves of Madrid's Barajas Airport (Architects: Antonio Lamela and Richard Rogers).

PHOTO SOURCE: MARTIN LEHMANN / SHUTTERSTOCK.COM

Biomorphy



Ba'ha Lotus Temple, New Delhi (Architect: Fariborz Sahba).
SHUTTERSTOCK.COM



Sydney Opera House (Architect: John Utzon)
PHOTO: C DU PLESSIS

Natural patterns and processes

Following these form giving and physical aspects, the biophilic design framework then moves to discussing how natural patterns and processes can be incorporated. The argument is made for the need for sensory variability and information-rich complexity, so as to give richness of experience. Design that connects the occupant to the passing of time such as facilitated weathering and patina, shadow and light, focal points, and the ability to observe weather, enables a connection to natural processes which have their own inherent complexity. Intentionally exploring complexity through the use of fractals, linked spaces or attention to complementary and contrasting details are some methods of achieving this. As illustrated in Figures 5 to 7, Japanese architecture has this element down to a fine art.



Figure 5. Weathering and patina, Temple Garden, Kyoto. PHOTO: C DU PLESSIS



Figure 6. Liminal space, Kyoto. PHOTO: C DU PLESSIS



Figure 7. Layered spaces. Tea house, Kyoto. PHOTO: C DU PLESSIS

The importance of prospect and retreat, as well as design that facilitate movement through linked spaces with engagement and purpose, are further aspects of this element. The interplay of bounded and transitional or liminal spaces provides a sense of both security and connection. The liminal space, variously termed a ‘thirdspace’ or a space ‘in-between’,²⁴ provides a place for pause and contemplation, whether conscious or not, before moving forward. The Kandalama Hotel in Sri Lanka discussed later in this chapter, is a good example of architecture which makes the most of liminal space.

Light and space

The next biophilic design element is the use of *light and space*. In design, this means thinking about the qualities of light and how natural light is filtered, diffused, captured, and reflected. It further considers the qualities of space and the linking of inside and outside spaces through features such as colonnades, interior gardens and picture windows. Connecting with external conditions enables participation in the external environment. There are many lovely examples of this, one being the Isamu Noguchi sculpture hall in the Nelson-Atkins Museum of Art, Kansas City (Fig. 8).

The spaciousness of the room mirrors the outside space, with the smooth floor and water feature bouncing light through the room, while the sculpture in its bed of pebbles seem to flow out to join other works in the garden.



Figure 8: The Noguchi Hall, Nelson-Atkins Museum of Art Kansas City (Steven Holl Architects). PHOTO: C DU PLESSIS

Place-Based relationships

The penultimate element of biophilic design is the fostering of place-based relationships connecting people to place through the cultural, ecological, hydrological and geological history of the place. This includes sensitivity to the spirit and story of the place, and a grounded context to avoid the sense of placelessness. Connecting to place is done by engaging many of the earlier mentioned elements, such as selection of materials, orientation, connecting to the landscape and so forth. It can be as simple as in the example of 30 The Bond (Fig. 9), that connects office workers to both the geological strata and the real-time progression of the sun and the seasons. This connection to the geography of place provides a sense of territorial control as well as an emotional connection to home. As discussed in the *Living Building Challenge* chapter, a sense of belonging, of home, is central to fostering a sense of stewardship, care, and participation ensuring contribution is not only possible, but driven.



Figure 9: 30 The Bond, (DESIGN AND PHOTO: LEND LEASE DESIGN WITH WHITTAKER HADENHAM OPENSHAW & PTW ARCHITECTS)

Evolved human-nature relationships

The final, and integrating element, is that of evolved human-nature relationships. Aspects are: design features that foster a sense of prospect and refuge, order and complexity, curiosity and enticement, mastery and control, exploration and discovery, affection and attachment, fear and awe. Here again the idea of prospect and refuge provides a sense of enclosure, shelter and safety. The ability to see out and engage with the wider world from a place of relative control provides a sense of safety while allowing opportunities for seeing without being seen.

In a design that fosters evolved human-nature relationships, the occupants are free to explore, innovate, imagine, connect, and feel secure, yet have some ability to engage in unexpected opportunities. Suggested techniques include fostering curiosity through providing a hint of an experience. For example, by designing a space in such a way that there is the potential for encountering the sound of water, the smell of flowers, unexpected movement through light or air, or contrast of colour leading to a focus. These aspects are illustrated by the walled reflection pool at Coromandel Estate (Fig. 10) that affords a protected vista to the open landscape, encouraging contemplation while providing connection to the larger world. Particularly, this element suggests the importance of beauty, inspiration and the ability to participate in a space, a place and a community.

“Water features constantly elicit especially high levels of liking or preference.”

Roger Ulrich²⁵



Figure 10: Coromandel, Lydenburg, South Africa (Architect: Marco Zanuso).
PHOTO: C DU PLESSIS

“Compatible connection to geology makes people feel buildings are grounded.”

Frank Lloyd Wright

Biophilic design in practice

The following two case studies illustrate the use of biophilic design elements in very different environments. Both award-winning projects demonstrate the benefit people can get from nature and how we can have a positive restoring role while creating a beautiful place to inhabit, no matter where we are.

The first, the Kandalama Hotel, is a luxury hotel situated in a Sri Lankan nature reserve, and its biophilic elements are a given – a necessary consequence of its function. The second project, Kroon Hall, is situated on the busy Yale university campus, squeezed in between other buildings. Yet it manages to incorporate most biophilic elements with great success.

Case study 1: Kandalama Hotel

Designed by Geoffrey Bawa, the hotel was constructed between 1992 and 1995 on the outskirts of Dambulla, Sri Lanka. Kandalama has received numerous awards for its environmental initiatives – including reforestation of the hotel property and surroundings, on-site wastewater treatment, an extensive recycling program, and consultation and on-going relationships with the local community providing educational and economic benefits.²⁶ Built in a sensitive nature reserve on a natural outcrop bordering the Kandalama Tank, and close to the famous Sigiriya heritage site, the hotel had to meet some very stringent criteria, including minimum visual impact. This was achieved by integrating the building with its surroundings, by massing it along the cliff face and using vegetation to effectively hide the building in nature. The time-series photos below illustrate how the hotel eventually became an almost indistinguishable part of its surroundings.

The Kandalama exemplifies all the biophilic design elements. It becomes an artificial cliff-face forest, host to lush vegetation and a number of small animal and insect species (as many an unwary hotel guest discover), and provides both prospect and refuge in a setting intimately connected to place. Guests become inhabitants of this forest, sheltered behind the vegetation, yet with views that encompass all of the lake and the famous Sigiriya rock in the distance. The hotel is a series of bounded and transitional spaces, as Ceridwen Owen describes:

The building can be seen as a liminal or 'between' space both physically and metaphorically. Physically, it adopts the architectural strategy of the verandah, the threshold space between inside and outside, public and private. Metaphorically Kandalama can be seen as a threshold between two realities – the familiar internal world and the external world 'out there'.²⁷

Guests enter the hotel through the cave-like opening, formed by the low concrete veranda propped on the natural rock. From the cave of the lobby they can step outside to take in the views of Sigiriya in the distance, while swimming in the infinity pool as if swimming in the lake itself. To get to the rooms, guests have to meander along a corridor formed on one side by the living rock face before entering rooms that themselves consists of a series of thresholds, the last being the curtain of vegetation that enclose the balconies. The kind of liminal spaces created by the Kandalama offers, to quote Owen: *the opportunity of a more reflexive engagement with place and a re-framing of human-environment, or culture-nature relationships*".²⁸



Infinity pool linking the hotel with the larger pool of the Kandalama Tank and Sigiriya in the distance. PHOTO: C DU PLESSIS



Kandalama embarking and disembarking. PHOTO: C OWEN



Kadalama's entrance tunnel. PHOTO: C OWEN



The artificial cliff in 2000. PHOTO: C DU PLESSIS



Kadalama's artificial cliff today. PHOTO: C OWEN

Case Study 2: Kroon Hall

Kroon Hall is the home of the Yale School of Forestry & Environmental Studies. Designed by Michael Hopkins Architects in collaboration with Centerbrook Architects and Planners, it is a building that integrates most of the biophilic elements. These include the use of local stone and timber sustainably harvested from Yale's local forests, the water treatment system with fish and abundant vegetation, the use of natural light, views from the building and natural spaces around the building. Kroon Hall offers a generosity of space, particularly on the third floor, where the height, diffused natural light, views and materials give those inside the feeling of being in a sacred space similar to what can be felt in a forest or a cathedral. The spatial experience is recounted by Kellert:

We had a conference up in the third floor, and it was celebrating the legacy of Aldo Leopold who is one of the iconic figures in the environmental field, and it was a dark stormy day, heavy rainfall, and people loved being in that room. You had the refuge of the room, but you had the prospect and enjoyment of looking out at nature. You felt like there was this dialogue between inside and outside that was so stimulating, affirmative. Certainly for the occupants of the building, the users of the building, there appears to be a tremendously positive reception, not just because it's more energy efficient, but because people really like to be there. And to me that will be the motivation to sustain the building, because the technology comes and goes in terms of how efficient it is. Ten years from now, technology we put in there to make it energy efficient will be eclipsed by far more sophisticated technology. But whether people will maintain that building and modernize the building and restore it will be because they really love the space.²⁹

Standing in the library space at the top, the views from each window creates a connection to place, whether it is to the trees outside, or to the heritage buildings across the quadrant.



View to trees outside. PHOTO: A MELCK



The car park hides under a green roof that becomes both water-treatment plant and open space. PHOTO: A MELCK



Generosity of height, coupled with natural light and a vista that connects the occupant to the outside. The many sources of light filtering through the levels create the feel of a forest canopy. PHOTO: A MELCK



Use of natural materials to integrate the building with landscape and context. PHOTO: A MELCK

“As far as I can recollect, without a single exception, every Homeric landscape, intended to be beautiful, is composed of a fountain, a meadow and a shady grove.”

John Ruskin³¹

Biophilic design and childhood development

One of the most intriguing and inspiring aspect of the connection to nature is its role in the development of children. The writing of Derr and Kellert³⁰ summarizes much of the evidence for this. Research has shown how crucial it is for children to experience nature, not just the well-tended parks and gardens in our cities, but the wild, unexpected, slightly scary nature found in the ‘wilderness’. They show that engaging and playing in all aspects of nature is central for the development of motor skills, increased cognitive functioning and attention capacities, alleviating childhood stresses, and results in more social and creative play. They also confirm a central tenet to the *Living Building Challenge* and the biophilic theory mentioned above, namely that such connection fosters care. That is, if a child is active in nature and has an adult mentoring them in its exploration and nurturing, this influences a sense of ownership, connection and relationship with nature.



Exploring the joys of nature. PHOTO: C DU PLESSIS



Generations and nature. PHOTO: D HES

Case Study 3: Paul Smith Children’s Village, Cheyenne

This case study outlines a project that inspired the authors more than any other. This whimsical garden exudes the essence of biophilia, connecting the visitor to nature and what is natural in a way that is rejuvenating and, most importantly, playful. It uses its small space to maximum effect, teaching children (and the whole community) what working in the ecological worldview could look like through the successful partnership of people and nature in a way that enriches both the environment and its community.



PHOTO: D HES

Cheyenne is a city in the middle of the United States, in the state of Wyoming. It is in a fairly hostile semi-arid climatic environment with little rain, intense cold, heat and wind. Sitting in endless treeless plains, Cheyenne is not a place where one would expect to have a world leading children's botanical garden that is inspirational, rejuvenating, joyous and exhibiting many of the aspects of biophilia. It also illustrates a remarkable nurturing of nature; making a contribution to biodiversity, as well as providing an inspirational environment in which children can be creative and playful. It is both whimsical and practical. Children are taught about water, while getting to play in the water; and quirky features teach them how to grow food, build using renewable materials, use renewable energy, and create beauty.

“The Children’s Village is a model of regenerative, ‘living’ architecture – transforming a maintenance building and yard into a vibrant place that teaches children and families about water, plant life, solar and wind energy, recycling and reuse makes this an exemplary project for Cheyenne.”

Brian Dunbar³²



Whimsical playful furniture



Mystery and surprise



Growing food PHOTOS: D HES

Named after a prominent philanthropist in Cheyenne, the Paul Smith children's village was designed by Herbert Schaal, a landscape architect with AECOM. The underlying concept of the design is to teach about sustainability past, present and future. It constitutes external garden spaces, greenhouses and a retrofitted building which has received a LEED Platinum rating.



Vision and inspiration.



Old stone maintenance building.

PHOTOS: D HES

The conversion of the original 1930's stone building and stone walls surrounding a courtyard resulted in the main teaching and gathering area, as well as very interesting external places for the children to explore. The building is now called the Lowe's Discovery Lab (named for the Lowe's Home Improvement store's support), and where it once held the council's tractors, trucks and snow blowers, it now provides a climate independent place for teaching, experimenting and learning about ecosystems. It is solar heated and solar and wind powered. It also includes a small historic greenhouse.

"We were doing 'sustainable' before the word was coined," said Cheyenne Botanic Gardens director Shane Smith. "With the children's garden, we will be teaching sustainability of the past as well as the future."³³



Cosy class room, run by solar heating and power.

PHOTO: A MELCK

The three-quarter acre site is filled with numerous specialty, interactive landscapes including a natural wetlands, gravity powered water works, windpump, solar pumps, sculptures, world vegetable garden, prairie plantings, a “Secret Garden”, art/crafts plazas, historic sheep wagon, tipi village, picnic orchard, puppet theatre and more. Providing the opportunity for both structured and unstructured exploration and play, it is designed for primary school children, an age at which a child rich with curiosity. However, its volunteer programme for children 12 years and older is proving quite popular, as Aaron Sommers, Education Director, explains:

We have a wonderful group of youth volunteers and in summer months when public school isn't in session we have a very active population of volunteers that help out... there's a whole lot of kids that also want to spend time here. And they can do it by volunteering, by helping out, by weeding, by watering, by cleaning the rocks and cleaning the pond. By helping lead some of the community classes.³⁴

“This garden is about art, water, building, energy, community, history and learning how things grow.”

Brian Dunbar³⁵



Learning throughout



Green roofs and tipis



Child scale structures



Water play



Hand powered barge



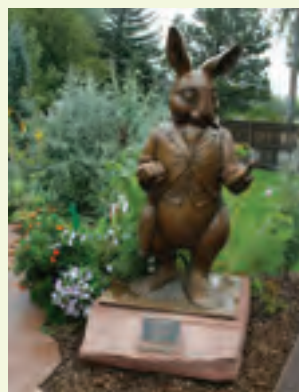
Secret writing wall



Water features



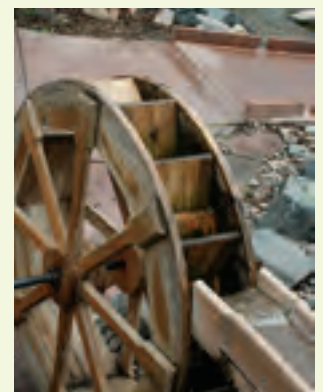
Wind pump



References to classic children's stories abound



Hand pump



Water wheel

PHOTOS: D HES



Theatre

PHOTOS: D HES



Plan



History



Edible gardens

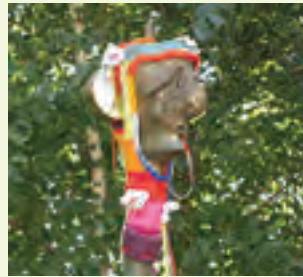
Reconnecting with nature at the urban scale

The principles of biophilic design remain relevant at urban scale, and city living still bring many opportunities for reconnecting with nature. The effect of projects such as the High Line Park in New York City, or the Cheonggyecheon River restoration in Seoul, South Korea, shows how both the environment and people can benefit from reintegrating nature and city. From being urban wastelands, these sites have become urban oases, with families strolling, picnicking, getting their feet wet and engaging with the wildlife now in their midst. Both places have seen an increase in biodiversity from non-existent to abundant, as they become living, active systems again. Not only do they now contain living biomass estimated at close to that of the original location as it was before human habitation, but added to this

rich environment is also the cultural diversity brought by sculpture, history, music, food and community. These projects provide a hint of what working from an ecosystems worldview could achieve.



Using nature to heal the wounds of an urban wasteland.
PHOTO: C DU PLESSIS



Art on the High Line Park. PHOTO: C DU PLESSIS



Water on the High Line Park. PHOTO: D HES



People strolling on the High Line.
PHOTO: D HES



Cheonggyecheon River.
PHOTO: MICHAEL SOTNIKOV/Flickr



Picnic. PHOTO: CARLOS FELIPE PARDO/Flickr



Cheonggyecheon River – before.
PHOTO: BLOG.NAVER.COM/SEOULMUSE



Cheonggyecheon River – after.
PHOTO: BLOG.NAVER.COM/SEOULMUSE

Conclusion

In this chapter we discussed how important it is for humans to live in environments connecting us with nature. As explained in Chapter 2, the ecological worldview allows us to see the world as an integrated whole again, and this includes the integration of our interior, subjective experiences and the exterior, objective world within which we live. The Biophilia Hypothesis helps us to understand why this integration is so important – that we have an innate psychological need for connection with nature in our exterior world. But more than that, it shows that for us as humans to become healthy and fully functional members of the community of life, able to contribute positively to the flourishing of life, we need to be connected to nature. Only when we are connected to nature can we fully express values such as mutuality, fellowship and positive reciprocity to heal the world and create conditions for a thriving future.

We have illustrated how our built environment can be designed to foster a greater connection with nature, but the objective of regenerating our world, of increasing its health and potential, requires that we take an active role in this regeneration through our practices of design and development. And that we do this in fellowship with nature. The next three chapters discuss the practices that would allow us to re-integrate our man-made environments with natural processes and systems to create an environment that nurtures and delights all the species that call it home.

“Go out to nature and learn from experiences what natural structures men find beautiful, because it is among such structures that men’s aesthetic sensitivity evolved. Then return to the drawing board and emulate these structures in the design of your city streets and buildings.”

Nicholas Humphrey³⁶

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Chapter 4

Working with nature

“The ecological view requires that we look upon the world, listen and learn.”

Ian L. McHarg¹

As Mark Lynas points out, our collective actions are now shaping, if not dominating, every system on the planet, leaving us with the responsibility to act as the stewards of the earth.² If we meet this responsibility with the arrogance of past approaches to ‘managing’ natural systems, we are doomed, for we can never fully understand the complexity of these systems. In the previous chapters we propose that humans are also part of nature, with an innate need for connection to nature if we are to be whole and healthy. If we accept this proposition, the implication is that we should follow the laws of nature, and cooperate with and participate in its processes, in both our daily life and in how we shape our habitats. Our only hope lies in working with nature to restore and regenerate our social-ecological systems. In the words of the *éminence grise* of the environmental movement, Wendell Berry:

*We have lived by the assumption that what was good for us would be good for the world. We have been wrong. We must change our lives, so that it will be possible to live by the contrary assumption that what is good for the world will be good for us. And that requires that we make the effort to know the world and learn what is good for it. We must learn to cooperate in its processes and to yield to its limits.*³

We need to stop seeing ourselves as different from other ‘ecological engineers’ such as beavers and coral polyps which create habitats for a wide diversity of species.⁴ Just like beaver dams and coral reefs, our settlements and cities can also create platforms for richly diverse ecosystems, restoring local natural systems to a healthy state of self-organization, and building the evolutionary potential of the social-ecological system. However, to do so, we need to work with nature: learning from it, and designing systems that interact effectively and productively with nature.

To develop such a co-creative partnership, Janine Benyus⁵ suggests we need to look upon nature as a mentor from which we can learn, as a model to inspire the designs and processes we develop, and as a measure to judge the

Cheyenne children's garden water. PHOTOS: D. HES



“Nature has evolved systems over billions of years that work in harmony with each other...the processes of nature have evolved self-regulating forces of beauty, grace and efficiency. Our challenge is to learn how to honour them and be inspired by their truth to create new cultural values and systems.”

James A. Swan and
Roberta Swan⁶

‘rightness’ of our innovations – an approach she terms biomimicry. In this chapter we look at the concept of biomimicry and its use in architectural design, as well as a number of design practices and processes that use lessons from nature to establish systems that serve human needs. They do so in collaboration with nature to benefit both ecological and social systems. These include the use of complex ecologies to treat water, developed by John Todd and the New Alchemy Institute; the practice of permaculture to establish self-regenerating food production systems, developed by Bill Mollison and David Holmgren; and the regenerative landscape design processes proposed by John Tillman Lyle.

Biomimicry – listening to nature’s wisdom

In learning to be natural again we also need to learn how to ‘do’ like nature. Biomimicry helps us to learn from the wisdom of nature and the processes and patterns that it has developed over aeons of evolution, so that we can channel our human creativity into directions that can contribute to the regeneration of both our ecosystem and ourselves. Benyus⁷ defines biomimicry as “the conscious emulation of life’s genius”, proposing that in a biomimetic world, we would manufacture, farm and develop the way animals, plants and ecosystems do, following the laws of nature.

The laws of natural systems identified by Benyus are:⁸

- Nature runs on sunlight.
- Nature uses only the energy it needs.
- Nature fits form to function.
- Nature recycles everything.
- Nature rewards cooperation.
- Nature banks on diversity.
- Nature demands local expertise.
- Nature curbs excesses from within.
- Nature taps the power of limits.

Benyus⁹ suggests that biomimicry offers us three avenues to finding design solutions in nature. The first uses nature as model – i.e. it looks for precedents in nature that can inspire technology and manufacturing processes that are more life-friendly and abide by the laws of nature. McDonough and Braungart¹⁰ describe these as a series of design assignments that challenge society to develop, for example, buildings and industries that produce more energy than they consume and purify their own waste water; or materials and products that at the end of their useful life can be returned to either natural cycles of decomposition or industrial cycles of re-use. The second is to use nature as a measure, providing “a standard to judge the rightness of our innovations”.¹¹ Resilience thinking is one way of using nature as a measure. The third is to look at nature as a mentor, extracting its wisdom not just for technological use to improve human life, but also to guide the

development of supporting social systems. Benyus uses the example of Natural Systems Agriculture (which includes practices and design systems such as permaculture) as an example of an area that uses the “genius of place” to inform not just human practices and technology, but a specific ethical and normative context that shapes a way of life.¹²

We can learn from the detailed way nature solves particular problems, such as distributing seeds, and apply this to design problems of our own, as in the well-known example of burrs clinging to a dog’s coat that inspired Velcro. But we can also learn from more systemic examples to guide our own interventions, such as the way a beaver’s dams affect the water systems in a landscape. The systems and organisms we have around us have all evolved over many millennia. They have evolved and survived because they could adapt to the problems of their context. For example, animals and plants in the desert have adapted to water shortage and high diurnal swings and thermal extremes in many creative ways. For example, desert plants have not only developed the ability to store water, but also to protect this precious resource from animals (Fig. 1). We have learnt from these plants to protect that which is precious to us with equally vicious thorns (Fig. 2).



Figure 1: Cacti with their impenetrable thorns.
PHOTO: C DU PLESSIS



Figure 2: Thorny human defences.
PHOTO: C DU PLESSIS

A well-known example of learning from how other organisms solve problems, and then applying this in the built environment, is the Eastgate Centre in Harare, Zimbabwe, designed by architect Mick Pearce in collaboration with engineers from Arup Associates. The design strategy for this building was inspired by the termite colonies native to the area, and their ability to use thermal mass, water, and natural ventilation to create their climatically controlled nests.

Case study 3 – Eastgate Centre, Harare

At the time of its construction in 1996, the Eastgate Centre was the country's largest office and shopping complex, yet it has no conventional air-conditioning or heating. The building uses a combination of design strategies borrowed from the open-chimney self-regulating mounds of *Odontotermes Transvaalensis* to maintain its indoor climate. These termites maintain a constant temperature inside their gigantic nests while the external temperature varies considerably. The diurnal temperature swings of between 10 and 41°C in Harare create the perfect conditions for the strategies used by both architect and termites: a combination of stack ventilation, thermal mass, and enlarged surface area created by a highly articulated surface. The high thermal mass of the concrete structure absorbs the heat during the day, with only a gradual increase of internal heat. During the day the warm internal air is vented through 48 chimneys with the assistance of fans, with cooler air being pulled in through cavities in the floor slabs and ceilings from the shaded atrium. At night, large fans cycle cool outside air through this system seven times per hour to cool the structure. Just like in a termite nest, this process is managed by opening and closing vents to ensure optimum temperature conditions. The extrusions on the façade not only shade the façade and its small window openings, but, like the multitude of internal ventilation channels, also increase the surface area available to absorb or release heat from the building structure. This is a strategy also used by prickly desert plants, as prickly surfaces are poor absorbers of heat by day, but good emitters of heat by night. The result is a building that uses about 10% of the energy of a comparable conventional building in Harare, saving its owners millions in energy costs.¹³

As Mick Pearce explains: *"The termites taught me how to make a building which responded to nature. By studying their building process (in at that time a rather simplistic way) it gave the design team the almost impossible challenge of harnessing the diurnal shift to eliminate any added power except the sun and the wind. We had in the end of course had to add some fan power to push the air on occasions when the chimneys could not cope."*¹⁴

While this sounds like a fairly simple design solution, making it work proved more difficult, and it took about three years to optimise the timing of the daytime and night time fans to align with diurnal differences in temperature and the occupants' heat output. Pearce was quoted as saying that "it was like tuning an organ built into a church, where the building resonance is important".¹⁵



PHOTO: SIMON GREIG/WWW.SHUTTERSTOCK.COM



PHOTO: M PEARCE



PHOTO: M PEARCE



PHOTO: M PEARCE

By reconnecting with nature and recognizing the genius of nature's strategies, biomimicry argues we can learn how to 'do' like nature does.¹⁶ Yet learning from nature and valuing its adaptation to a specific problem is only one aspect of reconnecting to nature. As critics of the approach will point out, any mimicking needs wise consideration to ensure that solutions are appropriate to the context. For example if we mimic how nature deals with waste treatment, we must also allow the land area, time for processing and redundancy that nature has. This is where combining what can be learnt from nature with our design, ecology and engineering expertise is crucial. It is a true partnership. While Eastgate only borrows design strategies from termites, the living machines originally developed by John Todd and the Ocean Arks Institute, exemplifies the kind of mutually beneficial partnership that can be achieved between the processes of human technology and living systems.

Living machines – a true design partnership with nature

The concept of the living machine (also called eco-machine due to trademark restrictions), flowed from the aspirations of John Todd, and other members of the New Alchemy Institute, to find a way for humanity to “exist again in a mutually supportive and beneficial way within the biosphere”.¹⁸ Their early work focused on developing shelter options that bring together greenhouse, agriculture, aquaculture and architecture in a ‘bioshelter’,¹⁹ designed according to a set of ecological design precepts in which building and design help to heal the planet. These include the integration of living systems, i.e. designing for people and nature as one client, with the living world as the matrix for all design; and design that is co-evolutionary with the natural world, meaning projects should be designed in such a way that they are able to evolve, change and adapt to the constant pressures and opportunities of the future.

In the late 1980's they brought this early systemic thinking to the problem of water treatment. The result was a set of self-contained networks of ecological systems that imitated the ability of natural aquatic systems to purify water.²⁰ These systems use local and adapted aquatic and wetland plants, bacteria, algae, protozoa, plankton, snails, fish and other organisms to take up and metabolize nutrients, toxins, heavy metals and other unwanted pollutants, leaving relatively clean water and often additional products such as flowers, biomass, animal feed and fish. These systems and their underlying principles have been used with success in applications as diverse as sewage treatment in single buildings (Omega Centre for Sustainable Living, Rhinebeck, New York), zoos (Emmen Zoo, Netherlands), and municipal treatment works (South Burlington, Vermont); treating factory effluent (Ethel M Chocolates, Henderson, Nevada); and the bioremediation of water courses (Fuzhou, China).

“Living machines can be designed to produce food, treat wastes, purify air, regulate climates, or even to do all of these simultaneously.”

John and Nancy Todd¹⁷



Figure 3: Living machine, Emmen Zoo, Netherlands.
PHOTO: C DU PLESSIS

While living machines are often contained systems, housed indoors in unfavourable climates, their design considers contextual factors, including local fauna and flora and the availability of renewable energy resources. Solar and wind energy might be employed to increase the speed of the process, for example using a simple turbine to turn the bottom of a pond to increase aeration and contact of sediment to the sun, but the key drivers of the system are the animals and plants. The 'living' part of the system would make use of snails, fish, plants, reeds, bacteria and other micro-organisms found on or around the site, and their use in the design of the machine would be informed by careful observation of the interrelationships between these organisms. Once designed, the system is carefully monitored over a period of time until it reaches a stable state, with the designers tweaking the systems, ensuring that the relationships between the various stages of the system are working. They are in fact playing the role of the feedback loop that in nature would take a long time; using their understanding of systems, biology, and ecology to do the experimentation that adjusts the way elements to work together. Unlike machines made of inert material, living machines need site specific customization, as well as continued observation and management. They can also act unpredictably until all the influencing systems are understood.

Todd and Todd provide nine principles for designing a living machine:²¹

1. Create **microbial communities** obtained from aquatic and terrestrial environments, especially organisms from chemically and thermally stressed environments.
2. Create **photosynthetic communities** as photosynthesis is the primary driving force of these systems, creating dynamic balance between anaerobic phototropic microbes, cyanobacteria, algae, and higher plants and heterotrophic microbial communities.
3. **Link at least three distinct types of ecological systems** to produce living machines that can self-design and self-repair over time.
4. Establish long/short term **pulsed exchanges** that are both regular and irregular to maintain diversity and robustness.
5. Ensure **reservoirs of macro nutrients and trace elements** in the system, and regulate carbon/ nitrogen/ phosphorus ratios, so that complex food matrices are available to a variety of successional strategies.
6. Introduce **geological diversity and mineral complexity** through solubilized ultra-fine mineral powders from a diversity of strata and ages.
7. Ensure **steep gradients** within and between the sub-elements of the system.
8. Ensure that **a diverse range of all phylogenetic levels** from bacteria to vertebrates are included.
9. **The microcosm is a mirror of the macrocosm** – so the system should as much as possible follow the design of the global system in terms of gas, mineral and biological cycles.

*Living machine, Emmen Zoo,
Netherlands. PHOTO: C DU PLESSIS*



The Baima Canal Restorer in Fuzhou, China²²

The city of Fuzhou empties its industrial and sewage effluent into a series of canals feeding into the Minjiang River. This project used 12,000 plants of 20 native species, to create a 500m long eco-machine or 'restorer' treating the heavily polluted Baima canal, which receives over 2.3 million litres of raw household sewage per day. The restorer successfully removes floating solids and odours, providing a beautiful, productive walkway. The plant root system and fabric media used in the restorer increase surface area available for beneficial bacteria and micro-organism growth. The restorer also includes fine bubble aeration and additional dosing of beneficial bacteria at certain points, while an anoxic zone at the beginning of the restorer allows for de-nitrification.



Raw untreated sewage in the Baima Canal before Restorer installation.



The Baima Canal Restorer also functions as a community walking bridge.



IMAGES AND PHOTOS: JOHN TODD ECOLOGICAL.²³

The problems that this system encountered were fluctuations in the water levels from an upstream dam problem to heavy rains, yet the system is reported to still be thriving.²⁴ Very little current information is available of the effectiveness of the system, though it certainly was so initially, dropping BOD and COD levels.²⁵

Design treatment Standards and Preliminary Results for Restorer

Estimated Flow: 750,000gpd

	Influent	Effluent Design	Preliminary Results	Reduction
COD mg/l	480	<50	40	92%
BOD mg/l	240	<30	19	92%
NH ₃ mg/l	40	<15	N/A	N/A
TSS mg/l	–	–		–

“Permaculture challenges humans to take responsibility for themselves and the economy that sustains them, by designing and practicing permanent, sustainable, cultural and agricultural systems created in accordance with environmental knowledge.”

James R. Veteto and
Joshua Lockyer²⁸

Where living machines are a good example of a happy marriage between technological and natural systems, the next approach discussed focuses on the “conscious design of productive living systems that have the diversity, stability and resilience of natural ecosystems”,²⁶ allowing us to move from “dependent and demanding consumers to interdependent and responsible producers”.²⁷

Permaculture – putting in place nature’s wisdom

The Permaculture concept was jointly developed in the 1970s by Bill Mollison and his then student, David Holmgren, as a practical and ethical response to a world of declining energy and resource availability.²⁹

As Holmgren says *‘it is about what we want to do and can do, rather than what we oppose and want others to change.’*³⁰ It has since grown to a worldwide movement, with local Permaculture practitioners adapting the concepts to their own climatic and cultural contexts. In many developing world countries, permaculture gardens form the backbone of school- or home-based food security initiatives.

The term Permaculture is a portmanteau created from **PERMANent agriCULTURE**, to denote a system of permanent, self-sustaining agriculture and human culture. Permaculture was initially conceived by Mollison and Holmgren as ‘integrated, evolving systems of perennial or self-perpetuating plant and animal species useful to man’.³¹ It has since evolved into ‘consciously designed landscapes which mimic the patterns and relationships found in nature, while yielding an abundance of food, fibre and energy for provision of local needs.’³² To paraphrase Holmgren, permanent agriculture evolved to a vision of a permanent, sustainable culture.

Permaculture has its roots in the sciences of systems thinking and ecology, combined with landscape geography and ethno-botany. At the core of permaculture is a set of three ethical principles: care for earth; care for people; and fair share, setting limits to consumption and reproduction, while redistributing surplus.³³ Care for earth builds on the idea of taking on stewardship of living systems, including soil, and to take responsibility for growing and maintaining biodiversity in these systems; while care for people includes taking care of self and developing non-material well-being. Without taking care of both earth and people, our agricultural and cultural systems cannot thrive. The third ethic reflects the values of mutuality and fellowship – of taking no more than you need, so that others can also benefit from the surplus in the system.

Permaculture Design Principles

- Principle 1 – Observe and interact
- Principle 2 – Catch and store solar energy and other resources
- Principle 3 – Obtain and yield
- Principle 4 – Apply self-regulation and accept feedback
- Principle 5 – Use and value renewable resources and services
- Principle 6 – Produce no waste
- Principle 7 – Design from patterns to details
- Principle 8 – Integrate rather than segregate
- Principle 9 – Use small and slow solutions
- Principle 10 – Use and value diversity
- Principle 11 – Use edges and value the marginal
- Principle 12 – Creatively use and respond to change

Building from this ethical basis, permaculture provides a set of universal design principles that can be used to guide the development of locally appropriate methods and solutions in agricultural and other social-ecological systems. In essence, these design principles lead the designer through a process of understanding how nature solves the problems of establishing flourishing living systems in that specific place; how it works with and strengthen the relationships and flows between different elements of the system, so that the resources in the system are effectively and efficiently managed and distributed; and what the successful patterns and processes are that determine the structure of the systems.



Figure 4: Permaculture kitchen garden, Plettenberg Bay, South Africa.

PHOTO: C DU PLESSIS

Permaculture has a central role to play in what Philip Ackerman-Leist refers to as rebuilding the foodshed, establishing multi-scale resilient food systems.³⁴ The genius of permaculture lies in its recognition of cross-scale relationships: building thriving communities of soil organisms to support larger-scale communities of fauna and flora in creating productive, edible landscapes at a variety of scales from simple kitchen gardens to urban food forests. Key to this is an in-depth understanding of relationship.

As with other design approaches rooted in an ecological worldview, any permaculture project starts with taking time to observe and build a relationship with the site; reading the landscape as if it is a textbook providing knowledge about existing patterns, details, flows and feedbacks found on site.³⁵ Understanding the natural patterns of the systems within which the design will fit, assists in finding the appropriate patterns which will form the structure of a design. Holmgren suggests that understanding pattern is more important than understanding all the details of the elements of a system.³⁶ Pattern describes relationships and flows. It suggests the best ways of combining system elements so that exchanges of energy, nutrients and services are optimized; providing multiple benefits and outcomes, and getting maximum useful output for input (for example, the chook tractor in Fig. 5). By putting the right things in the right place, mutually beneficial and supportive relationships can be encouraged. Permaculture does this through establishing guilds or groupings of plants, animals, insects, and other natural components that work together to help ensure their combined survival. Such permaculture guilds combine form and function: mimicking natural stacking and layering from canopy to root system to provide a host of ecological services, only some of which may be directly productive for humans.³⁷



Figure 5: The chook tractor. PHOTO: C DU PLESSIS

The 'chook tractor' is an example of how one member of a permaculture guild provides a number of ecological services; with chickens tilling, fertilizing and removing insects, doing the work of tractor, plough, rotary hoe, fertilizer and pesticide – and providing food.

In selecting the members of a permaculture guild, it is important to consider the need to take, as well as give. A tree does not just produce fruit, it also draws nutrients, sunlight and water; or as Holmgren puts it “you can’t work on an empty stomach”.³⁸ Understanding how energy moves through natural systems, and remaining aware of the negative and positive feedback loops within these flows, is crucial to the design of self-regulating systems that require less work, while increasing investment value over time. A general rule of thumb used to manage feedback is the concept of tripartite altruism. This holds that in nature approximately one third of captured energy is

required for metabolic self-maintenance; another third is used to maintain lower order system providers, and the last third goes toward higher order contribution. The first third helps us survive, the second third is the work required to ensure future survival, and the last third contributes to the betterment of the larger system.

Trial and error plays an important role in establishing these guilds, and a healthy and successful guild will continue to evolve, adding diversity and becoming more resilient. A number of the permaculture design principles focus on enabling this evolution. The first of these is an emphasis on smaller and slower solutions. Smaller solutions are more agile, more adaptable, and often simpler. They make better use of local resources, and can be managed locally. Slow growth strategies allow for better monitoring of feedback and encourage the system to self-regulate and evolve. A second key principle is to use and value diversity, avoiding monocultures, and protecting and providing ecological niches. A healthy, resilient system will have not only a diversity of species, but also a diversity of structure, age and genetic makeup that will allow it a range of responses to pressures and changes, thus reducing vulnerability to a variety of threats. Mollison argues that it is not about diversity for diversity's sake.³⁹ It is the relationships, or functional connections, between the species that are important. Allowing space for feedback and adaptation enables a system to creatively use the stresses of change to evolve these connections.

Like the living machines, permaculture systems need a process of fine-tuning until they function as intended, and are able to self-regulate and evolve. They will take time to reach their full potential and need to be developed for their specific context – a permaculture garden in Norway should look very different from one in Kenya. Furthermore, a permaculture system is not a fully natural system, but an agricultural system designed to yield functional crops such as food, fuel and fibre for human use. These basic truths are often forgotten in the over-enthusiastic promotion of permaculture as a low-input, high-output solution to global food security, leading to unmet expectations and project failures. It can therefore be expected that there is some criticism of the concept – the strongest of which is that there is little real, scientific evidence to support many of the claims made for permaculture's effectiveness in providing sufficient yields.⁴⁰ The lack of scientific literature on permaculture designs and their successes and failures, means there has been little opportunity to leverage learning and prove the design principles put forward by the permaculture movement.

However, the very valid critiques of the concept do not lessen the important role that permaculture has played in shifting development thinking towards processes and principles based on how nature works, viewing landscape and people as a single system.⁴¹ For many years now permaculture has provided a toolkit of strategies that improved the lives of many people, whether by feeding thousands of school children in South Africa, or providing people with the hope that there is a more responsible way of living. There are also outstanding examples, such as the Chikukwa Project in Zimbabwe,

“One of the most intriguing and exciting comments frequently made was the extent to which people felt empowered by permaculture and that for so many permaculture was a source of hope and inspiration. People from all walks of life talked of permaculture giving them a sense of hope and direction for the future, for the rest of life’s journey.”

Caroline Smith⁴³

where detailed records stretching over twenty years illustrate the difference that permaculture can make to environmental restoration and food security, and in the process regenerate communities.⁴²

As David Holmgren suggests, the twelve permaculture design principles can be applied to all social-ecological systems, fostering transformation across the seven key domains described by the permaculture flower. For example, understanding the value of the marginal helps us to realize the potential for innovation in the edge conditions created by our cities and our social systems, whether these are the edges between built and natural, between street and building, or between cultures.

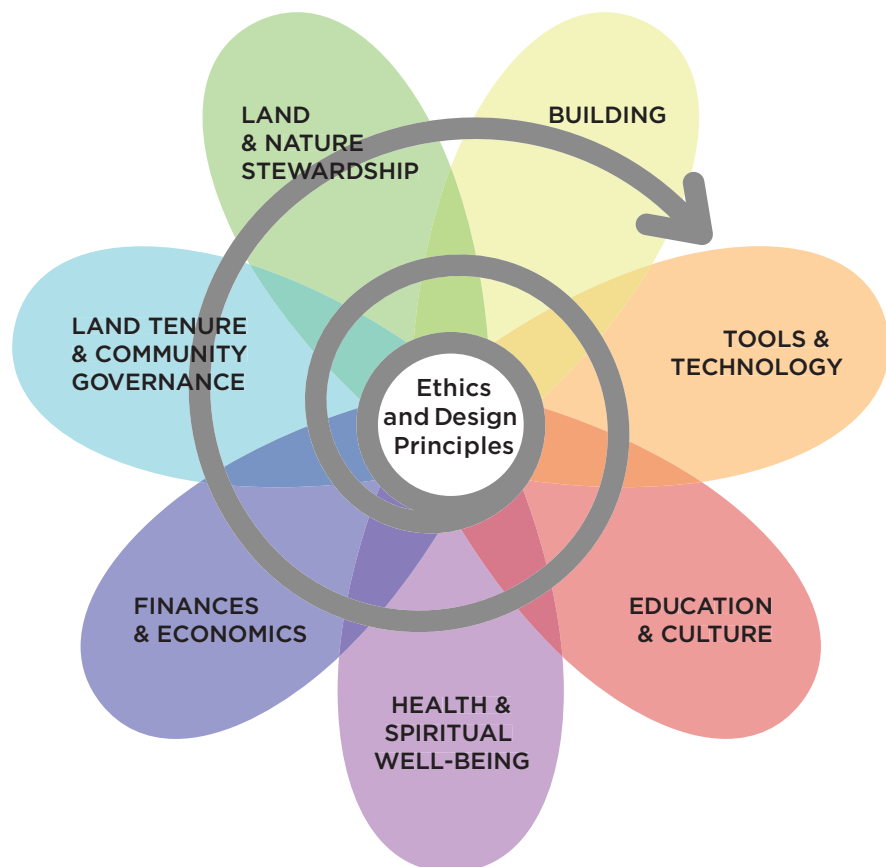


Figure 6: Permaculture flower – the seven domains of permaculture action.

Source: <http://permacultureprinciples.com/principles/>

The last approach we discuss in this chapter builds on the concepts of biomimicry, living technology and permaculture discussed so far, to propose that buildings and cities can be designed in such a way that they are no longer degenerative input-output based technical systems, but become regenerative systems in which technology becomes the “means for augmenting nature”, and not the model for designing social-ecological systems.⁴⁴

Creating regenerative landscapes

The term ‘regenerative design’ was introduced by John Tillman Lyle, a landscape architect, in his 1994 book *Regenerative Design for Sustainable Development*. His main point of departure was that the linear throughput models that structure our human habitats will eventually lead to the degeneration of the systems that supply the energy, materials and other services to our cities. Instead, he suggests, “the supply systems for energy and materials must be continually self-renewing, or regenerative, in their operation”.⁴⁵ The conceptual differences between existing linear throughput system models, and the more closed-loop models of regenerative systems, are illustrated in Fig. 7. Such a regenerative system, Lyle suggests, can be achieved by reincorporating the basic life-support services of nature such as energy conversion, water treatment, cycling nutrients, and waste assimilation into the design of landscapes.

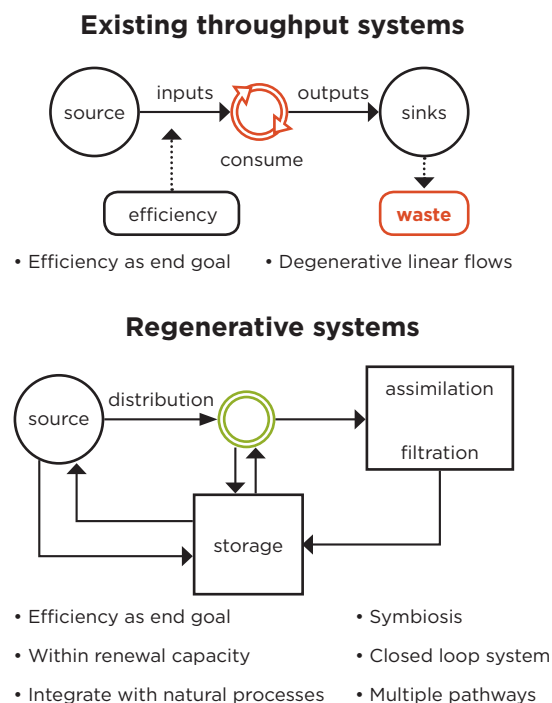


Figure 7: Lyle’s comparison between flows in degenerative and regenerative systems

Source: <http://akihan.hubpages.com/hub/Regenerative-Architecture>

Lyle proposes that “in cities of the future, the working landscape becomes the unifying, integrating network of urban form, rather than a decorative addition as in the industrial city”.⁴⁶ By returning the landscape to its original role as the medium for regulating flows and recycling resources, highly technical, degenerative infrastructure systems can be replaced with regenerative landscapes that provide the same service by letting nature do the work. These interventions make use of the self-organization and self-designing capability of ecosystems, with designers providing a choice of initial species and the physical start-up conditions that allow for natural processes such as succession and competition. The focus is on using biological species and ecosystems to do the work (e.g. clearing pollution) that in an environmental/ infrastructure engineering approach would have been done by mechanical

“Making visible the ecological processes that support life is an important part of this emerging [regenerative] landscape. The child who grows up in a regenerative city of the 21st century will know very well where the water she drinks comes from and where her wastes go. She will have an inner feeling for the atmospheric fluxes that make cool and warm places, and she will know how food grows and in what season. All this will be part of her daily experience.”

John T. Lyle⁵²

means such as scrubbers, filters and chemical precipitators.⁴⁷ For example, we can manage the flow of water with channels, pipes and pumps, or through using landscaping interventions such as swales and retention ponds that fulfil all the natural functions of wetland systems, including flood control, cleaning run-off water and increasing biodiversity. Lyle cites producing food using permaculture principles, and the living waste water treatment systems of John Todd, as other examples of replacing industrial processes and technologies with regenerative processes and technologies, learning from and working with nature.⁴⁸ In this way, the design of landscape becomes “a pathway towards making the city as a whole both liveable and sustainable”.⁴⁹

He cautions though that the landscape is part of a larger natural and cultural context that should be considered in its design, and that the forms generated by such an integrative way of thinking will look different from those in landscapes living on “industrial life-support systems”, and may even be perceived as strange.⁵⁰ Neither would they necessarily look like natural landscapes. However, by giving visible form to natural processes, these ‘new’ landscapes serve to reconnect human culture to nature and its processes and their forms can become symbols for a new way of living.⁵¹

To identify regenerative landscapes, he suggests four qualities that indicate regenerative processes: locality, fecundity, diversity, and continuity. A regenerative landscape grows from the natural and cultural patterns of its place; it is rich in both organic growth and organic decay that feeds new growth; it reflects diversity in the ongoing interactions of its elements; and even though it goes through inevitable changes, it is never fragmented.⁵³

Active, Beautiful, Clean – Singapore’s ABC waters Programme



Rain garden and treatment pond, Kent Vale Apartments, NUS, Singapore (Architects: MKPL Architects). PHOTO: C DU PLESSIS

An excellent example of regenerative landscape design is the ABC Waters Programme initiated by the Singapore Public Utilities Board (the national water agency) to improve the quality of water and community life by harnessing the full potential of the city-state’s waterbodies.⁵⁴ This is done by integrating parks, waterways and communities, turning the city’s network of canals, drains and reservoirs into beautiful and clean streams, rivers and lakes that also provide recreational ‘active’ space for people to enjoy.⁵⁵ It uses a range of ecological treatment strategies, including vegetated swales, sedimentation and bioretention basins, constructed wetlands and cleansing biotopes, which draw on the thinking of Lyle and the permaculturists, amongst others. The programme also encourages the use of green roofs, vertical gardens and rain gardens to improve water filtration and harvesting.

An important aspect of the programme is to make Singaporeans aware of the value of their water resources and their role in protecting this resource – an objective achieved through integrating water courses into the recreational spaces of the city, and encouraging schools to develop educational learning trails in nearby water projects.

Already there are 56 PUB and privately developed projects that have helped Singapore to close its water loop and built a diversified and sustainable water supply from four sources known as the Four National Taps: water

from local catchment areas; imported water; NEWater (high-grade reclaimed water); and desalinated water. Two of the projects developed by a partnership of PUB, public agencies and private developers, are the famous Gardens by the Bay, and the improvement of Yishun Pond, next to the Khoo Teck Puat Hospital discussed in Chapter 5.



Gardens by the Bay: the Supertree grove, designed by Wilkinson Eyre and Grant, harvest rainwater and solar energy, while the Dragonfly Lake acts as a natural biofilter to clean stormwater run-off. PHOTO: C DU PLESSIS



Promenade past Khoo Teck Puat Hospital. PHOTO: C DU PLESSIS

The Yishun Pond project used a sedimentation and stormwater management basin to create a catalyst for both ecological and community regeneration. The use of bioretention and remediation strategies increased the local biodiversity and provided a park which links the hospital and different parts of the local neighbourhood through a network of footpaths, linkbridges and a promenade with a stationary bicycle facility. The waterfront that is created provides an opportunity for the hospital to provide health education and activities such as tai chi classes to the public.



Biorestorers in Yishun pond. PHOTO C DU PLESSIS

Lyle suggested twelve strategies for regenerative design which, in essence, echo the biomimicry design principles identified by Benyus, the design precepts of the Todds, and the permaculture principles of Holmgren, as well as the principles of ecological design proposed by a number of other design practitioners.⁵⁷ In the final section of this chapter we discuss the essential commonalities between all the various design principles and strategies put forward for designing with nature, or as it has become known, ecological design.

“Ecological design is design which transforms matter and energy, using processes that are compatible and synergistic with nature and that are modelled on natural systems.”

Charles Kibert⁵⁸

Common strategies for designing with nature

Since Ian McHarg wrote *Design with Nature* in the 1960s, the idea of working with nature to create better human habitats, has inspired a number of design approaches, some of which are discussed above. Each of these comes with its own set of design principles and strategies, yet they are very similar. The point of departure for all is nature not only as context, but as mentor and co-creative partner. John and Nancy Todd refer to “the living world being the matrix for all design”.⁵⁹ As Lyle describes it, in any place the landscape has coevolved over a long period of time, establishing complex networks of energy and material flows, which determine the “character and capacities” of the place providing the model for future development.⁶⁰ It is therefore important to begin with understanding the context: the ‘story of place’ that is being written by the interactions between nature and culture. However, working with nature requires also doing things the way nature does them – following the strategies of nature.

The **first** of nature’s strategies is to use resources efficiently. This requires the system to use every bit of energy that it captures, but not more than it absolutely needs to keep functioning, keeping to what it can source locally. It also means that nothing should go to waste, with waste products from one process becoming a resource for another, and captured energy eventually being returned to the system either directly as fuel, or as nutrients. Nature is also efficient in solving many problems with one solution, for example wetlands which provide a number of ecosystem services, and human skin with its functions of protection, elimination and temperature control.



Figure 8: Nothing is wasted in nature, for example the nutrients in a dead tree feed fungi and other organisms and is eventually returned to the soil. PHOTO: L VAN ROOY

The **second** strategy is to integrate different systems and elements so that they can effectively share resources. In a mature ecosystem, organisms occupy many non-competing niches, allowing them to “clean up every crumb before it falls off the table”; and even where they share a niche, their patterns of resource consumption have evolved in such a way that different

groups can be supported by the same piece of land.⁶¹ Lyle describes how on a regenerative farm the different species provide for needs of other species such as shade, structural support, protection or nutrients.⁶² Integration therefore enables cooperation and co-evolution, which is the **third** important strategy. Design should be co-evolutionary with the natural world,⁶³ and projects should be designed in such a way that they are able to evolve, change and adapt to the constant pressures and opportunities of the future.

A **fourth** strategy is to create options by building diversity and redundancy into the system. The ability of a living system to create and fill a diversity of niches increases the resilience of that system, making it more flexible in how it can respond to change, and decreasing its vulnerability to the loss of one particular member of the ecological web.⁶⁴ This strategy can be transferred to the built environment through the idea of creating multiple pathways, such as a hybrid renewable energy system in which a mix of solar, wind and biofuels ensure a steady supply of energy,⁶⁵ or in the design of movement routes through a city⁶⁶ (see Fig. 9). Serge Salat describes three types of diversity one would encounter in a city: diversity among similar objects (such as types of housing or cars); diversity created by the spatial distribution of different functions; and diversity of objects at different scales (such as roads of different sizes).⁶⁷



Figure 9: Different neighbourhood road configurations increase or reduce access and distance travelled to and from access points (marked in red). Apart from its impact on greenhouse gas emissions, limited access points also make residents more vulnerable as it increases the response time of emergency vehicles. IMAGE: D NEL

Following flow is the **fifth** strategy to borrow from nature. As Lyle puts it, “flow follows form follows flow”.⁶⁸ A key aspect of the ecological worldview is the understanding that living systems are not static, but constantly in flux; being continuously created by the flows of resources, influence and information. This strategy can be as simple as designing according to the natural flow of water and air, or ensuring proximity between the different elements of the system exchanging resources, as in the design of living machines or permaculture systems. It can also be as complex as aligning the built environment with the metabolic and thermodynamic flows of the city through concepts such as material and energy-flow accounting (MEFA), an analytical tool that can link “socio-economic dynamics (e.g. monetary flows, lifestyles or time allocation) to biophysical socio-economic stocks and flows and these, in turn, to ecosystem processes”.⁶⁹ Tools such as the MEFA framework can analyse the interactive processes between the natural

(biophysical) and cultural (symbolic) spheres of causation that together create the city, bringing together the interior and exterior aspects of the urban social-ecological system. However, it remains an analysis of the biophysical stocks and flows in the city, and while convenient for modelling, remains reductionist and does not necessarily address “the potential for a more symbiotic relationship between built and natural environments”.⁷⁰

Key to making use of the flows in the system is an understanding of feedback. As Benyus suggests, nature runs on information that comes in the form of positive and negative feedback.⁷¹ This allows the system to adjust to changes in its environment or composition, and to regulate energy and material flows to avoid over-consumption. However, in ecological systems this feedback is often non-linear and involves numerous interacting and interdependent feedback loops “which may completely obscure the original source of the disturbance”.⁷² Furthermore, as discussed in Chapter 2, the increasing returns provided by positive feedback loops can get magnified into outcomes that are historically irreversible, or at least totally disproportionate to the initial event that triggered the feedback.⁷³ The **sixth** strategy is therefore to keep an eye on feedback and act according to the information it provides.

Conclusion

The ethos described in Chapters 2 and 3 calls for a co-creative partnership with nature. It sees a shift in our definition of development from the successful domination of nature (forcing it to follow ideas of order that ignore its inherent systemic properties) to embracing nature and participating in and co-evolving through its processes – i.e. development through cooperative regeneration, with people working with nature to restore and maintain ecosystem health and communities working together to restore the social fabric.⁷⁴

In this chapter we looked at different approaches to establishing such a partnership. Each of these approaches offers its own set of design principles or precepts, and contributes to the development of common strategies for learning from, as well as designing and working with nature. Foundational to these strategies is a systems approach that understands the project as active part of the natural and cultural systems in which it is situated, requiring design informed by its specific local and bioregional context. This is further supported by the key principle of efficient resource use.

However, McDonough and Braungart suggest that this next sustainability paradigm be based on the idea of eco-effectiveness, instead of eco-efficiency. This requires that “instead of using nature as a mere tool for human purposes, we can strive to become tools of nature who serve its agenda too”, and in the process we can produce a world of abundance in which “there can be many of us and the things we make, because we have the right system – a creative, prosperous, intelligent and fertile system”.⁷⁵ In the next chapter, we look at Positive Development, an approach that aims to achieve just that.

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Chapter 5

Positive development

“If what goes in must equal what goes out, we will not try to increase positive outputs to create surplus benefits.”

Janis Birkeland¹

In previous chapters we have discussed how connection to nature has psychological and physical health benefits for humans, and how we can improve the quality and efficiency of human habitats and industrial processes by learning from and working with nature, even letting nature do the work, as McHarg,² Mollison,³ Lyle⁴ and others have proposed. The question addressed in this chapter is whether humans can also be of benefit *to* nature. Can we design not just with, or like, nature, but *for* nature? Can we design human habitats that will increase “the total amount of ecosystems good and services, as well as the health and resilience of the natural environment”?⁵ Can we create the intellectual, physical and institutional frameworks that would enable the implementation of truly sustainable environments?

These are the questions Janis Birkeland asked when she proposed the concept of Positive Development. She suggests we can increase life quality for everyone, while increasing the sustainable choices available to future generations, through development that makes everyone better off and expands future options. In fact Birkeland argues for the need to increase nature in absolute terms to achieve this. This requires that our goals shift from ‘doing less bad’ to ‘doing more good’, as articulated by McDonough and Braungart and others.⁶ It was called ‘positive’ development because it systematically identifies how all sustainable development processes and methods are ‘negative’ in that they can only slow down ecological collapse. It replaces all negative premises, analyses and methods with positive counterparts. In addition to a framework of models, methods and metrics for eco-governance, Positive Development provides a process of eco-positive design, to achieve both ecological and social net benefits: providing more natural and social services, and thus more potential for survival and wellbeing than ever before (as required by an increasing human population).

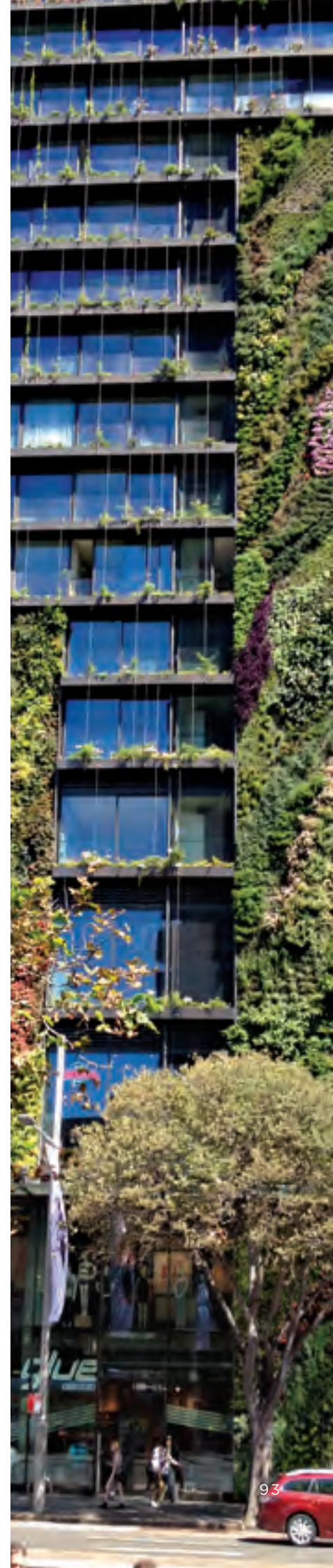




PHOTO: C DU PLESSIS

“Urban development is not sustainable if it does not maintain or increase the pre-settlement level of ecosystem services.”

Janis Birkeland⁹

Where the approaches discussed in Chapter 4 mainly focused on restoring degenerated social-ecological systems, improving resource efficiency and promoting equitable distribution, Positive Development aims to increase the health, resilience and natural, social and economic capital of the system, to over-compensate for the accelerating consumption, losses of biodiversity and threats to human health, thereby expanding future options. It proactively seeks *opportunities* to create net positive outcomes, not less negative or even neutral ones, so as to expand both the ecological base and the public estate beyond pre-settlement conditions. The target is to reverse the ecological footprint of development, not just compensate for its physical footprint.

Central to Positive Development is its emphasis on whole systems change, and the idea that this can best be achieved using design thinking. Design, Birkeland proposes, is “an interactive, imaginative process for creating something that has not existed before”,⁷ “creating synergies, syntheses and symbioses across different dimensions”,⁸ and revealing possibilities and opportunities not visible when using decision tools designed to measure performance relative to what exists. These tools limit the planner or designer to making choices between existing options and trade-offs between competing interests to reduce negative impacts.

Although Positive Design may not yet exist in the fullest of its intention, some aspects of Positive Design will be illustrated using four projects: a research facility in Taiwan, the Venny in Melbourne, Khoo Teck Puat Hospital in Singapore, and a speculative project that Birkeland has designed for Canberra, Australia. We will also briefly look at SmartMode (Systems Mapping and Redesign Thinking), a set of processes Birkeland proposes to address the biases and omissions in current planning processes.

Key concepts

Ecological Base is the means of survival – the whole natural life support system, including biodiversity, natural capital, carrying capacity and eco[system]-services. It includes the intrinsic, as well as instrumental values of nature.

Public Estate refers to equitable access to the means of survival (the ecological base). It also refers to the support of human development through education, culture, art, history and so forth.

Eco-Services are the natural systems that provide essential services that benefit humans and nature such as air and water decontamination, pollination, flood control, climate stabilisation, fertile soil, storm water retention, food and medical resources.

Design for eco-services is actively designing to support locally appropriate ecosystem functions, goods and services surplus to occupant needs.

Green Optimum is the decision rule for Positive Development: development should result in everyone, including nature, being better off than before, causing neither unjust enrichment nor harm to others.

Design for Eco-services – Increasing the ecological base

The Millennium Assessment Programme defines ecosystem services as the benefits people obtain from ecosystems, and identified four categories of service: provisioning, regulating and cultural services that directly affect people; and supporting services needed to maintain the other services.¹⁰ *Provisioning services* are the products obtained from ecosystems, such as food, fresh water, fuel and fiber. *Regulating services* refers to the benefits obtained from regulation of ecosystem processes, including air quality maintenance, climate regulation, disease regulation, water purification, pollination, biological control, and storm protection. *Cultural services* are the nonmaterial benefits obtained from ecosystems, such as recreation and ecotourism, but also spiritual, religious and inspirational benefits. *Supporting services* include the essential processes of life: oxygen production, nutrient recycling, soil formation and primary production. Birkeland, uses the term, ‘eco-services’, to indicate the inclusion of the non-material benefits of nature, such as intrinsic value.

Expanding the ecological base requires that we consider how the built environment can contribute to the provision of ecosystem goods and services that constitute the Earth’s life-support system by a) providing infrastructure that will allow for natural systems to unfold in their own way; b) developing synergistic relationships between human and natural infrastructures; or c) augmenting ecosystem services. Pedersen-Zari suggests that the following could be deliberately designed into any development:¹¹

- mindfully providing habitat for species other than humans
- contributing to soil formation and fertility through careful cycling of biodegradable wastes and recycling of non-biodegradable wastes
- purifying air, water and soil
- regulating the climate through mitigating greenhouse gas emissions or possibly sequestering carbon
- producing renewable energy
- collecting water

The table below outlines how the built environment can contribute to the provision of ecosystem services, and the potential positive environmental implications of this approach.

Table 1: Ecosystem services for the built environment, Pedersen Zari¹²

Ecosystem service	Ranking criteria			Examples of existing design methods that could potentially be used	Positive environmental implications
	Applicability to the built environment	Ecological significance	Negative environmental impact caused by the built environment		
Supporting services					
1. Habitat provision (including: provision of genetic information; biological; fixation of solar energy; and species maintenance)	Medium	High	High at a local scale	Revegetation; preservation of existing flora and fauna; urban wildlife sanctuaries; living walls; urban forests; green roofs and facades; wildlife corridors; green belts	Increased biodiversity; reduction of the urban heat island effect; sequestration of carbon; increased air, water and soil quality; remediation of some forms of water, air and soil pollution; possible protection from wind or wave surges; more adaptable ecosystems as the climate changes; reduction of storm water peak flows
2. Nutrient cycling (including: decomposition; soil building; and the provision of raw materials)	Medium	High	High at a regional/global scale	Recycling and reuse techniques; cradle-to-cradle design; composting techniques; design for deconstruction; landfill mining; industrial ecology	Reduction of waste; reduced need for mining growing/production/transportation of materials and energy leading to reduction in greenhouse gas (GHG) emissions, waste and ecosystem disturbance; decreased use of energy; increased health of ecosystems and humans
Regulation services					
3. Purification	High	High	High at a local/regional scale	Living machines; phyto-remediation and bio-remediation; filtration techniques; green roofs and facades; urban forests; constructed wetlands; composting techniques	Increased health of living organisms; increased terrestrial and marine productivity; reduction of air and water pollution; eutrophication reduction; remediation of polluted sites; reduced ozone damaging gas and GHG emissions
4. Climate regulation	High	High	High at a global scale	Storage of carbon in building structure; revegetation; design to enable behaviour change in energy use; renewable energy generation; passive solar design; non-high thermal mass infrastructure and landscaping; design to reduce reliance on fossil fuels	Mitigation of the causes of climate change; more adaptable communities; mitigation of the urban heat island effect; improved health of living organisms
Provisioning services					
5. Provision of fuel energy for human consumption	High	Medium	High at a global scale	Design for renewable energy generation; cogeneration methods; design to enable behaviour change to reduce energy use; industrial construction ecology	Reduced transport and energy generation-related GHG emissions; more self-reliant and therefore robust urban environments; reduction of air, water and soil pollution; reduction of mining and drilling impacts
6. Provision of fresh water	High	High	High at a regional scale	Rain water harvesting and storage; grey/black water recycling; design incorporating water saving equipment; porous paving surfaces; water efficient landscaping	Reduction of water pollution; increased health of riparian systems; reduction of the urban heat island effect; increased quality of water; increased health of living organisms

To the above list of ecosystem services that can be improved through built environment design, Birkeland would add also:¹³

- Disposing of organic wastes
- Producing food, fibers, pharmaceuticals
- Producing healthy construction materials
- Developing topsoil and maintaining soil fertility
- Producing crops and natural fertilizers
- Heating, cooling and ventilating using the sun
- Preventing soil erosion and sediment loss
- Alleviating floods and managing storm water runoff
- Protecting against UV radiation

In Chapter 4 we discussed living/eco-machines and the use of ecosystems at different scales to harvest rainwater and clean storm water. These are examples of increasing the ecological base through design for ecosystems. Greening the building envelope through creating micro-habitats on walls and roofs, is another. Birkeland proposes a number of design criteria for increasing the ecological base and leaving everyone better off (e.g. by contributing to de-carbonization, detoxification, and/or dematerialization), rather than merely doing less harm than competing proposals. These include the following:¹⁴

- Exceed 'resource autonomy' (i.e. self-sufficient energy production, water and waste treatment) by creating positive onsite and/or offsite impacts that increase the ecology and eco-services.
- Create synergies and shared spaces for natural and human habitats where possible (e.g. by multifunctional design and integrated indoor/outdoor spaces) as well as increasing resources.
- Improve human and environmental health (i.e. not just reduces toxins) by creating opportunities for social interaction, exercise, semi-outdoor spaces and local food production.
- Support the bioregion and indigenous biodiversity by acting as a gene bank and incubator for regenerating the region's ecology and/or remediating rural monocultures.
- Use natural systems and forces to maximize heating, cooling and ventilating before any active systems are added, even when the latter are powered with renewable energy sources.
- Improve the surrounding exterior micro-climate and reduces the impacts of the urban heat island effect and carbon emissions to provide public open spaces and greenery.
- Reduce land coverage while increasing natural capital, natural habitats and biodiversity in urban areas and developments by creating 'ecological space' (or even sky parks where practicable).
- Is 'suitably' durable, or reversible, demountable and adaptable, since permanent development may not reduce impacts on distant ecosystems, and for many reasons may not last.
- Use organic, compostable, adaptable and renewable resources and materials instead of mined materials with high embodied waste or toxic binders, solvents and so on, when possible.

In a project proposed to demonstrate net positive design, the Australian National Sustainability Initiative (ANSI), Birkeland brings together these criteria in the design of a proposed new research and education facility which would also test how design can be measurably 'net positive'.

Australian National Sustainability Initiative (ANSI)



Passively designed, the facility provides extensive ecosystem services. It integrates productive eco-technologies such as 'algaetecture', 'vegetecture', 'aquaponics' into the building envelope. ANSI structures are modular with integrated gabion walls, glazing, ventilation and shading depending on their orientation. The construction creates atria, aquaria and terrarium walls. Walkways joining different areas travel through these spaces, allowing occupants to experience the plants, small animals, insects and birds. The modular design innovation ensures that every space can be individually controlled through the use of a set of screens and systems (air, thermal comfort, water, waste, fire, etc.) embedded in the triangular truss structures. This design for multiple uses is central to Positive Development.

The proposal is reversible and sits lightly on the site, respecting the soil. The elevated, off the ground, modules are insulated to ensure passive performance. Each module can include plants, algae or aquariums as 'living wall paper'. This allows for the building to provide eco-services such as fresh air, food, water treatment, and habitat, but also social services like meeting places, connection to nature, and education. It aims to provide more 'ecological space' than total floor area, and provide a gene bank for rare or threatened indigenous ecosystems and species.

IMAGES: AUSTRALIAN NATIONAL SUSTAINABILITY INITIATIVE'S EDUCATION CENTRE PROJECT ANSI © ANSI

While the above example is not yet constructed, the following project in Taiwan is a research facility that aimed to test a symbiotic system of human habitat, waste recycling through composting, and vertical farming. The project increases the ecological base through its use of vertical farming and on-site waste treatment and nutrient recycling.

Symbiosphere 1, Taiwan¹⁵

The Archilife Research Foundation initiated the Symbiosphere 1 as a research project in 2002. The project includes a residential apartment complex wrapped in a scaffold supporting rotating vegetable beds, a concept first used by ARUP a few years earlier. Planted with wild edible vegetables, these beds receive water from the building's water capture and recycling system and nutrients from the dry composting toilets in the apartments. The water recycling system includes a living or eco-machine to provide the eco-services of waste treatment and protein production in the form of fish.¹⁶



PHOTOS: J HUANG CHIN-YING, ARCHILIFE RESEARCH FOUNDATION



A commercial agricultural version of this vertical farming concept was launched in Singapore in 2012, but it misses many of the opportunities of integration with the built environment fabric, as well as the social aspects of people interacting with the system. However, it provides an opportunity for agricultural production in a city that imports almost all its food, thereby increasing the eco-service of local food production.



Singapore urban farm. PHOTO: BL ONG



Birkeland further proposes that the existing urban fabric provides numerous opportunities to establish ecosystems and provide ecosystem goods and services surplus to occupant needs, therefore eco-retrofitting of cities offers great potential for Positive Development.¹⁷ Retrofitting has been shown to pay for itself through energy and water savings. While most retrofitting has been for efficiency alone, Eco-positive Retrofitting would add onsite and offsite public benefits, such as future proofing and protecting endangered medicinal plants. She suggests one means of achieving this is Green Scaffolding which can provide at least 33 eco-services in one building.¹⁸ This design concept provides simultaneous eco-system services such as clean energy, air, water, food, natural amenity and biodiversity habitat. The concept is centred on retrofitting with three versions: Building Green Scaffolding, Domestic Green Scaffolding and Interior Green Scaffolding. However, it can be used in new buildings, as in the case of the proposed sustainability centre. Using this idea to retrofit existing buildings has other benefits if done thoughtfully, for example it could extend the longevity of buildings skins, increase thermal performance and provide biophilic benefits. Further, if integrated with urban agriculture it could provide food, habitat and as well as the other eco-services. Other Positive Development design concepts (e.g. Solar Core, Green Space Walls and Passive Solar Retrofit Modules) are all different, but can be mixed and matched to address local social and ecological deficits.

“It really gives you more of a sense of community, the whole community; you get to know the people who live around you.”

Janis Birkeland²⁰

Increasing the public estate

The second aspect of Positive Development is to increase the public estate. Some of the criteria Birkeland suggests for this include the following:¹⁹

- Address distributional inequities of the surrounding area or city (e.g. ensuring equity in access to green space, public facilities, healthy employment, transport, hospitals, and so on).
- Correct social and economic deficiencies of the surrounding environment (e.g. provide day-care, playgrounds, public plazas, landscapes, parks, water storage).
- Provide infrastructure for ‘community building’ activities and ‘sense of place’ or identity, and social interaction, such as rooms designed to be used at night for community events.
- Identify community-wide needs – not just specific ‘client’ needs (economic, cultural, recreational and psychological), such as public health, welfare, equity, and safety.
- Re-examine concepts of values through active engagement in participatory design processes supported by adequate mapping of ecological and ethical considerations.
- Ensure access and use of built environments by disabled people, the elderly, mothers, and so on, through design for adaptability, accessibility, deconstruction, and so on.

The case study presented next, illustrates how the public estate can be improved through meeting the above requirements. It is also regenerative in increasing the ecological base through its green roof and self-sufficient energy systems.

The Venny – better a broken bone than a broken spirit

The Venny is a staffed communal backyard and adventure playground facility located in Kensington, Melbourne. This project was built to support the local high density, low socio-economic neighbourhood, providing a communal backyard and child support services. The playground, the building, the staff and the activities conducted are all centred on supporting the at risk social housing families, allowing them to play, learn, and interact with nature and each other, and to become part of the community.

The clubhouse is made of 5 refurbished shipping containers forming a U shape, creating a large column-free activity space. Each container has the added benefit of being able to be closed off offering programming flexibility. The space in between is the communal space with a concrete floor and trussed cathedral ceiling. The building has a green roof designed to be accessible to the children, providing eco-services such as habitat, insulation, cleaning the air and slowing and treating storm water. No toxins were used in the development as far as the project team could discern and the building was designed with as much recycled materials as possible. The project produces surplus energy and water, it is designed with passive lighting, heating and cooling strategies. The use of shipping containers meant that for the same capital investment a much higher quality building could be achieved. One of Birkeland’s requirements is that a project should aim to be reversible. While the shipping containers leave a light footprint, the concrete floor does not. However, it provides the thermal mass necessary to make use of Melbourne’s beneficial diurnal swings for passive thermal control.



PHOTOS: D NEL

Venny Clubhouse

shipping containers



PHOTO: E PERES



PHOTO: D NEL

The floor has a much more important story to tell though. It embodies the history of the Venny and its operation over the last three decades. The children that the Venny caters for come from often stressful home environments. The Venny is a safe place to be, to explore, learn and play. When the decision was made to demolish the old facilities and move them, the staff was very concerned about the stress to their charges. To address this, a 12 month process of consultation with the children and Venny staff was undertaken. They shared with the designer what they loved about the old Venny and what they wanted for the new building. In short they wanted to save the walls, floor, ceiling and door, everything. In response to this the staff, designer and children started to capture 'loved elements'. They made models of the old building, drew, painted, made prints, and wrote stories about the Venny. These were embedded in the new floor so that it became the holder of this history.



Children designing the playground. PHOTO: D HES



The Venny floor of memories. PHOTO: D HES

Danielle, one of the staff, recounts how one of the boys, the one with the greatest problems and stresses in his life, entered the new building with 3 other friends:

“One of things I most love about this place is the possibility for on-going change and development... that it’s a constantly evolving place with the capacity to respond to the children and users, it’s very organic and I love that.”

Venny employee, SV¹²²

‘I took them into the new building for the first time... PR was the first one to come in, he bags’d first, and when they got in they went wild. The photo montage of the old Venny door at the entrance stunned them ... they gasped and then they moved in and started to run through the space they all ran around the spiral, they walked, they stopped and looked, stood still, ran again, ran into every part of the space, they danced a lot... then PR went back to the door montage and lay down on it he stretched out across it and stayed very still... this was such an intimate gesture and kind of embrace ... then the others joined him sitting and lying on the old door. Then PR got up and started dancing the shuffle...’²¹

Creating this sense of place and identity for a marginalised community is but one way the Venny improves the public estate. That it does so in a process that respected and consulted the youngsters, and continues to partner with them in the development of the centre, is part of what makes this project an example of Positive Development.



PHOTOS: C DU PLESSIS

The second way the Venny contributes to the improvement of the public estate is by meeting a need specific to children growing up in high-density urban areas. Many of the families living in the target group have recently arrived as refugees or have suffered other hardships. The children in their apartments do not have a backyard: they have no place to play in the mud and no trees to climb, let alone a place to learn how to grow food and build play houses. Yet these things are imperative for balanced development and a healthy mind and body. As Stephen Kellert points out: “play in nature, particularly during the critical period of middle childhood, appears to be an especially important time for developing the capacities for creativity, problem solving, and emotional and intellectual development”.²³

Part of that development is the ability to take risks, to learn about one’s physical limitations. There has been increasing concern that society’s preoccupation with safety and the elimination of risk is having a detrimental effect on urban children.²⁴ Rather than learning how to assess and deal with risk through learning, children become accustomed and reliant on risk being managed for them, and are ill equipped to recognize risk themselves. Adventure playgrounds, such as that provided by the Venny, provide an opportunity for children to develop positive risk and healthy lifestyle choices.²⁵ Research further suggests that the experience of actual minor injuries, is a universal part of childhood and has a positive role in child development, “allowing children to gain direct experience of the consequences of their actions and choices, and through this an understanding of their abilities and competence”.²⁶



Playhouse at the Venny.



Venny Playground and animal life. PHOTOS: C DU PLESSIS

The third way the Venny contributes to the public estate, is through educating the children (and the broader public) about the environment and more sustainable ways of living with nature. Designing facilities that demonstrate environmentally sustainable design is crucial; especially for the young as it fosters an ability to recognize and adopt these practices in their everyday lives.²⁸ In a recent study of four education facilities, Higgs and McMillan²⁹ found that daily exposure and interaction with sustainable design and strategies helped promote both learning and adoption of sustainable practices by children.

*Frequent, direct experience with nature, coupled with an adult who teaches respect for nature, significantly influences the development of environmental care and stewardship later in life.*³⁰

This generation of children will be the ones dealing with much of the consequences of the old mechanistic worldview, and as Rob Adams, key proponent of the Venny has said, providing this type of example is crucial so that *kids can see what the future will [could] look like.*³¹



Teaching children to grow vegetables



Illustrating renewable energy technologies and green roof PHOTOS: C DU PLESSIS

The Venny shows that it is possible to design for both social and environmental benefits, and although the integration of design and nature is not as evident as it could be, the project demonstrates many aspects of Positive Development. The staff and children were integral to the development process, the environmental context was carefully considered and the systems implemented mean the project is in continual development and evolution.

“I love that my kids can come and run around and jump on a trampoline, to get outside and see the animals.”

Local community member, C5²⁷

“It’s got such a great design, with the containers and the roof garden, I love that the environment is more visible there... I love it, my kids love it, it has such a great combination of things, the play, the animals, the nature.”

Local community member, C6³²



PHOTO: JUI-YONG SIM/WWW.FLICKR.COM

Positive Development in practice – Khoo Teck Puat Hospital

While there is, as yet, no existing building that fully meets the criteria of Positive Development, Khoo Teck Puat Hospital in Yishun, Singapore, comes pretty close. Designed by CPG Consultants Pte Ltd and opened in 2010, it was planned as a “hospital in a garden and a garden in a hospital”.³³ The developers, Alexandra Health Systems, had three objectives for the hospital: a) provide a healing environment for patients through gardens that engage the senses of sight, sound, smell and touch, providing a quiet and calming atmosphere for patients and their families; b) become a model for environmental conservation and reduce the hospital’s carbon footprint; and c) create community involvement through volunteerism and place-making, creating space for the community to conduct activities and enjoy social interaction.³⁴

The project, with its many biophilic elements, has several characteristics that make it an excellent example of the spirit of Positive Development, even if it does not meet all of Birkeland’s criteria such as exceeding resource autonomy, and an adaptable, demountable, expandable, reversible, and ultimately invisible structure.

Some spectacular efficiencies were achieved, with the project using 30% less energy than comparable modern hospitals in Singapore,³⁵ while renewable energy produce all hot water needed;³⁶ factors that helped it earn a Platinum Green Mark rating. What makes the project an exemplar of Positive Development is its contribution to increasing the ecological potential through the amount of green space and biodiversity added to the site. With a green plot ratio of 6.18, the amount of green surface added is more than six times the size of the land on which the hospital sits.³⁷ The heart of the hospital is a garden court open to the neighbouring Yishun storm water pond and the public promenade. The central garden, with its ponds and stream, provides a number of secluded spaces for meditation or relaxation, while adding to the biodiversity on site. The hospital provides four different freshwater environments ranging from shallow ponds to fast-flowing streams, home to a number of native fish species that were reintroduced to the area. There are also extensive planters lining the open walkways and balconies, as well as a number of green roofs and a rooftop community garden. Since its opening 79 fish species, 35 species of butterfly, 43 bird species, and 21 species of dragonfly have been observed in the hospital – according to the public information boards in the courtyard. The rich biodiversity has also attracted a number of creepy crawlies, and the hospital has had to learn how to manage ‘wild nature’, providing signs and education to staff and visitors explaining the reasons why caterpillars, grasshoppers and spiders are to be encouraged.³⁸

The rooftop community farm is run by community volunteers, and apart from vegetable crops, also include a number of fruit trees such as papaya, banana and custard apple. The farm is run on organic principles, making use of natural pesticides and vermicomposting of kitchen and garden waste

to increase soil nutrients and quality. The harvest is shared amongst the volunteers, and a portion goes to the hospital kitchen where it contributes to inpatient meals. The rooftop farm is also just one example of how the project increases the public estate.

An important aspect of the design and management of the hospital is the interaction with the community. The hospital is open to the public and the community is encouraged to use the gardens. There are also several initiatives to improve community health and well-being such as tai chi classes and de-stress zones; information and facilities that promote good health, including a self-screening health corner where users can check their weight, Body Mass Index (BMI) and blood pressure; and educational aspects such as a medicinal garden and information about the biodiversity in the hospital gardens. The food court is situated next to the promenade so that it is accessible to those making use of the walking trail around the pond and in the adjoining Yishun Park. True to form it offers healthy yet delicious food prepared with less oil, salt and sugar, with more wholesome food options priced lower to encourage healthier eating. The KTPH hospital also regularly conducts activities to educate and empower patients, staff and the community on maintaining a healthy lifestyle.³⁹



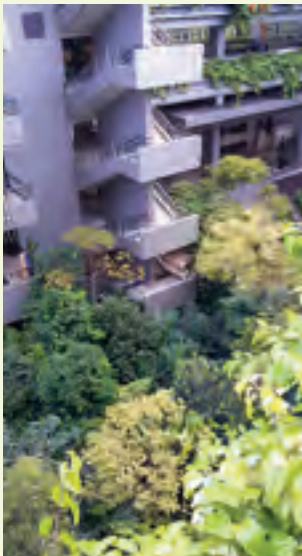
Hospital entrance. PHOTO: C DU PLESSIS



Central courtyard. PHOTO: C DU PLESSIS



Planting on the façade.
PHOTO: C DU PLESSIS



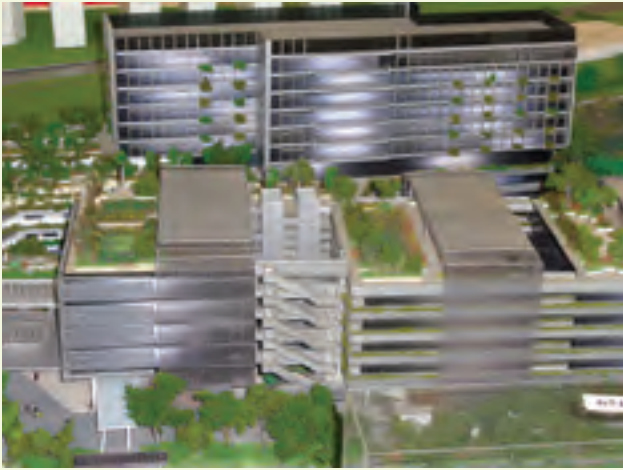
Looking down into the courtyard canopy. PHOTO: C DU PLESSIS



Exercise zone.
PHOTO: C DU PLESSIS



Educational garden.
PHOTO: C DU PLESSIS



Scale model of hospital.
PHOTO: C DU PLESSIS



Documented increase in biodiversity.
PHOTO: C DU PLESSIS

SmartMode

The last aspect of Positive Development is the redesign of processes used to plan, design and make decisions. Birkeland suggests a 12-step process she named SmartMode (Systems Mapping and Redesign Thinking Mode).⁴⁰ The process emphasizes collaboration and inclusion based on a shared understanding of terminology and the non-negotiable bottom line of strong sustainability. From this point, fair decision-making principles, processes and rules can be set, and project objectives and criteria can be articulated collaboratively.

Once these guiding factors have been set, the next step is to understand the project context through a set of forensic audits or analyses and critical interrogation of the assumed project and system boundaries. Birkeland identifies over a dozen analyses that should be performed to increase transparency about resource transfers, metabolic flows and power differentials between stakeholders (to a case-appropriate depth and detail).⁴¹ These include the Ecological Transformation Analysis that is used to establish the Sustainability Standard, i.e. the net positive impacts that a development needs to create in order to compensate the future for past losses.

The next set of stakeholder activities centre around the selection and use of appropriate analytical and decision-making tools to assist in the development of planning information, concepts and strategies that remain relevant to the sustainability goals of the project. The 'design process' is guided by a design research process,⁴² or Eco-positive Design report, which requires a documented investigation of eco-solutions to meet the Positive Development Sustainability Standard. It also supports the required ecological design education, and facilitates timely feedback from assessors and the community. It is also important that the measurements employed have meaning not just for the project, but for the larger system. The measurements are based on whole system factors and stationary benchmarks (as opposed to relative to typical buildings), and takes a long term view (using ecological timeframes) to ensure impacts are not being shifted to the future. The tool distinguishes negative, regenerative and net positive outcomes and offsets to incentivize

positive public impacts. Current rating tools only count reductions in negative impacts (called ‘gains’) and ignore many common negative social and ecological impacts.

The last set of processes calls for assessment of the design through reflective self-assessment to ensure that the previous goals and objectives are being met, that all parties have had a voice, and that the assumptions made earlier hold true. Such a self-assessment process would measure the project against the sustainability standard and the Green Optimum rule. The result of this self-assessment process is also made public and external assessment may be sought, especially if this is a requirement of the project. The last step is about ensuring accountability and performance through post occupancy evaluation, re-checking that all the aims of the project were achieved and if not, why not, so that others can learn.

Questions to ask in a design self-assessment⁴³

Will the action/design/project:

- Expand the ecological base and future options?
- Increase natural capital?
- Increase natural security?
- Be reversible, adaptable, diverse?
- Increase and distribute renewable resources?
- Replace fossil with solar (or other renewable energy source)?
- Make everyone (the general public) better off by expanding the public estate?
- Increase participatory democracy and community engagement?
- Provide freedom from harm and protect human rights?
- Foster responsibility and accountability?
- Increase the range of responsible lifestyle and consumer choices?
- Increase the diversity of sustainable pathways and cultural diversity?

Conclusion

Central to the values of the ecological worldview is the idea that interactions between the members of a social-ecological system should be to the benefit of the whole. Whereas previous chapters looked at how we can establish a co-creative partnership with nature by learning from and working with her, this chapter looked at how we can design also for nature: increasing the ecological base to leave nature better than it was before human settlement, and doing it in a way that also increases the public estate. This approach makes use of many of the tools and technologies of ecological design, with the caveat that the outcome should be net positive: more nature, more opportunity and more options.

The chapter also touched on the importance of design as a tool for transformation which will be more effective than the current performance measurement tools used to encourage ‘sustainable’ decisions, such as rating and assessment schemes and the either-or thinking they encourage.

Birkeland suggests the open systems thinking of design allows us to make “fertile connections” based on multiple values and options leading to novel solutions.⁴⁴ She further suggests that through design, the built environment can become a solution, not a problem. However, it is not only the built environment that needs to be redesigned, but also our measurement and assessment systems, planning processes and institutions.

In the next chapter we look at a redesigned design and development process that uses whole-systems thinking to develop design solutions that will regenerate both the ecological base and the public estate, allowing a project to create abundance using Positive Development and its framing of what constitutes a sustainable environment.

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Chapter 6

Regenerative Design and Development

“...the continual evolution of culture in relationship to the evolution of life. This defines the work of regeneration.”

Pamela Mang and Bill Reed¹

The terms ‘regenerate’ and ‘regeneration’ have a number of meanings. According to the Oxford English Dictionary, they do not merely refer to reinvigorating or reviving a system, or restoring to a better state or condition; but to *changing* the system into something different and better, as well as to bringing about a thorough moral change or improvement. Regenerative design and development is based on the fullness of this definition – bringing about not just new practices, but also a new way of being, and is much more than urban regeneration “which seeks to bring about lasting improvements in the ... condition of an area that has been subject to change”.²

As discussed in Chapter 4, the term ‘regenerative design’ was introduced by John Tillman Lyle³ as an approach to the design of urban landscapes which enables them to regenerate lost ecosystems. He emphasized the need for a shift from linear throughput processes to circular flows of resources, arguing that “in order to be sustainable, the supply systems for energy and materials must be continually self-renewing, or regenerative, in their operation”.⁴ Apart from Lyle, a number of other theorists and practitioners have developed approaches to regenerative design and development. For example, Herbert Girardet has explored the idea of regenerative cities, expanding on Lyle’s ideas of circular metabolism.⁵ Pliny Fisk and Gail Vittori of the *Centre for Maximum Potential Building Systems developed Eco-Balance™*, a planning and design process that is in essence, “the balancing of resource flows by adroitly managing nature in ways that continually supply our basic needs in a regenerative manner”.⁶ However, these approaches are still focused on the metabolic flows in biophysical systems.

The approach discussed in this chapter is based on the design and development methodology developed by *Regenesi*, a Santa Fe based collective of professionals in design, land-use planning, business and development.



PHOTO: GIANCARLO LIGUORI / SHUTTERSTOCK.COM

“It is not enough to aspire to mitigate the effects of human activity – people need to take their place again as a part of nature.”

Pamela Mang and Bill Reed¹⁴

Moving beyond the biophysical, this methodology contracts with the entire social-ecological system to grow its potential.⁷ While there are some similarities with Positive Development, such as the intention to achieve net positive project outcomes, the outcomes aimed for are much broader. Whereas the aim of Positive Development is to increase the ecological base and the public estate beyond what was before, the aim of regenerative design and development, according to *Regenesi*s, is the “reconnection of human aspirations and activities with the evolution of natural systems – essentially co-evolution”.⁸ Their approach has a strong theoretical base, drawing on organization and human development theory, living systems thinking, bioregionalism and permaculture, and has been tested and refined through use in a number of actual projects. The *Regenesi*s school of thought has also inspired the development of a number of tools, such as REGEN,⁹ a regenerative design framework developed by architectural firm *Berkebile Nelson Immenschuh McDowell* (BNIM) for the US Green Building Council; and LENSES,¹⁰ a facilitation tool developed by the Institute for the Built Environment at Colorado State University. Both of these tools are discussed in Chapter 7 as forming part of an increasingly formalized regenerative sustainability paradigm.

It is important to recognize that regenerative work is not something different from sustainability. As Bill Reed explains, the concept of sustainability is impossible without regeneration. The question is: how do we shift our thinking and being to be participatory and co-creative, therefore co-evolutionary?¹¹ If what we create does not have the capability of evolving itself, entropy means that it will eventually deteriorate.¹² And it is not just the project or living system we are working with that needs the capacity to evolve, it is also necessary to continually regenerate ourselves in relationship to evolutionary processes.¹³ The regenerative development and design methodology developed by *Regenesi*s aims specifically at enabling regeneration and evolution at different levels of the whole system. In this chapter we look at the conceptual basis of regenerative development, as well as this methodology, as illustrated through a number of case studies.

The conceptual basis

The regenerative development and design methodology developed by *Regenesi*s draws explicitly on the ecological worldview, providing an example of how a consciously held worldview can shape new practices and transform the way we engage with the built environment.¹⁵ The methodology is based on four premises:

- Humans are part of nature and as such have a contributive role to play in the health and evolution of the living systems of which they are part, continually participating **as** nature and developing the potential of both the system and its inhabitants.
- It is necessary to develop a ‘new mind’: not just new mental models, but literally a new way of seeing the world, and by implication, the built environment. As Ben Haggard describes it: “a regenerative designer cultivates the ability to see them [aspects of a site or development project] as

energy systems – webs of interconnected dynamic processes that are continually structuring and restructuring a site”.¹⁶

- The regenerative paradigm requires significant changes in the role of the designer and the processes of design. *Regenesi*s use the analogy of the designer as gardener.¹⁷ A gardener consciously designs an ecosystem and is responsible for maintaining its health, and is therefore never finished as the garden is always evolving: changing, adapting, and responding to the pressures around it. For a gardener to succeed he or she needs to develop an understanding of the relevant systems, what David Orr refers to as ‘ecoliteracy’.¹⁸ However, unlike a gardener, a regenerative designer also needs to have social, cultural and psychological literacy so as to work effectively within the community.
- Working developmentally, i.e. improving the value of the whole, taking systems to their next level of development, and building the capacity of these systems to pursue higher order goals, is essential to the work of regeneration.

For the planner, designer and developer, working from these premises has some challenging implications, most difficult of which is to accept that “it’s not about the building”. This phrase kept coming up in interviews with members of *Regenesi*s, as well as BNIM, and others pointing to a number of projects where the initial design intervention became a catalyst for the regeneration of the community and ecosystem, even if no building is eventually built. The Playa Viva project discussed below is an example of how the regenerative development and design process can grow the potential of the whole system and create a culture of co-evolution.

Playa Viva, Mexico

“Playa Viva is designed to provide an environment that will broaden your perspective, open your heart and remind you of the interconnection between all living things.”¹⁹

The conceptualization of the project, a sustainable boutique hotel in Juluchuca, near Zihuatanejo/Ixtapa Mexico, was influenced by the owners’ passion for sustainable building and community engagement. They saw the project as a leverage point for reconnecting nature and providing good social impact, and wanted this ethos to be reflected in the design of the hotel.²⁰ On engaging the *Regenesi*s team (specifically Tim Murphy and Bill Reed), their thinking moved towards a more integral approach. The owners saw the role of the sustainable hotel as developing the regenerative capacity of both natural and human systems; setting its goal as “not just to do less damage (building green) or be net neutral (sustainable), but to make a significant impact in creating a better local economy, more resilient and thriving ecosystems, and still have a profitable business endeavour.”²¹



PHOTO COURTESY OF PLAYA VIVA BY RANDOLPH LANGENBACH

The importance of this project does not lie in the architecture, but in the role the project plays in the regeneration of the social and ecological systems. While the hotel is beautiful, peaceful, passively designed and inspiring, the building project served only as a node of influence that resulted in the establishment of community businesses, the restoration of the local ecosystem, and an ongoing process of engagement with stakeholders, including visitors, to transform both people and place.

Playa Viva sits at a meeting point between saltwater and freshwater systems. This convergence of ecosystems enables a symbiotic exchange and transformation of resources. The *Integral Assessment* and *Story of Place* identified several “potential-rich transformative nodes” where ecological, social and economic flows intersected to create potential leverage points.²² The first set of these enabled the restoration of the local ecosystem, which helped the natural bio-diversity to return, and increased the resilience of the native ecosystem. The Playa Viva Reserve aims to restore at least 85% of the resort’s 200 acres (86 hectares) to coastal forests and wetlands, bringing back mangroves, hardwood trees and a variety of indigenous flora and fauna. Odin Ruz, head of permaculture, describes how the removal of invasive grasses and dredging of the water courses to restore water flow saw the return of shrimp, and with them also the return of ducks and many other bird species.²³



The turtle nursery. PHOTOS COURTESY OF PLAYA VIVA BY DANIEL CAMARENA

The second set of leverage points deals with the role of the project to build capacity in the community, as without the support of the community, gains made in terms of biodiversity can be quickly undermined. Programs in the community focus on “the golden triangle” of education, health and economic development. Programs include improvements to the structure and providing supplies to local schools and health clinic, a recycling program that raises money and keeps trash out of the river; a partnership with a local artisanal salt manufacturer; and support for the local sea turtle nursery, which is 100 per cent volunteer-based. The resort also began offering local farmers organic agriculture courses after noting that the workers who helped to establish the organic gardens were “taking home the principles of poly-cultivation, soil regeneration, organic pest control and use of plants for medicine.”²⁴ The hotel purchases the organic produce and is helping to expand the organic food market into the broader community. The strategy is to provide both push and pull for greening the local supply chain.



Local food production, salt making and recycling. PHOTOS COURTESY OF PLAYA VIVA BY DAVID LEVENTHAL

The third set of leverage points was to provide a transformative experience for visitors. As the owner describes, these experiences can be “as simple as transforming from a busy hectic life to one of observation ... or it can be a much deeper transformation that creates a bond with the ecology and local community”.²⁵ Aside from enjoying the amenities and natural environment of the resort, visitors can also participate in existing community and ecological projects, or suggest their own programmes.

The last set of leverage points lies in the design of the actual buildings. The master plan ensured that all buildings were passively cooled and lit with minimal reliance on electricity; this meant that the resort could live within its onsite energy budget with a 5MW PV system that is the car-park shading system. Similarly, the site was designed within its water budget, with an aim of actually improving water quality. Waste water is treated, nutrients reused, and the lake restored. Landscaping is based on permaculture principles to improve soil condition, using appropriate local drought-tolerant and aesthetic/food-bearing species to attract birds and beneficial insects.



PHOTO COURTESY OF PLAYA VIVA BY RANDOLPH LANGENBACH.

After completion of the first phase of the project, the decision was made to delay the next phases to ensure that ongoing development of infrastructure, ecosystem and communities remain within the capacity of the system to deal with the growing impact and needs of the resort community. However, the strong relationships built with the community and guests will ensure the continuation and evolution of the project. As Bill Reed states: “...the real victories in this project are the relationships between the village, the visitors, its farming practices, its economy, the watershed and the ecosystem in general; the buildings are the least important aspect of regeneration. In fact what I think is the most powerful, is that the teenagers are coming back to live in the community.”²⁶

This is reiterated by David Leventhal, the project developer, when he states “I am most proud that we have created the biggest employer in the area with 15 employees, all local, who are learning to live a more sustainable life and taking those principles home to their families.”²⁷

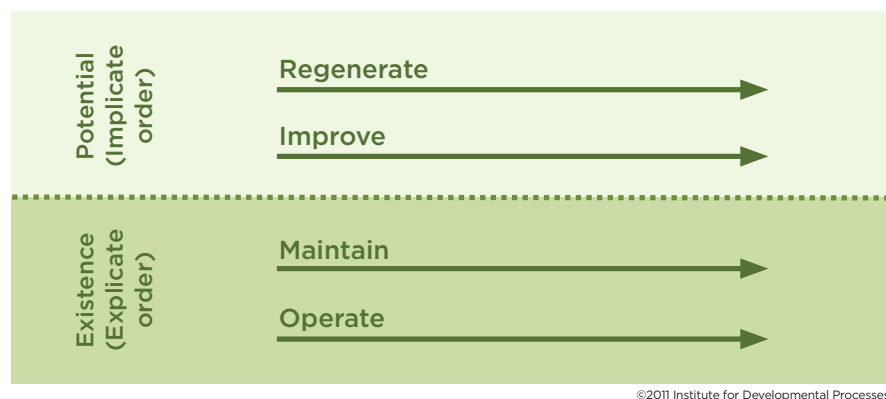


PHOTOS OF THE CONTEXT OF PLAYA VIVA. PHOTOS BY COLIN DURRANT AND RANDOLPH LANGENBACH

Six specific ideas inform the work of *Regenesi*: regeneration as a level of work in living systems, development and design as necessary corollaries, place as core, pattern literacy, the power of story, and potential.

Regeneration as level of work

Physicist David Bohm proposed the theory that the whole of all possible existence is enfolded within every aspect of itself (the implicate order).²⁸ Matter is that part of the implicate order which manifests (has been unfolded) in relatively stable form and appears as the explicate order of the four-dimensional world of objects in space and time. Charles Krone, the organizational architect, took this idea of enfolded and unfolding potential and combined it with living systems theory to develop a framework known as the Levels of Work in which every living system must continually engage.²⁹ The bottom two levels (‘working below the line’) deals with the explicate order, i.e. that which already exist; the top levels (‘working above the line’) deals with the implicate order, i.e. potential that has not yet manifested. Working at all four levels is essential for a system’s ongoing health and capacity for evolution.



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Figure 1: Levels of Work³⁰

‘Below the line’ work deals with the system as it currently is, increasing efficiency and maintaining effectiveness. Work at these levels is critical to the continued existence of the system, and inability to manage these two levels will undermine efforts to improve or regenerate the system. However, as the lower two levels are in the ‘real’ world and therefore ruled by entropy, limiting work to the levels of operate and maintain makes it impossible to move “beyond slowing the rate of depletion and degradation – materially, psychically and spiritually”.³¹ Green building, with its emphasis on efficiency, control and limiting negative impacts, sits very much at the ‘operate’ level, while resilience in its narrow interpretation can be said to sit at the ‘maintain’ level of work. ‘Above the line’ work aims to develop and increase the potential and creativity of the system, revealing its potential in relationship to larger systems; with regenerative level work producing “the field within which the improvement of living systems can take place” by asking what the system’s unique role is in advancing the whole.³² The integrated whole presented by the Levels of Work can be seen in the *Regenesi* approach,

which starts with understanding the unique potential (or essence) of a place, before asking what the role of the project is in manifesting, growing and co-creating that potential. It is from this understanding that the development and eventual design of the project proceeds, and it remains a touchstone throughout the lifecycle of the project.

Development + Design

Pamela Mang proposes that design and development are “distinct yet synergistic aspects of a regenerative methodology”, with development as the process from which the design flows.³³ *Regenesi*s suggest that the work of regenerative development is to a) determine “the right phenomena to work on or give form to”, thereby informing design solutions; and b) to build the “capability and field of commitment” which will allow stakeholders to act as both co-designers and stewards of those solutions.³⁴ That is, regenerative development firstly determines the questions the design will respond to, and as such looks for the greatest leverage points for the development of potential in the system. Secondly, regenerative development facilitates the understanding, caring and commitment of the stakeholders because they own the designed solutions. Regenerative design then uses a set of strategies and technologies to build the self-renewing capacity of the systems within which design interventions take place. This process allows the participation of the different professional disciplines, as well as social, educational, cultural and economic systems and stakeholders, to achieve a broader and deeper scope of engagement. However, their understanding of development goes much deeper, as Reed explains below.

“Develop means to bring forth new potential. The simple definition is to add value. You can see how a building developer would take that word and say “yes I’m adding value by building this building.” But if we look at this whole system, to add value means that we’re continually allowing people, living systems, to create their new potential, to actually participate in moving forward. So development means in order for it to be whole, we have to be working on our own development, as well as participating and being aware of how we are in relationship with other living systems so their development can be meaningful to them.”³⁵

Place as core

The third idea informing the regenerative paradigm is the core position of place in development. This goes beyond the glib assertion that any design solution needs to be place-based, as proposed by the Critical Regionalism of Kenneth Frampton.³⁶ ‘Place’, from a regenerative point of view, includes far more than topography, climate, light and tectonic form. It is a construct which emerges from the entire network of ecological and cultural systems and their interactions within a geographic area. The purpose of development is to “contribute to the capacity of all of the natural, cultural and economic systems that it affects in a place (to grow and evolve their health and on-going viability)”.³⁷ It can be argued that it is only through their relationship to place, and the possibility of playing a co-creative role in the development of that place, that people find the intimacy and meaning that fosters ongoing stewardship.³⁸

“The caring about a mutuality of relationship that comes from deepening connection with a living place is essential to launching and sustaining a regenerative process.”

Pamela Mang and Bill Reed⁴²



PHOTO: D HES

Pattern literacy

The ecological worldview enables us to see the world for what it is: a complex, adaptive and dynamic system in which, as Jan Smuts pointed out, the whole is much more than the sum of the parts.³⁹ Many of the problems we are facing today came about as a result of treating complex systems as if they were complicated systems; a mistake perpetuated by both conventional and green building engagements with sites and their biophysical and social environments. When dealing with site as a complicated system, the tendency is to collect data to elucidate understanding. The result is often an unmanageable propagation of data which produces little understanding of the actual workings and qualities of the site and how to engage with this. A complexity approach instead focus on understanding patterns of relationships.

While the regenerative development and design process does collect large amounts of data, the kind of data collected and its analysis aims to reveal these relationships through pattern recognition. Patterns provide clues to how systems self-organize and sustain themselves, and even what their evolutionary potential may be. Using pattern literacy to ‘read’ a landscape, allows the designer to understand the flows and relationships shaping a site and determining its potential, and how to harmonize with and contribute to the site through their design. Permaculture is an example of using pattern as a way to meaningfully interact and contribute to site, allowing us to shift “from dominance to intimacy with nature through mutually beneficial interaction with the entity of place”.⁴⁰ By understanding the relationships and metabolic flows of a place, it is possible to create “human systems whose metabolic patterns resonate with and amplify the metabolic patterns of their place”.⁴¹

The Sundance Resort story below provides a clear illustration of the ability of pattern literacy to foster development that is in harmony with the potential of the site, and avoid costly and dangerous mistakes. The developers dealt with the site as a complicated system: collecting data on geology, hydrology, archaeology and seismology. Analyzed as independent data sets, no obvious concerns were raised. *Regenesi*s approached the site as a complex system, and made a sobering discovery by looking at the patterns revealed by the relationships between the findings of the four scientific studies.

Sundance Resort, Sundance, Utah



Avalanche. PHOTO: WWW.SHUTTERSTOCK.COM

Sundance Resort is a ski resort located 13 miles (21 km) northeast of Provo, Utah, spanning over 2700 acres on the slopes of Mount Timpanogos in Utah's Wasatch Range. The client wanted to build an environmentally responsible resort to reflect their reverence for the beauty and majesty of the place. *Regenesis* had worked with the client before and were asked to undertake an *Integral Assessment* and create a *Story of Place*. Doing due diligence, the corporation had the site for their new 5 star hotel assessed by archaeologists, geotechnical engineers, soil scientists and hydrologists. But no one had brought the data from the four together until *Regenesis*, in looking at the relationships between the data in the four reports, realised that there was a reason there

were no archaeological traces of humans on the site. The site was located on a glacial moraine (unconsolidated earth) in the path of three avalanche trajectories, and on a previously undetected earthquake fault. The developers now ensure they have an in-depth understanding of the site for all their projects. Further, and more demonstrative of the 'development' aspects, the Sundance *Story of Place* is showcased as a context for visitors to understand the place but also as the framework for organising a North Fork residents association which works to ensure that any further development was in harmony with the character of *the place*.

The power of story

Throughout human history, story has played an essential role in shaping and maintaining relationships between people, the place in which they reside, and past and future generations. Stories can also be powerful agents of change and, as Thomas Berry points out, "we are in trouble right now because we do not have a good story, we are between stories... and have not yet learned the new story".⁴³ Stories help us to organize and make meaningful connections between different pieces of information in a way that "reveals a holistic, understandable picture".⁴⁴ They also create collective identity, deepen connections and provide meaning.

Through the development of *Story of Place*, *Regenesis* taps into the power of story to a) understand how best to align human interventions with the processes and relationships already on site; b) evoke a sense of caring and ownership of the place; and c) provide an ongoing learning process that will support the co-evolution of people and their place. Weaving 'who' the place is into a coherent narrative, not only helps seemingly unrelated aspects to be seen as part of a whole, but also supports the ownership of the initiative as the stakeholders see how the project fits into the larger story; their story. As Joel Glanzberg explains, it is about "getting the fish to be able to see the water they are swimming in, so that they can then be aware of it and work on it in a conscious way".⁴⁵ This level of engagement with a project creates a collective identity and purpose, putting in place a collaborative system that can help the project continue to engage with the stakeholders long after the designers and builders have left. Further, the story field that is developed from an authentic engagement with place can result in a project that "has an acupuncture effect, creating a ripple effect out far beyond its direct impact".⁴⁶

Getting fish to see the water

The power of *Story of Place* to engage people and make them aware of their relationship to their place is illustrated by the following story recounted by Pamela Mang.⁴⁷

“We introduced the *Story of Place* on the morning of a five day intensive charette. And so we presented it, then engaged the community that was there: all the people that had been interviewed and the city folk, plus the design team in a dialogue to pull more information out. And then we took a break. One of the fellows came up to Nicholas [Mang] who had presented the more human community side of the patterning, bringing them together. And he said: ‘Are you going to be here for lunch? Please say you can stay, Nicholas.’ So the guy raced home and got a children’s book that he had created for his kids and grandkids and brought it back. And he said: ‘This is what you were saying. This is who we are.’ You could see that suddenly he could see a greater significance in what he saw and why it was important. And you know when that’s happened, you’ve got people who are connected at a level of deep caring for their place. It is the greatest source for transformation and for regeneration.”

Potential

The final concept informing the work of *Regenes* is the idea that all living systems have potential, i.e. “the inherent capacity for coming into being, for growth and development” that is defined by the unique essence of the system.⁴⁸ Regenerative development looks at the potential of the project in relation to the essence of the larger system in which it is nested, asking how the project can contribute to the integrity, life and viability of this larger system.

A Regenerative Methodology

The framework in Figure 2 summarizes the regenerative methodology developed by *Regenes*.⁴⁹ At the highest level it is informed by philosophical assumptions grounded in the ecological worldview, which provide a strong set of guiding premises and concepts (as discussed earlier). This theoretical and conceptual approach (how one thinks) informs the development framework and overall system of methods and processes used (how one works), and leads to the methods, tools and techniques used (tools to do the work).

Regeneration is first and foremost “a process of engagement with the purpose of healing living systems and birthing a new spirit to consciously participate in expanding the healing process”.⁵¹ It requires that participants become aware of the whole system of which they form part, so that they can consciously experience the relationships generating this system. To enable this experiential and participatory approach, the regenerative methodology developed by *Regenes* is guided by three approaches: Living Systems Thinking, permaculture, and developmental change processes. **Living Systems Thinking** enables an understanding of place and the living systems and organizations in that place as dynamic wholes evolving and changing over time through their relationships. It requires that these systems be seen as “a system of energies or life processes, rather than a system of things”. These processes form part

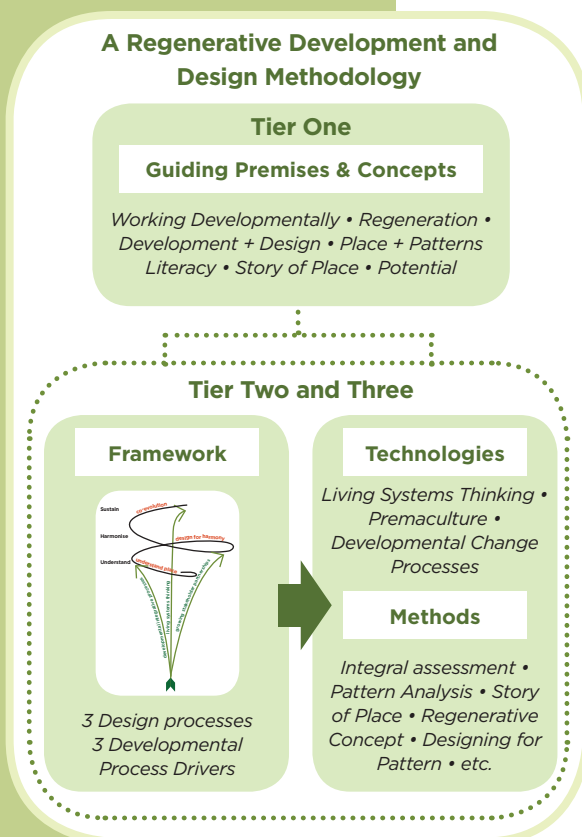
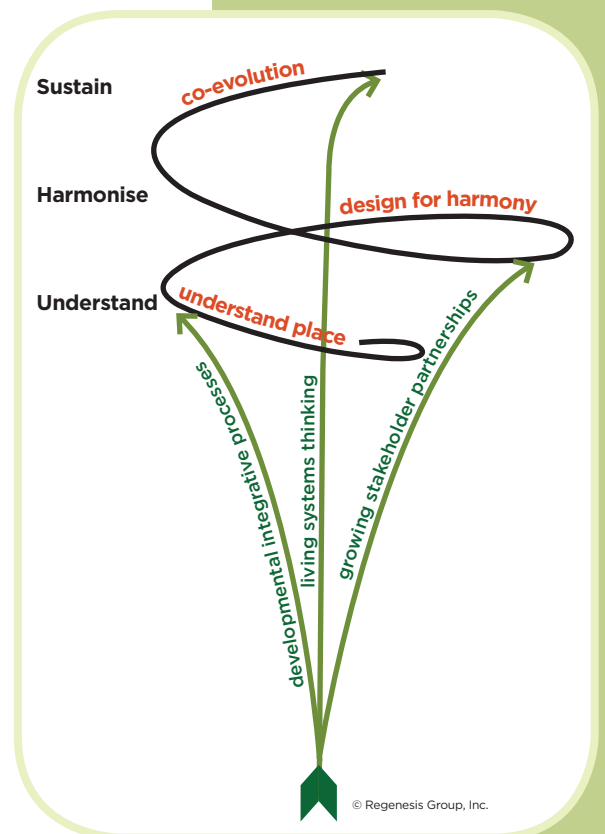


Figure 2: Key elements of the Regenerative Development and Design Methodology⁵⁰

of a web of interrelated relationships spanning many scales. Imaging these relationships provides the basis for illuminating the core organising principles of the system and the potential that the system can manifest. **Permaculture** provides the pattern recognition ability that, together with living systems thinking, enables identification of the essence of place, which in turn, reveals the design solutions and management techniques that will enable that potential to manifest. **Developmental change processes** allow design teams to enter into a co-creative dialogue with the stakeholder communities through storytelling, creating a ‘story field’ that shifts the focus from problem solving and conflict resolution to seeing the potential of the whole system and how this potential can be evolved.⁵² They do this through engaging with all the Levels of Work, thus carrying out an actual project informed by seeing the potential (of the whole and the project) and how it could be evolved (above the line – regenerate and improve levels), to inform the direction for how to design, construct and operate (below the line – maintain and operate levels). Together this creates a system of processes structured over three phases.

The first phase is about understanding and conceptualizing the right relationship to place. The second is about designing for harmony with place, and the third is about fostering a culture of co-evolution, mutual investment and the potential for the project to sustain its intention. Within each of the phases, *Regenesi*s uses a broad set of tools and approaches to facilitate their work. Three developmental processes drive the activities in these phases: Growing Stakeholder Partnerships, Living Systems Thinking, and Integrative Developmental Processes. The phases overlap and are iterative, even though they can be seen, from a design perspective, as aligned with the main phases of the design process. Phase 1 aligns with the project inception phase in which the brief and project guidelines are developed; Phase 2 aligns with design development, design detail/documentation and construction; and Phase 3 aligns with the often forgotten post-occupancy maintenance, operations and monitoring phase: building the structure, capacity and commitment in the community to support the ongoing function and evolution of the project and its place. As such, Phase 3 runs continuously through the first two phases. Figure 3 illustrates this framework.



Phase 1: Understanding the right relationship to place

The main purpose of Phase 1 is to understand the site and its community in relationship to place, through the dynamics, patterns, relationships and potential inherent in that specific place; and to conceptualize how, through right relationship, the project can be a regenerative force.⁵⁴ To do this a strategy of data and story collection is followed. The first step is to *define the*

Figure 3: Regenerative development and design guiding framework⁵³

study area by asking ‘how big is here?’ This may seem simple, but when working from a systems perspective in which everything is connected, it is both challenging and significant to consider the boundaries of the place in which the project is situated. It may mean drawing boundaries as broad as the watershed, or the bioregion.

Once the boundaries are defined, the next step is to do an *Integral Assessment* that captures the whole of the system. The Assessment covers the cultural, economic, geographic, climatic and ecological aspects of the site, discovered through site visits, interviews, reports, maps and other data. It aims to discover the core patterns organizing the relationships and dynamics of the place, giving it its character and nature. These core patterns shape the structure for the *Story of Place*, and provide a reference point to anchor the project.

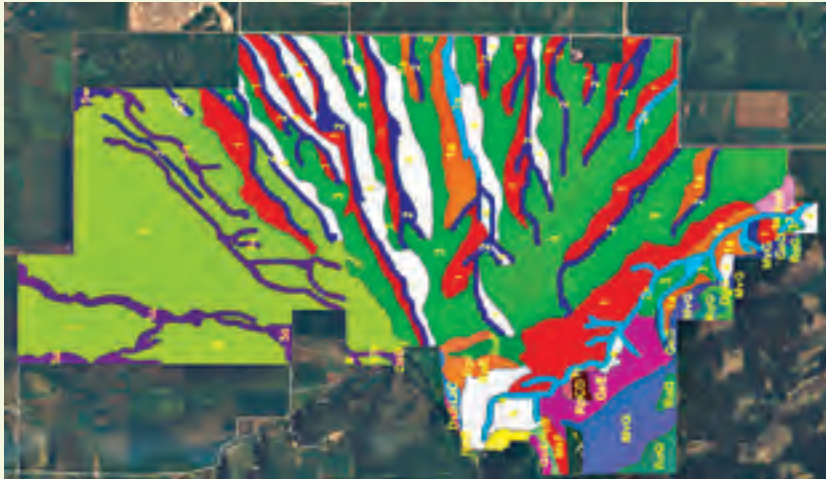
The third activity is the *Story of Place*, which takes these patterns and weaves a narrative that enables people to connect to and see themselves in relationship to the uniqueness and character of the place. The story describes the organising principles of the place, what *Regenesi*s refers to as its essence, and the vocation of the place, i.e. its distinctive generative role in the larger system. This process also helps the design team to build mental maps of the leverage points where “small initiatives can energize the system as a whole”.⁵⁵ The story of Mahogany Ridge illustrates how an understanding of pattern can identify the vocation of a place.

Mahogany Ridge Resort, Driggs and Victor, Idaho⁵⁶

The intention of this project was to develop a 1,300 unit resort community on the 3,500 acres of economically unviable farm land in the Grand Teton Valley. The site was part of an alluvial fan deposited by water flowing from the Big Hole Mountains to the Teton River and comprised mainly of unviable farmland. *Regenesi*s was brought on board to help the developer to work with local community opposition to the development, and in so doing, help deepen the client and community’s perceptions about the potential of the project. The patterns that emerged from the *Integral Assessment* and *Story of Place* told the story of a once richly biodiverse and connected ecosystem, with the site acting as the living bridge between the mountains and the river. However, intense irrigation and farming practices had broken the connectivity between the mountains and the river – the stream had become intermittent, the water table was lowered, habitat corridors broken, migratory patterns disrupted, and fish were no longer able to spawn in the upper reaches of the streams.⁵⁷ It was clear that maintaining the current function of the land would only continue the degradation. The question was what kind of development would act as a regenerative force? The ‘vocation’ of the site as living bridge provided a clue to what the project could be, and how the act of development could restore the living bridge, reconnecting the community to the place.



Mahogany Ridge – connecting mountain and river. PHOTOS: REGENESIS



Understanding the flows IMAGE: REGENESIS

Regenesis worked with the developer to ensure the design would reconstruct the bridge, with the resulting benefits of reconnecting the hydrological and nutrient cycles, re-establishment of wildlife corridors, and restoration of the native riparian and upland vegetation communities. This would restore the capacity of the site so that it can become the source for ongoing regeneration and development of potential, thus ensuring the provision of ecosystem services for the community.⁵⁸

Once the design team has been able to bring to the surface stories and patterns from the assessment, the local stakeholders are engaged to get their reaction to what is being uncovered and see if it resonates with their experience of place. This reflective dialogue evolves the understanding of place, as well as a shared meaning of what the place is and can be. While this story is alive in the group, the first set of guidelines, principles and concepts for the design are developed. These are refined and differences reconciled using a framework called the Law of Three Forces.



PHOTO: WWW.SHUTTERSTOCK.COM

Difference between essence and vocation

Essence is the quality which indicates the true nature or distinctive character of something or someone; that identifies or makes them who they are. **Vocation** is how they manifest these aspects of their essence: what is meaningful to them and others, the repeated patterns of their work over time (for example in their job, or jobs, or non-profit work, or how they interact with others). In the example of the Mahogany Ridge Resort, the essence is that the site has a deep purpose and process of linking or connecting the mountains and the river ecosystems. Its job or vocation is to be a living bridge.

The Law of Three Forces⁵⁹

The purpose of the Law of Three Forces is to creatively develop solutions to difficult or wicked problems. As described by *Regenesis*, “use of the Law of Three can result in more effective and meaningful interactions and planning, while creating a culture in which everyone is focused on moving ahead with a higher degree of alignment and with what best serves the greater wholes”.⁶⁰ The idea is that two seemingly conflicting, or even paradoxical, ideas are held in the decision making space at the same time; valuing both while leaving space for a new idea to emerge. Central to this approach is the belief that both ideas have value and, while being different, both can potentially be right. The hypothesis is that restraining (conflicting) forces stimulate creativity while they are both valued, however they impede creativity if seen as barriers or without merit. This is explained in Figure 4.

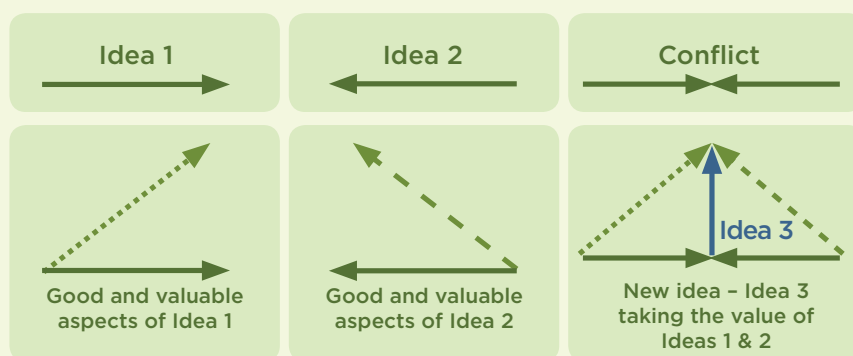


Figure 4: The Law of Three Forces

Idea 1 represents the *activating force* – the idea that starts the conversation. It is the impulse to produce some object, thought, or action and originates in the core value of creating viability and building new capabilities. It has the quality of thrust and propulsion in a direction.

Idea 2 is the *restraining force*, the paradoxical or conflicting idea that originates in an impulse to have things in a particular way, to be unique, and to be complete and whole. It has qualities of denying, forming and utility.

Idea 3 is the *reconciling force* integrating the best aspects of Ideas 1 and 2, and comes from the impulse to provide or increase the value or benefit for all levels of the system. It has a quality of harmonising, aligning or attuning.⁶¹

The fourth and final activity is to define or uncover what the real potential of the project is, to *enable regeneration*. This begins by revisiting the aspirations of the project, revising synergies and conflicts from within the much richer understanding of the place. *Regenesis* take their project partners through a three step process to develop this regenerative concept:⁶²

- They **envision** the higher order potential through asking two questions: What would this place really be like if it lived up to its full potential and vocation? What can it contribute?
- They then **appreciate and celebrate** the project’s aims and aspirations, again guided by questions: Who and what is this project serving and how? What will its meaning be if it achieves this? Why is that significant in this place?
- Finally, they **translate** the project’s aspirations and site understanding into the project concepts by asking: What can those involved do to help the project reach its potential? Can the project be tied and linked to the systems around it? The key, they have found, to developing a powerful concept at this stage is to create an uncomfortable place where the potential of the site and the project need to be reconciled; deepening the understanding of both until an idea emerges that achieves this – once again using the concept of the Law of Three Forces.

Phase 2 – designing for harmony

In Phase 1 the objective is to understand the larger system and its core patterns so as to develop an idea of the project's role within this place. Phase 2 drills down to the specifics of design, reconciling the potential or vocation of the place and the project aims and aspirations to develop the regenerative design concept which “reveals a greater potential for both”.⁶³ Such a design would aim to harmonize the buildings or infrastructure with the patterns of the land and its cultural and ecosystems, to improve all, including the inhabitants of the place. This requires that the project and its site are seen as situated within a living system with its own unique characteristics, meaning that solutions cannot be formulaic or copied from elsewhere. Permaculture design principles are particularly useful for seeing the unique site relationships and what they would mean for determining appropriate engineering and design solutions.

Central to this phase is ensuring that the project holds on to its original key aims and values. One way of doing this is to establish a core team whose main responsibility is to “remember, hold, and promote the core aim and higher aspirations of the project”.⁶⁴ The establishment of such a core team was one of the factors behind the success of Curitiba's urban sustainability programme. The failure of such a core team can lead to a project becoming stuck in the planning phase, continually reinventing the wheel, as is illustrated by the story of Yestermorrow.

Yestermorrow, Warren, Vermont

This case study illustrates a very effective technique for getting stakeholders to understand each other's point of view, but it also demonstrates the importance of ongoing engagement and holding of the vision. Yestermorrow was started by a group of architects and built environment professionals who wanted to have a place where the practical skills of design and building could be taught. The campus is a 35 acre (15 hectares) site deep in the Vermont countryside near Waitsfield. As well as teaching practical building skills, the school aims to teach the design process and different approaches to sustainable design and construction – passive solar, strawbale, Permaculture and so forth. More than thirty years on, the demand for these courses continues to increase as architecture schools teach less and less of the practical aspects of design, while environmental concerns increase. The school needed to plan for expansion.



PHOTO: D HES



When Bill Reed, John Boecker (7Group), and Joel Glanzberg were asked to lead the development of a master plan for the Yestermorrow campus, the school already had several master plans on file, but none were ever implemented. It was quickly realised that they did not really need a new plan, but rather a process for decision-making and developing a common vision. The problem was consensus, not necessarily the plans themselves.

So, as a first step, they asked if the board would take the class Bill, John and Joel were teaching at the school so that they could understand regenerative development. Following the class, the board met for two days to outline their purpose statement and think through the relationship Yestermorrow would have with its staff, students, community and environment. They also considered what the requirements and aspirations of each of the stakeholders were. The stakeholders were identified as the students, co-creators (staff), community, investors and the earth's processes (nature). The defining essence of what each wanted was:

- Students – skills for place-based, community living.
- Community – developing sustaining and integrated self-reliance.
- Co-creators – developing authentically engaged collaborative work.
- Investors – resourcing and enriching co-learning, hands-on design communities.
- Earth's processes – “Beavering” (creating new landscapes and ecological niches) and foresting.

Once the vision and purpose was defined, the team started to do the research and data collection required to create the *Integral Assessment* and *Story of Place*. This allowed the integration of the aspirations of both the board and the place, and informed the new master plan. However, Bill and John were hesitant to present the master plan in the traditional manner. They knew that there was not enough time to present the full extent of the plan, and that this would result in dissatisfaction, as each party would see it through the lenses of their own interests and responsibilities. For example, the facilities manager was being very concerned about where the snow clearing equipment needed to go. Instead of the traditional ‘question and answer’ format, they decided on another tactic:

- A short presentation on Yestermorrow’s mission and fundamental aspirations.
- A laying out of the master plan on the table.
- 15 minutes in silence to look at the master plan and write down any questions.
- A cataloguing of all the questions on the white boards.
- Grouping the questions and then answering them.

By approaching it in this fashion, not only did every person feel that their questions had been addressed, but everyone else could see the complexity of their fellow stakeholders’ needs. Taking 15 minutes of silent contemplation and then an hour of seeing everyone’s questions going up, also tempered the immediacy of individual responses, avoiding the usual knee jerk reactions that often lead to conflict.



Students designing at Yestermorrow



Conceptual Master Plan PHOTO & IMAGE: YESTERMORROW

The master plan presentation was a success and achieved buy-in from the group. But 12 months on, Kate Stephenson, director of the school, spoke about the problem of including those that had not attended the session. With part of the team having experienced the planning process, the same issues which previously lead to the failure of the other master plans was resurfacing. This shows the ongoing nature of this work. If true collaboration, co-evolution and development are the principal drivers behind regenerative projects, then there must be a process of constant engagement and returning to the core values. Hence the need and importance of the core team.

Phase 3 – Co-evolution

A regenerative project aims to set conditions in place which will ensure ongoing co-evolution and mutually beneficial integration of human and natural systems. *Regenes* therefore sees a regenerative practitioner as one that ensures that there are systems in place to allow for the ongoing regenerative capacity of the project; and that these systems can be sustained through time. Ben Haggard proposes that “to sustain the ongoing enrichment of potential that is the hallmark of regenerative development, projects must act as a continually unfolding source of inspiration and spirit for all of the stakeholder constituencies affected by them”.⁶⁵ To achieve this, it is necessary to grow stakeholders so that they are able to fulfil their role as regenerative agents in the larger system.

As regenerative work is first and foremost about shifting to a ‘new mind’ and new way of being, growing the capacity and potential of stakeholders requires not just learning new skills, but “integrating inner development processes with the outer development work”.⁶⁶ *Regenes* uses a three-pronged approach to growing stakeholders. The first prong is about discovering a shared identity through the *Story of Place* process, allowing stakeholders to transcend artificial boundaries. The shared connection to place and sense of belonging is fertile ground for the development of the caring and connection to place that is necessary to support and evolve both project and place. The second prong is a redefinition of what is at stake – the vision of what could be. Instead of a focus on what is wrong, stakeholders are reminded about the shared vision and opportunities created by the potential that a regenerative project brings to the whole system – *what could be* versus *what is*. The third prong is to shift the roles of all involved to that of partner-gardener. The activities in Phase 1 prepares the stakeholders for this by making them aware of the role they can play in creating the conditions for the ongoing health and regeneration of the place they inhabit.

For all to become partner-gardeners, it is important for stakeholders to develop skills in whole and living systems thinking that will enable them to see and understand systems dynamics and the implications of the patterns and flows of resources in the system. Furthermore it is important to “manage one’s own state in order to maintain the clarity and breadth of mind and mental discipline required to think systemically all the way through a process”.⁶⁷ The Willow School, discussed below, is an excellent example of Phase 3 at work.

“The Willow School experience will help each child to be knowledgeable and wise, curious and creative, responsible and confident. The Willow School children of today will grow to become the leaders of tomorrow.”

Renae Jensen⁶⁸

Case study – the Willow School

The Willow School, a small, independent co-educational day school for students in kindergarten through eighth grade, is located on a 34 acre (14 hectare) site near Gladstone in New Jersey. The founders of the Willow School, Mark and Gretchen Biedron, could not find a place to educate their children in a way that promoted academic excellence, a love of learning, and an ability to experience the wonder of nature. They therefore set out to develop such a school themselves. We met Mark ten years into this journey. He explained that initially they did not really consider green building, and it was through a chance conversation with local landscape architect Anthony Sblendorio, that they saw the connection between their aspirations for the education of their children, and the authentic activity of creating a green campus. They halted the design process of their new school buildings, which were 70% complete, asking the design team to go away for two months and come back with a response to the need for the school to reflect its educational and green objectives in the design of the campus.

As a first step, it was decided to aim for LEED certification, and though initially some in the design team thought it would be impossible, the change to an integrated and collaborative design process resulted in the Phase 1 building achieving LEED Gold, and Phase 2 LEED Platinum. Elements such as passive design, natural light, use of natural materials, rainwater harvesting, a healthy indoor environment and natural landscape, means the campus sets a standard of green design excellence. Phase 3, the Health, Wellness and Nutrition centre, is designed to produce more energy and water than it uses and no waste that isn't a resource, aiming for a *Living Building Challenge* rating.

The involvement of *Regenesis* added an entirely different dimension – integrating understanding of place, site design and use of building into a curriculum aimed at helping students understand patterns, connection and the potential in the systems of which they form part. This changed the way the school saw itself, with the campus becoming a textbook for responsible and regenerative living. The aim is to create an environment in which students can develop “a keen sense of awareness of their true place in the natural and social systems”.⁶⁹ Richard Eldridge, former head of the Willow School, explains the school's vision as follows:

*We are a school that sees sustainability as a key element in our relationship with the natural world as much as with our social world. Children learn to share intellectual resources with peers to sustain a community. They also learn to share, respect, and conserve nature's resources. As we marvel at the gifts nature provides, we also learn that nature, like our social relations, must not be wasted by profligacy or indifference.*⁷⁰

The *Story of Place* revealed that the site was formerly a productive forest, but was severely degraded by overgrazing and unsustainable farming practices. Regenerating the forest became one of the main design goals. To this purpose the entire site was designed to enable ecosystem regeneration. As one of the main roles of a forest is to serve as a place for water infiltration, a core organizing principle is water collection and treatment using natural

processes. The design includes a number of design and infrastructure solutions, such as a constructed wetland for waste water and a deep pool wetland for stormwater management; as well as measures to facilitate rain water harvesting and storm water management such as permeable paving and bio swales. Through the use of nature-based designs and student projects, students, staff and community are taught how they could partner with the forests and engage in the regeneration of the site and its evolution to “higher levels of effectiveness and ever-increasing capability to support life while it stores, filters, and gradually releases stormwater”.⁷¹ This awareness of natural systems and their functioning is woven into the curriculum, for example “when the school studies water, each class explores the topic in a unique way, based on the school’s water systems: art classes draw all the elements of the system; math classes solve problems using units of water; even music classes sing about water”.⁷² Students are also exposed to the impact of their activities on water – the school water system is continually monitored and students can see how much water flows through the system, as well as how much of this water is reused.



Water treatment system, regenerated forest landscape and a sunshine fairy. PHOTO: D HES

Furthering the connection between place, purpose and curriculum is an ongoing process. The aim for the new wellness centre is to be a building that “truly illustrates how food shapes our lives and connects the growing, preparation, consumption and waste generation, all under one roof.”⁷³ The focus on local food adds another dimension to the school and its curriculum: incorporating all aspects of the food production system within the school boundaries, and discovering the connections to the community and ecosystem within which the school is nested.⁷⁴ *Regenesis* is assisting the school not just with the place-based aspects of local food production, but

also how to include this in the curriculum. In this, the Willow School becomes an example of the changing role of the professional team – shifting from design and planning of places and spaces, to developer of spirit and potential, creating the conditions for the ongoing evolution of self, community and ecosystem. As Bill Reed describes below, the building became just a leverage point for a much bigger transformation.

They hired us to do a green building. We gradually morphed the project so that the building became secondary and the relationships of the school, with the Faculty, the students, the community, the ecology became more important. The building became an acupuncture point, if you will, for that level of engagement. But the shift happened over time. It was very difficult for them to perceive that in the beginning because they needed a building. But by actually engaging with them around the purpose of their school and the nature of the thinking that was going behind their school, the building was seen through a different lens. And that allowed that whole progression that you saw over twelve years now, to be quite transformative.⁷⁵

The other important example the Willow School offers is the importance of the client as holder of the vision. Mark Biedron speaks of this as a journey of continual learning and exploration, holding the vision and purpose while dealing with challenges and obstacles, because “once your eyes have been opened to the higher level of potential, there is no way to accept a lesser option”.⁷⁶



Mark Biedron contemplating the water treatment system.



The goal of regenerative development as an ever-present touchstone.



Demolished old barn becoming a library.



Honouring the history of the barn.

PHOTOS: D HES



Classrooms provide a biophilic learning environment.



Running on sunshine.



Native meadow landscaping provide habitat for small creatures and an appreciation of the wild aspects of nature.



All spaces are connected to the landscape.



Opportunities for connection to each other and to nature.

PHOTOS: D HES

Conclusion

The shift to an ecological worldview requires that we think about the world in terms of systems and relationships, and consider not just our place, but also our role within 'our' place. In previous chapters we have looked at rebuilding the human-nature relationship through designing for and with nature. The regenerative paradigm, discussed in this chapter, took it to another level by looking at the role of humans in this relationship as co-evolutionary partners, existing in symbiotic relationship with the land and communities they inhabit.

This role requires that our development and design efforts are not only restricted to 'below the line' work of reducing negative impacts, being more efficient and effective in our use of natural resources and restoring degraded social-ecological systems; but that we also need to do the 'above the line' work of building the evolutionary potential of the whole system: the biophysical system of buildings, infrastructure, and natural systems, as well

“So this work is about becoming conscious of how we participate in order to create a state of evolutionary health.”

Bill Reed⁷⁷

as the culture, economy and politics of communities and the relationship between these.⁷⁸ And that we then use this ‘above the line’ work, to shape and direct the ‘below the line’ work. This requires that we not only develop the ability to understand and work with systemic frameworks, and can see and understand the flows and patterns shaping a living system, but that we also transform internally, asking how can I develop myself so that I can be of value to the systems of which I am part? And the role of projects is both to “re-weave human and natural communities into a co-evolutionary whole”⁷⁹ and to act as source of inspiration, enabling “all of us to perceive and pursue new orders of potential – in ourselves, our families and communities, and in our work”.⁸⁰

The regenerative development and design methodology presented is designed to discover, through the development of *Story of Place*, the fractal patterns in the social and biophysical systems of the ‘place’ a proposed project will inhabit. These patterns reveal the essence (the defining qualities) and the vocation (the purpose or role) of the larger system, so that we can co-design (in the broadest sense of the word) an engagement with the system that will help it to fulfil that role and build its potential to evolve. Further, through the creation of the story, stakeholders become aware of their own place in the project and the larger system, and how they can become conscious participants in its healing and ongoing evolution. The strength of this methodology lies in the fact that it has been tried, tested and refined through years of practice.

While *Regenesi*s uses a particular set of tools, other practitioners adopting a regenerative framework for their work have developed further tools to assist with the work done in Phase 1 of the *Regenesi*s process. In the next chapter we will discuss two of these tools, as well as a framework for whole systems thinking.

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Chapter 7

Tools to support regenerative practice

“How do you get people to re-connect and listen to their place, listen to their children, listen to themselves, and try to imagine a different kind of future?”

Phaedra Svec¹

As a paradigm born from the ecological worldview, regenerative practice has to contend with the complexity of whole living systems. As seen in previous chapters, it is not as simple as stringing together a number of technologies, passive design strategies or urban design principles to improve the measurable performance of a building or a city relative to a set baseline. And while the technical performance of the building/infrastructure/landscaping project remains important ‘below the line’ work, the essence of any regenerative project is its contribution to the ongoing health and evolution of the whole system. As Phaedra Svec of BNIM explains, a regenerative project is about creating the “best vitality that we can create in this place, and in a way that it will continue to inspire and involve”.² This requires an approach to the purpose and content of supporting tools that is substantially different from the measurement-based tools supporting green building, including those that include broader social and economic concerns such as SPeAR (*Sustainable Project Appraisal Routine*) and SBAT (*Sustainable Building Assessment Tool*).

Supporting tools for regenerative development and design practice are “tools for thinking and making connections, rather than tools for measurement or certification”.³ As such, they are process-based tools able to do the following:

- Develop an understanding of how the proposed project fits into and contributes to the wider system within which it is situated.
- Make visible the connections, relationships and flows between the different elements of the system across scales.



- Enable meaningful and inclusive dialogue that will build ownership, ongoing commitment and personal transformation.

There are numerous tools and techniques available to support these objectives, although none is sufficient by itself and many require skills far beyond those found in the usual built environment professional team. We can only point to a fraction of these and their possible use. These tools and technologies can be divided into four groups: those used to map and model complex system dynamics; those used to help stakeholders understand systemic relationships by making connections visible; those for enabling broad stakeholder dialogue; and those for bringing hidden values and concerns to the surface, enabling the process to meet people where they are.

Mapping and modelling complex systems

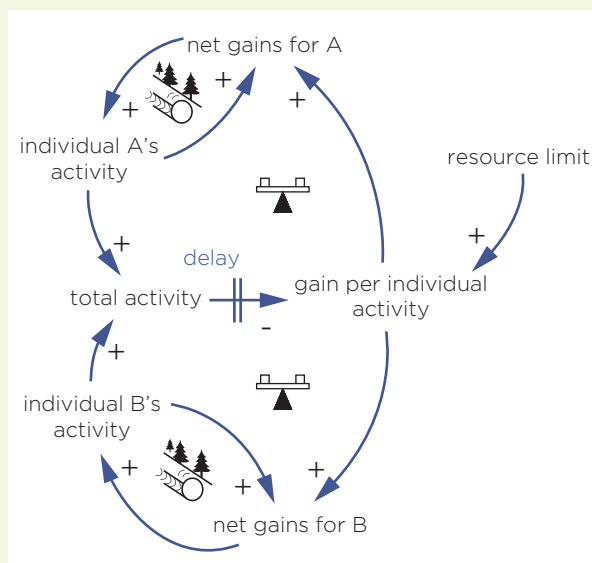
The ecological worldview presents a universe that consists of dynamic relationships (described in terms of systems and networks) and the processes they engender. Systems thinking helps us understand these systemic interactions, providing a framework for seeing wholes, interrelationships, and patterns of change.⁴ The vast field of systems thinking has its roots in the feedback concepts of cybernetics, originally conceived by Norbert Wiener⁵ and Ross Ashby;⁶ as well as in Ludwig von Bertalanffy's⁷ work on open systems and General Systems Theory. We can understand a system through its dynamics, its structure, or the behaviours of its agents. In this section we will look at only the first two, as they are the most useful to regenerative development and design practice. Other ways of looking at systems, such as agent-based modelling and Bayesian Belief Nets, can reveal the simple generating rules that determine self-organization and emergence in complex systems through the behaviour of individual agents; or the causal webs of influence and their conditional dependence and sensitivities. However, these methods require extremely skilful use as the complexity of the models makes them extremely vulnerable to error – the old programming adage of 'garbage in garbage out' applies – and their main function, simulation of systems behaviour, while useful, is not critical to the regenerative development and design process.

System dynamics

Two concepts underpin the way the dynamics of systems are described: feedback (or causal loops) and flows (e.g. metabolic and thermodynamic flows). Feedback refers to the loops of causality within a system: an initial action by one element causes an effect on another element, in response to this effect, this second element in turn causes an effect on another element and so on, until the last element feeds back into the effect of the first element. In principle, there are only two types of feedback. The one type is *Reinforcing* feedback loops, which cause change in the same direction (if there is more of the one, there is more of the other). These feedback loops result in

interactions where each action adds to the other – for instance, compound interest. They drive growth and change. The other type is *Balancing* feedback loops, which cause change in the opposite direction (if there is more of the one, there is less of the other). These result in actions which attempt to bring the current state and the desired state to agreement. They negate change and stabilise systems. An example is a thermostat regulating the temperature in a room. The same principles can be applied in understanding the flows through the system. The system is modelled as a series of inputs and outputs (flows) of stocks (e.g. energy, matter, information), which result in increase or decrease of stocks; for example, positive feedback mechanisms can cause an increase in stocks (growth).

This concept of reinforcing or balancing feedback loops that influence stocks and flows forms the basis of ‘systems dynamics’ modelling techniques developed by Jay Forrester and others, such as the Club of Rome, who used it to develop the models behind *Limits to Growth*.⁸ These two types of feedback loops can combine to form various archetypes of systems such as ‘Limits to Growth’, ‘Shifting the Burden’, ‘Escalation’, ‘Success to the Successful’, and the well-known ‘Tragedy of the Commons’.⁹



Tragedy of the Commons Causal Loop Diagram. IMAGE: B JANA

The Tragedy of the Commons system archetype illustrates how maximizing an individual's standard of living and wellbeing can destroy the wellbeing of the collective, and ultimately of the individual. Garrett Hardin¹⁴ described the dangers of this approach in his famous *Tragedy of the Commons* paper, using the village commons as an example. The Commons is a village resource, available to all for grazing of their livestock. As each person tries to maximise the number of livestock they own, the Commons becomes overgrazed until it can no longer support anyone's livestock. The global commons consist not only of ecosystem services, but also of the spatial, social and economic resources of the world. As each individual claims the right to an improved standard of living, the wellbeing of the collective is gradually eroded. The aim of a regenerative path to sustainability is to turn the balancing feedbacks into reinforcing feedbacks so that individual actions will instead build the wellbeing and potential of the collective.

As Forrester warns, though, the structure of complex systems, such as cities, is not a simple feedback loop where one system state dominates the behaviour of the system.¹⁰ The complex system has a multiplicity of interacting feedback loops with internal rates of flow that are controlled by non-linear relationships. While one of the strengths of system dynamics is that it allows the inclusion of unquantifiable social factors, thought processes and people's perceptions, it can also be criticised for oversimplification in describing systems, thus missing vital aspects of the system's structural and behavioural complexity.¹¹ Peter Checkland further suggests that the complexity of the world cannot be objectively modelled and optimised, and that the use of systems concepts such as modelling is to learn and debate the nature of a problem, rather than its solution.¹²

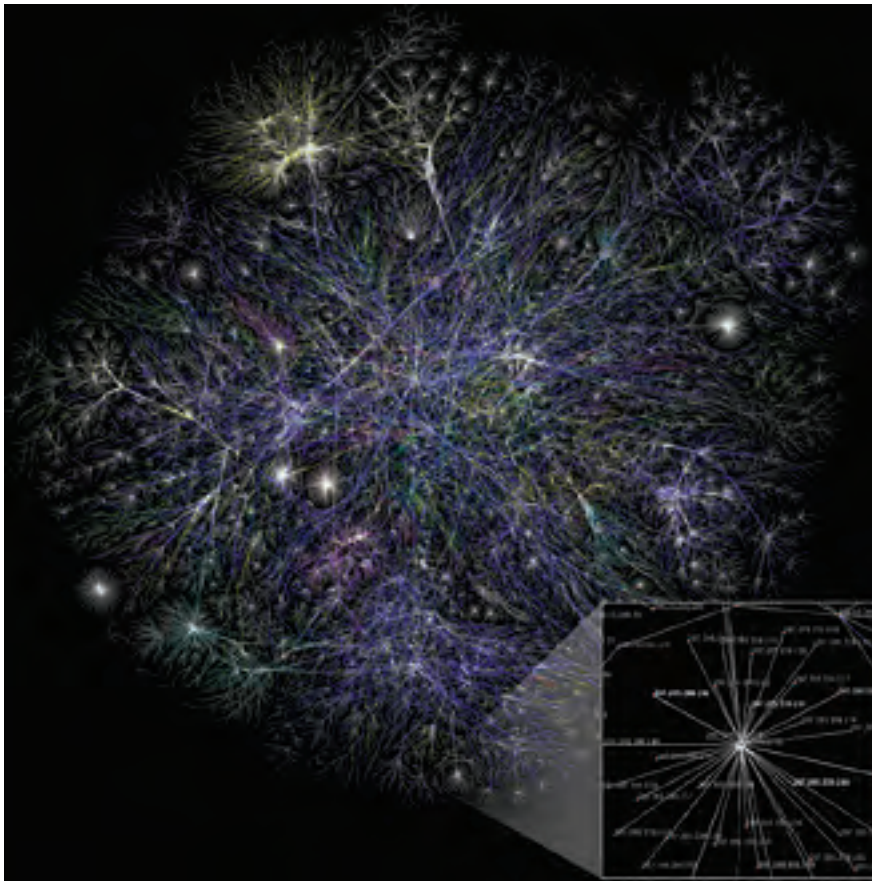


While systems dynamics is a useful tool in helping us to understand the long term impact and unintended consequences of our actions, it also illustrates an internal locus of control: rather than a set of external forces, the system itself is the cause of its behaviours. Solving problems within the system requires a change in the behaviour of the system, and not necessarily an external solution such as that offered by technology. Peter Senge proposes that the bottom line of systems thinking is the concept of leverage (i.e. finding those places in the system where actions and changes can result in significant and enduring changes in system behaviour).¹³ However, these leverage points, and the direction in which we need to push them, are usually counter-intuitive. Donella Meadows, one of the seminal systems thinkers, suggests that not all leverage points are equally effective or efficient. According to her, the traditional points of intervention, such as changing the numbers or the structure of the system, is far less effective than changing the goals and the mindsets that gave rise to the system. We see this understanding in the emphasis regenerative development and design processes place on making stakeholders see their place, and their role (as well as the project's role) in that place, in a different way: starting not with performance measures, but rather with common values, aspirations and purpose.

The feedbacks and flows in a system are partly determined by the system's structure. One structural aspect of systems is their arrangement at multiple levels nested within each other; the other aspect of a system's structure is addressed through its networks.

System as network

A network perspective on social-ecological systems provides a useful method of analysis as the different attributes of a social-ecological system, e.g. trust, information, power, flow of resources, can be presented as a network consisting of both human (and social) nodes and nonhuman (or ecological) nodes.¹⁵ Network thinking represents a system (or a population of interacting agents) as “a network of nodes linked by connections”, and uses the methods of graph theory and statistical analysis to describe key characteristics such as connectivity and centrality.¹⁶ While metabolic and social networks generate material structures,¹⁷ network thinking looks not at systems as represented by these static, material structures, but rather as “evolving structures that are the products of dynamic processes”, meaning that a network has both topological and dynamical properties.¹⁸ To change behaviour within the system can be as simple as changing the connections by either modifying their ‘strength’, or by changing the whole network's wiring diagram by removing old connections and forming new ones.¹⁹



Map of the internet showing strong and weak connections. IMAGE: THE OPTE PROJECT

Mark Buchanan proposes that both social networks and ecosystem networks belong to a type of network governed by what is referred to as ‘small-world architecture’.²⁰ This is a network structure made famous by the idea of ‘six degrees of separation’ which holds that one person can reach any other person on the planet through about six intermediaries, based on an experiment performed by Stanley Milgram in 1967.²¹ However, Milgram’s experiment really showed not that everyone is linked to everyone else in just six steps, but that in reality “a very small number of people are linked to everyone else, and the rest of us are linked to the world through those special few”.²² Buchanan describes two kinds of small-world networks: “egalitarian networks in which all the elements have roughly the same number of links, and aristocratic networks characterized by spectacular disparity [in that only a few nodes possess most of the network’s links]”.²³ These nodes are called hubs or connectors, and while they have numerous links to other nodes, these links tend to be weak links, meaning that there is infrequent interaction between the hub node and other nodes to which it is linked. These weak links, he proposes, maintain the stability of the system.

Removing one of the hubs in effect also removes a large number of weak stabilizing links, threatening the overall integrity of the system. In ecosystems a hub would be a keystone species (e.g. bees or elephants); in transportation it could be a major airport through which many regional or international flights connect. It is important to realize that hubs are not determined by

size or status, but by number of connections – thus the personal assistant of a CEO may be a more important hub than the CEO him/herself. In regenerative work, network thinking helps us to find the important points of connection in the system, whether these are resources, places or people. This helps to filter the information that goes into developing a *Story of Place*, shows where possible ‘acupuncture points’ would be, and identify stakeholders who can be change agents.

An ecology of systems models

The challenge of modelling specifically to understand the sustainability of social-ecological systems is formidable. Not only do models have to consider the complexities of natural systems, as well as the norms, values and beliefs that drive human behaviour, but they also have to consider cross-scale and cross-sector interdependencies, the emergence of unpredictable new behaviour, the system’s ability to re-organize in a number of ways, and the objectives of sustainability. To address this complexity, Camaren Peter suggests a modelling approach that starts with developing mental models using graphic causal models (taking care to record assumptions, conflicting opinions and data sources).²⁴ These graphic causal models are used to develop a Bayesian network with quantitative and qualitative variables and the probability of the strength of their influence on the system. This Bayesian network can then be used to visualize the conditional dependencies and sensitivities within and between dynamic system models of the various subsystems that comprise the whole study system and, using Bayesian sensitivity analysis, identify key leverage points for management and observation. From here, dynamic systems models can be derived to determine thresholds and stability regimes, while agent-based models can be used to simulate emergent systems states. Peter further suggests it is possible to integrate values, norms, beliefs and agency into this modelling framework as part of the graphic causal models that are used to formulate Bayesian Belief Networks.²⁵

This approach has been used with success in understanding issues such as the sensitivity of water use in agricultural activities to climate-change effects.²⁶ It provides a powerful method for enriching the *Story of Place*, illustrating dependencies in the system, and testing the potential outcomes of strategies. However, it is a labour and resource intensive process that goes beyond the budget of most projects, and in all but the most sensitive cases, it would be total overkill and can lead to analysis paralysis. This brings us to the downside of using the many available tools to understand system behaviours and patterns. While systems thinking provides very powerful ways for understanding systems, its use requires specialist skills such as programming and advanced mathematics, which may not be readily available to the project team. The results from these tools also need to be translated into a format that can be understood by all stakeholders. However, they are useful backroom tools to inform stakeholder engagement and other tools intent on making connections and relationships visible.

Making connections and relationships visible

In this section we look specifically at two tools developed to guide dialogue that will shift mindsets and inspire positive action. The first, REGEN, is a data-rich web-based tool providing a plain visual interface for some very complex data crunching; the second, LENSES, provide a very unassuming three-dimensional entry point for discussions about the relationships and connections between fundamental values, aspects of place and flows.

REGEN – a platform supporting regenerative design projects

As the Kansas City-based firm *Berkebile Nelson Immenschuh McDowell* (BNIM) was instrumental in the establishment of the Green Building Council and the development of LEED and the *Living Building Challenge*, the US Green Building Council appointed them to develop a tool that will go beyond LEED Platinum and stimulate market transformation toward regenerative thinking. Building on their own project experience, and drawing from others such as *Regenesis*, they defined Regenerative practice as containing:

- A perspective or mindset that is “systems based, place-based and positive-outcome oriented” – integrating ecological and social systems and recognizing the uniqueness of each place to develop projects that contribute to the well-being of the whole.
- Processes that are based on a collaborative dialogue of discovery that reveals the story of place and, in the process of discovering that story, create a firsthand experience of community connection that will be sustained after the professional team has departed.
- The use of broad sets information with the community and the place itself as key sources of information.²⁷

As Phaedra Svec recounts, given this understanding of what regenerative practice is, it took the team about 25 minutes to realize that asking what a regenerative design rating system would look like, was the wrong question.²⁸ Instead they asked the following question:

*How can a tool foster a more informed dialogue about place that will shift the consciousness of the community and result in a collective will to work for the benefit of all life?*²⁹

The answer was a tool which will provide:

- a framework that encourages systems thinking, the establishment of positive goals, and collaborative dialogue; links specific strategies to the whole; and shows the interconnectedness of individual strategies;
- place-based resources: data and other information for use by project teams;
- examples of projects that have incorporated the elements of regenerative thinking.³⁰

The team found that while existing frameworks such as *One Planet Living*,³¹ the *Living Building Challenge*³² and the Biomimicry Laws of Nature³³ address

some aspects of regenerative design, they are not sufficiently comprehensive to guide dialogue and link information in a way that would support a regenerative approach. However, these frameworks provided some starting points for developing the REGEN conceptual framework, which not only aimed to pull together data from many sources through a graphic interface which will allow the project team to move between detailed project decisions and their influence on the larger system, but to meet individuals and groups where they have the most interest and then guide them to those things which connect to what they care about most.³⁴ Bob Berkebile explains: “We use an issue such as water as entry point, but instead of dealing with the issue, we deal with the relationships and connections where water intersects with human activity or energy, and show how through changing the relationships, we change the system”.³⁵

The conceptual framework is composed of nested systems at two levels. At the highest level the framework incorporates the 4 quadrants of life – robust and resilient natural systems, high-performing constructed systems, prosperous economic systems and whole social systems. The next levels incorporates the components of life including water, flora, fauna, energy systems, transportation systems, capital, employment, food, social justice, public health and so forth. These are shown by the coloured circles, and aren’t a limited set, being responsive to the project as well as the evolution of the components over time (see Fig. 1).

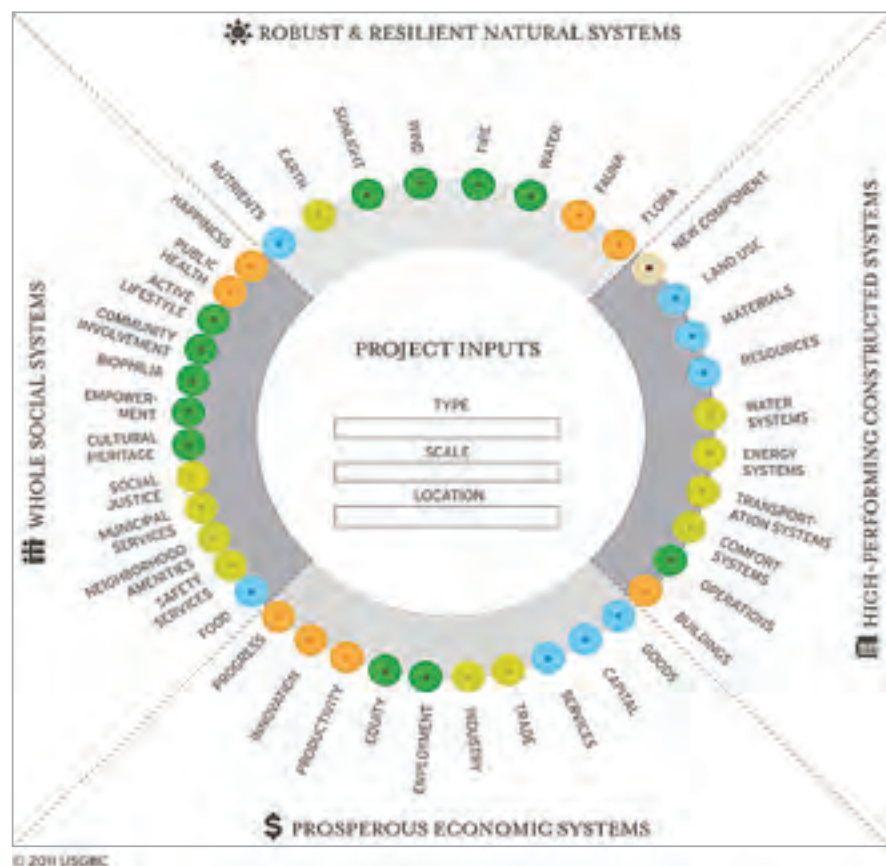


Figure 1: REGEN Concept Framework. IMAGE: BNIM

The tool, which is still in development, is meant to be a data-rich, web-based platform to guide dialogue and allow the project team and community to explore different strategies and their outcomes. The idea is that the project team can input basic project data such as the project type and location, and the tool will automatically populate the graphic interface with existing data about the place and the health of its various systems available on open-source databases. The health of each component is shown by a change in the size of the circle representing it (see Fig. 2). This enables the team to identify data that may not be available and to check whether the databases concur with on-the-ground perceptions, observations and experiences of the community and the design team. This interrogation of the data and filling in the gaps helps to develop a much richer story of place and identify areas of opportunity and priority.

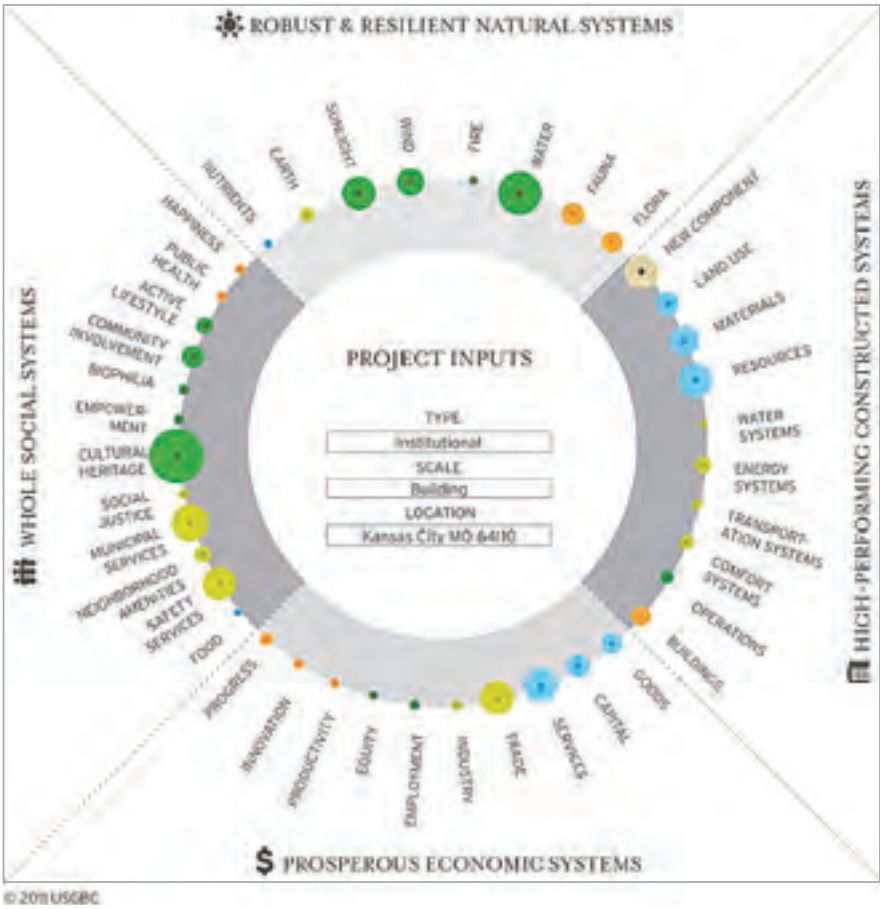


Figure 2: REGEN framework showing place-based information. IMAGE: BNIM

The next step is to input specific strategies and map their relationships with and impact on different components (see Fig. 3). This helps identify positive and negative interactions, as well as strategies with multiple benefits which can be further explored. The tool will allow the user to enter at different scales, from the large system level (the quadrants), the components (circles) or the strategies (points within the web).

The back-end to this tool links place-based information from open source databases on specific system components (such as environmental or economic indicators), with other information such as design or technology

strategies and relevant rating credits. These databases can be further populated by users and this data will be available to future users of the tool, allowing the system to grow and evolve. The final component of the REGEN tool is a data rich set of case studies and project examples through which the strategies can be demonstrated in practice.

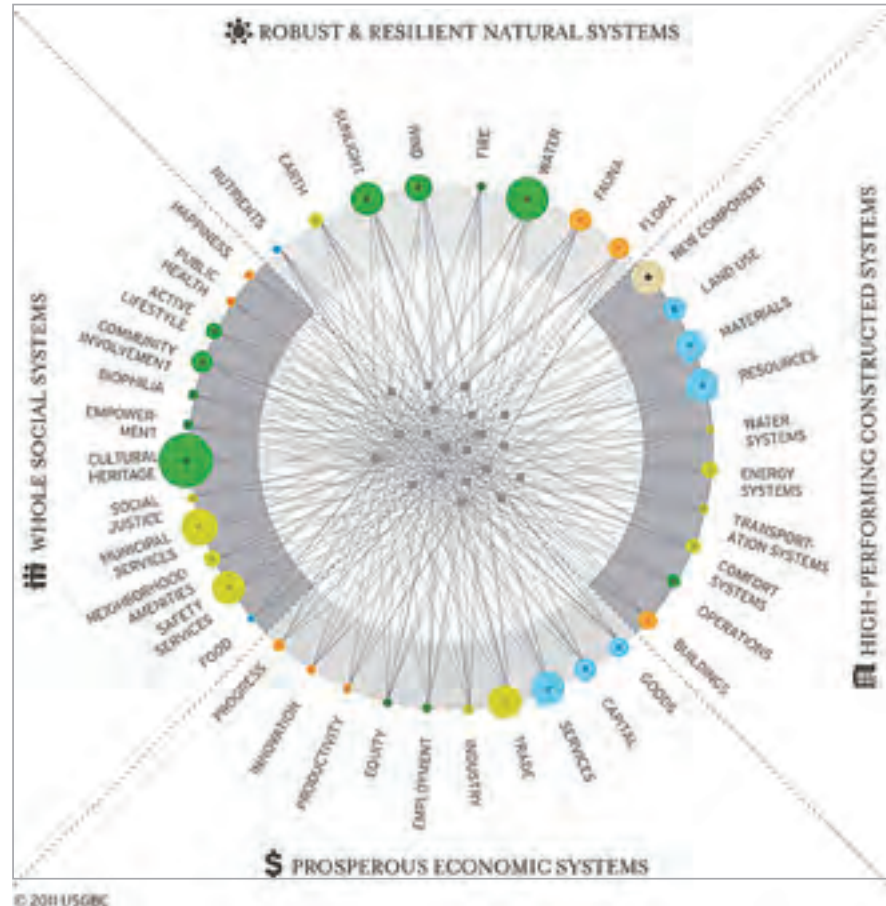


Figure 3: The interconnected web of strategies connected to various components.
IMAGE: BNIM

The tool is still under development, facing numerous technical and other challenges that will take some time to resolve, and will require strong buy-in from many role players. It also remains to be seen how well it will be able to cross geographical and political boundaries. However, even if it can illustrate only the impact of a set of strategies on the different components, it can be a powerful tool for informed dialogue, reflection and learning. The danger is that presenting a list of strategies will have the same stifling effect on innovation as the checklist of performance requirements in green building rating tools. The potential of REGEN lies in its capacity to “facilitate processes that focus on place, organize complex information, and enable many disciplines and voices to be heard and take ownership of the work”.³⁶ However, it uses quite a sophisticated electronic user interface to translate the data from its connected databases into a simple visual representation of the connections in the system and the impact of interventions at key entry points in the system. This can be a very effective strategy in data-rich environments such as found in developed countries. In contrast, the following tool, LENSES, uses a simple physical interface to open up

discussions leading to the need for specific data which can then be sourced in a useful format. This makes LENSES suitable for use in environments with less sophisticated means of data collection and management; and allows the thinking about a project to gradually evolve from within the stakeholder group without pre-empting strategies.

LENSES – a way to develop the story of place

As we saw in the section on the REGEN tool, there is a desire to develop something that will help professionals in the built environment to think regeneratively and from an ecological worldview. LENSES and REGEN both respond to the critiques that are becoming more persistent that the current tools are only creating less bad buildings and are not helping create a sustainable, let alone a thriving, future. The LENSES (Living Environments in Natural, Social, and Economic Systems) Framework was initially developed by the Institute for the Built Environment at Colorado State University and is now managed by CLEAR (Center for Living Environments and Regeneration). Drawing on Bill Reed's³⁸ trajectory of environmentally responsible design (see Fig. 4), LENSES aims to shift practice in a project from degenerative to regenerative by urging communities and groups to move towards foundational principles that create and support life, aligning human activities with natural processes to create living environments.³⁹

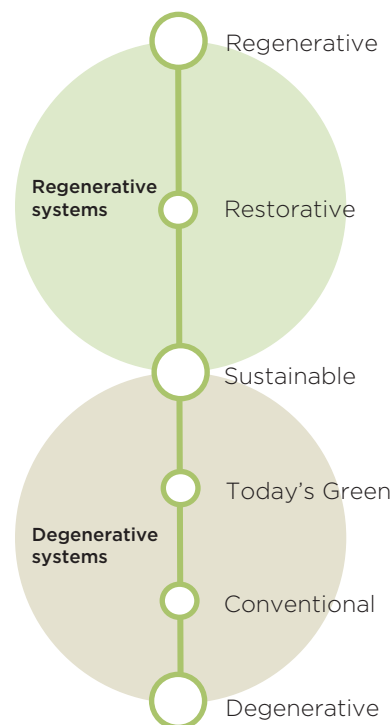


Figure 4: Moving from degenerative to regenerative.

IMAGE: INSTITUTE FOR THE BUILT ENVIRONMENT⁴⁰

Inspired by the work of Donella Meadows⁴¹ and Robert Doppelt,⁴² its intention is to support and provide structure to conversations which can shift mindsets to a more holistic way of thinking, leading to the creation of healthy, vital places through a regenerative process. From this point it then becomes

“How do we synthesize regenerative whole systems principles into a framework that facilitates the type and scale of change needed?”

Josie Plaut, Brian Dunbar,
April Wackerman and
Stephanie Hodgins³⁷

possible to “create and rearrange teams, alter goals, restructures rules of engagement, align communication, provide feedback loops and align systems and procedures”.⁴³ The ultimate goal of LENSES is to transform thinking and actions through a guided process of constructive and contributive dialogue that can explore the regenerative potential of placed-based solutions and different measures of success. It is not a tool that provides for comparative assessment of projects, focusing instead on descriptive metrics that express the quality or attribute of a practice and its suitability as a contextually appropriate solution.⁴⁴

The framework consists of three lenses: Foundation, Flows and Vitality (Fig. 5). Each of the lenses have a number of predetermined elements derived from the literature, personal reflection and experience, as well as through a series of workshops involving hundreds of people from many disciplines and backgrounds.⁴⁵ In addition to defined terms, each layer has an open space for user input to project- specific contexts, reflecting humility on the part of the developers, as “we can’t tell everyone everything about what they might possibly need to do and explore”.⁴⁶

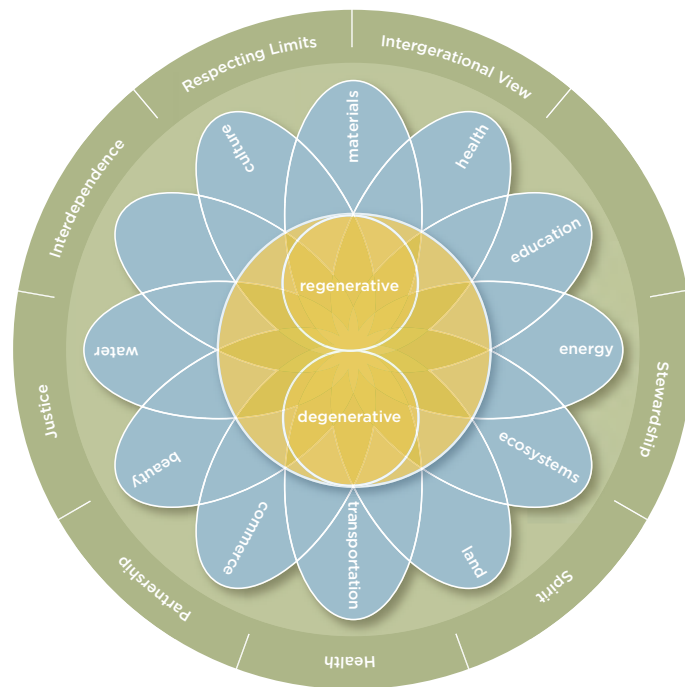


Figure 5: The LENSES Framework. IMAGE: CLEAR

The **Foundation Lens** (Fig. 6) consists of eight guiding principles, originally identified by Andrés Edwards⁴⁷ and modified during the development process. The principles are: Stewardship, Respecting limits, Interdependence, Justice, Intergenerational view, Partnership, Health, and Spirit. These principles are graphically rooted in the nested triple bottom line of Natural, Social and Economic Systems. The purpose of the Foundation Lens is to help project teams to think about *who* is given a voice in the project: who is represented and who should be represented. The ecological worldview requires a redefinition of who qualifies as stakeholders, what their roles are and who are affected in which way. For example, members of a project’s construction team would be both internal (i.e. having

a contractual relationship with the project) and external (i.e. affected) stakeholders, “while traditionally external and powerless stakeholders such as local communities and Nature are recognized as playing a major role in the creation and functioning of the built environment”.⁴⁸

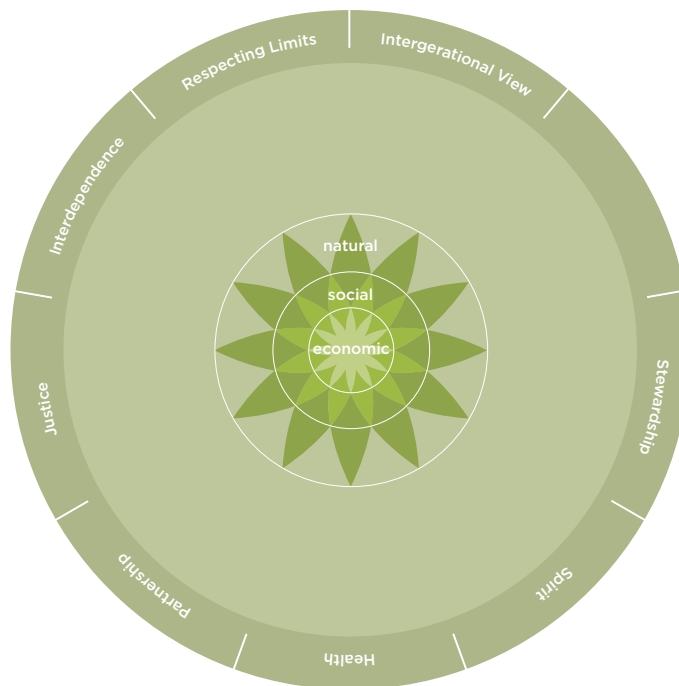


Figure 6: The Foundation Lens. IMAGE: CLEAR

Working with the Foundation Lens is also the time where the foundations for collaborative work in the project are laid. This requires both creating an environment conducive to sharing, listening, responding and reflection; and building the capacity of the project team to work within such an environment through establishing appropriate working relationships and nurturing personal transformation. Engaging with the foundational principles provides experiential learning through which the project team is led to a deeper understanding of the larger whole and the connection of the project with this whole. The work done through the Foundation Lens also provides an entry point to introduce newcomers to the project, and a touchstone to which the project team can return from time to time – reflecting on whether they are still on track, still true to the project values.

The **Flows Lens** (Fig. 7) addresses critical built environment issues and is comprised of twelve components that can flow into and through a project and define project context. The use of this lens is intended to guide teams in recognizing and honoring the inherent uniqueness of a project. The Flows Lens also facilitates discovery of intersections and relationships. Flows categories include: Land, Transportation, Energy, Water, Materials, Culture, Education, Beauty, Commerce, Ecosystems, Health, and an Open Space. In using the Flows Lens, a project team or community is prompted to consider which of the Flows are most critical to arriving at a healthy, living environment.

The *Regenesi*s process for developing a purpose statement could form a useful part of the Foundation Lens discussions, with the team developing a statement that reads:

- This project’s purpose is to ...
- In a way that....
- So that

This purpose statement becomes the principal touchstone of the project. It is important to realize that the purpose statement and the aspirations that gave rise to it, can (and should) be revisited through each stage of decision-making and as more data is collected. Mark Biedron from Willow School displayed their purpose statement and resulting mission in his site office, so that all contractors and visitors could see and reflect on this every step of the way.

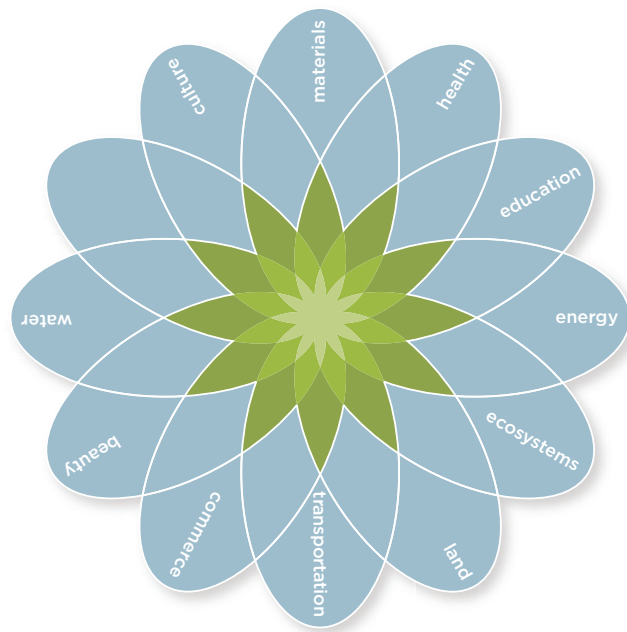


Figure 7: Flows Lens. IMAGE: CLEAR

As flows keep changing over time, it is important that the project team considers both past and present flows in identifying and collecting data.⁴⁹ As we have seen with the work of *Regenesi*, historic flows are crucial to determining pattern and informing the project about both potential opportunities and risk (as could be seen in the Sundance Resort and Mahogany Ridge examples). At a more pragmatic level, this lens sets targets or budgets for system flows of, for example, water, energy and waste.

The third lens, the **Vitality Lens** (Fig. 8), supports teams in considering critical issues when setting goals, and in measuring the value and impact of decisions. Unlike the Foundation and Flows lenses, the Vitality Lens cannot stand alone; rather, it works in tandem with the Flows and Foundation Lenses. While the purpose of the Flows Lens is to understand historic and current flows, the Vitality Lens guides teams through subsequent visioning of the future or potential state of each flow.

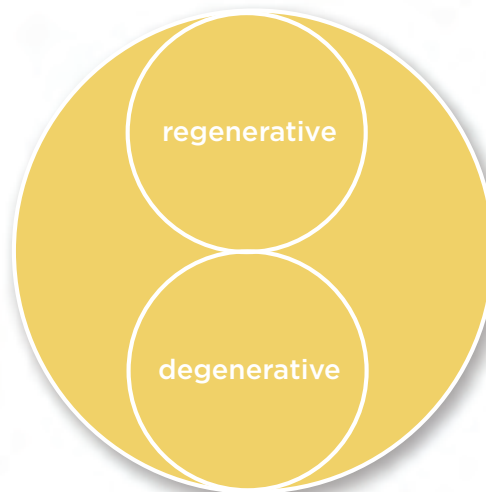


Figure 8: Vitality Lens. IMAGE: CLEAR

The sphere diagram of the Vitality Lens illustrates a scale of impact from degenerate to sustain to regenerate. The Vitality Lens is positioned atop the Flows Lens, physically representing the act of evaluating the potential outcome of each flow. The integrated bottom line of the Foundation Lens displays through each flow, representing that each has natural, social, and economic implications.

With this third lens, the team can explore a project’s potential outcome, which is facilitated through using a rubric for each flow, inspired by the *Whole Measures Guidelines* produced by the Center for Whole Communities.⁵⁰ The rubrics consist of a number of focal points for each flow, with each focal point provided with five short explanations of what the system state will look like on a scale from degenerative to regenerative. Each rubric is also accompanied by a set of powerful questions to open and expand dialogue.⁵¹ The questions and rubrics provide a starting point from which the team can brainstorm possible outcomes of proposed solutions, helping them to gauge where their ideas fall on the regenerative scale and measuring their success. Table 1 shows a sample rubric created by the LENSES team from the focal point of Inclusiveness for the Commerce flow, with the statements illustrating how the project would change as it moves from degenerate to regenerate.

Table 1: Sample Focal Point from Commerce Flow

Focal point	Degenerate		Sustain		Regenerate
Inclusiveness*	Decision-making is exclusive and managed by a select few. Involves the least possible number of stakeholders with little or no community involvement. Disregards the ecological, social and cultural context	Limited exploration of context and local resources including people, history, materials and natural systems. Responds to community identified interests and provides some benefit to the community. Creates communities for some, but at the expense of others	Engagement with community members appropriate to the type and scale of the project. Listens and responds to community input. Considers the biological implications of the proposed action	Fosters the participation of diverse stakeholders by including people who are traditionally marginalized due to lack of power and influence. People's input and participation are valued. Espouses cultural sensitivity, trust-building and examines social privilege. Supports biological communities	Development <i>with</i> rather than <i>to</i> or <i>for</i> a community. Invokes community partnerships that did not previously exist. Creates opportunities to benefit underserved populations throughout project design and implementation. Embraces and restores biological communities and functionality

Note: * Considering the well-being of all social and ecological communities.

Source: Institute for the Built Environment

The Vitality Lens works in conjunction with the Flows Lens, bringing together the attributes of the Vitality Lens with the movement and relationships described by flows. This allows the user to consider the impact of each ‘flow’ along the scale of degenerative to regenerative. To really exploit the usefulness of the Flows Lens, flows should be mapped in layers that can be superimposed on one another.⁵² This allows for viewing many different patterns and relationships between the vitality of the place and the flows through that place. This lens is perhaps the real innovation of this tool. By analyzing specifically for the flows the project team can see where the ‘below the line’ activity is (drawing from the system) and where the ‘above the line’ potential is (giving back to the system). It also allows a project team to identify intersections where many flows come together, indicating the focal points and increasing ability to prioritize.



Figure 9: The LENSES three-dimensional framework. PHOTO: A MELCK

The actual ‘user interface’ is a three-dimensional representation of the three lenses layered one on top of another and spinning on a centre pivot (see Fig. 9). As one twists and discusses each of the flows, the interaction with the natural, economic and social systems and the foundational attributes defined for the project becomes visible, providing a framework for discussion. This encourages users to contemplate the interconnectedness of the different elements, for example, asking how beauty (a Flow) is related to the economic system (part of the integrated bottom line) and stewardship (a guiding principle). Josie Plaut describes how this reflective process would work:

We can look at three elements together, for example Respecting Limits, Social systems and Transportation. And that can begin to give you some interesting ideas about maybe your own personal commute and respecting the limits of yourself and your transportation to and from work. Or you can look at what is the effect our transportation systems have on other organisms.⁵³

LENSES provides meaningful process guidance for facilitators and project teams in exploring issues and developing goals for a specific project, but does require a skilled facilitator deeply familiar with the framework and its embedded philosophy. Because it can provoke meaningful discussion between the many different types of stakeholders (including the ‘silent voices’ of other species and future generations) and a diverse project team (including disciplines outside the built environment such as ecology, anthropology and sociology), LENSES has the potential to include both subjective and objective information and so integrate both the ‘exterior’ and ‘interior’ dynamics of a social-ecological system. This need for dialogue that goes beyond the usual suspects and incorporates concepts such as values, flows, and aspirations, in addition to biophysical considerations, is critical to the regenerative development and design process. BNIM has developed and discovered several tools and techniques for eliciting and enabling such a broad dialogue.

Enabling broad dialogue

Meaningful community engagement that is not just about *ad hoc* community input, but about stimulating discussions that “can elicit and clarify aspirations and values, and enable the community to recognize and feel its connections to the natural systems of which they form part”, thereby transforming the community and the individual, is central to regenerative development and design processes.⁵⁵ Developing community engagement processes able to do this, and which enables participation by diverse voices (and not just the usual suspects), is in many ways the Holy Grail of regenerative development work. In this section we’ll look at a process developed and refined by BNIM over two decades; an approach they describe as a “collaborative dialogue of discovery,” created through facilitated community conversations both face to face and through social networking.⁵⁶

Through working on a number of national demonstration projects, BNIM discovered the powerful effect of meaningful, values-based dialogue among diverse stakeholders and expert groups on expanding project visions and development frameworks. Following the 1993 Mississippi Floods, the firm used a process called ‘Community Treasures’ to familiarize the international disaster relief experts with the culture and people of Pattonsburg where they would be working.⁵⁷ The strategy was to ask three questions to the community:

- What do you love here? What are your treasures – the things of great value to your community?
- What are the problems – the barriers that prevent the success or quality of life you would like?
- What is the thing you would like to create that you’ve never had?⁵⁸

The community would work on these questions in small groups and then report back. The outcomes of this process were surprising. As Bob Berkebile recounts:

It worked to accomplish the goal I was after, to inform the team of experts. What I didn’t anticipate was the members of those communities telling me they had never felt more sense of community, because we have given them the opportunity to express what they really felt in a safe environment.

Creating such a safe space in which communities can think, learn and question in a trusting and uninhibited fashion, is crucial to successful public engagement which ensure that the solutions proposed in their redevelopment plan has long-term traction.⁵⁹ Even more important is finding ways to include the silent majority, and BNIM unexpectedly stumbled upon ways of doing exactly that.

BNIM has been involved in a number of disaster recovery projects, whether natural disasters such as tornados and hurricanes, or the slow social disasters of disintegrating communities. Disasters have a way of clearing the decks for something new, opening up a space for possibilities that goes beyond rebuilding what was before, a space that can be filled with new visions and new dreams. However, when disaster strikes the timeframes for

“This transformative work has revealed that when all the residents, stakeholders, and consultants come together as a collaborative community, a creative force emerges.”

Jeremy Knoll and
Bob Berkebile⁵⁴

responding and developing a vision is often very tight, condensing processes that would normally take months, if not years, into weeks. To address these short timeframes and maximize the energy and openness to change and collaboration that follows in the aftermath of a disaster, the firm continued to use the above process, further developing and refining it. Usually they would call a public meeting in a public place such as a town hall or sports facility. However, the town of Greensburg, Kansas lost 95 per cent of its buildings to an EF5 tornado, leaving the grain elevator as the only structure still standing. There was no place to hold a public meeting, except the circus tents provided by FEMA (the US disaster relief agency) to the relief teams. The community, now spread throughout the area in whatever alternative accommodation was available, was invited to visit the tents for a free meal. Initially people were just reconnecting and celebrating the lives that were lost. When they were ready to think about the future again, the same venue was used to start the dialogue. Bob Berkebile relates what happened:

For the first time in our experience all the women and children were in the conversation. Prior to this, these dialogues were dominated by the leadership which was 90% white, middleclass males. We found that with the women and children present in that dialogue, different questions were asked, different visions were embraced and their vision for the future and the goals they set were entirely different as result of that dialogue. With everyone in the conversation, the quality of the conversation is dramatically improved.

For example, participation by the children in the dialogue fundamentally changed key architectural and design decisions. The children argued persuasively for rebuilding the school in the centre of town on Main Street, instead of out of town, halfway to the next big town. For the school was seen as the hub and heart of the community.⁶⁰ As a result of these conversations, Greensburg became the first city in America to adopt LEED Platinum as their standard. The town also built a municipal wind farm that generates four times the energy the city consumes. The citizens of Greensburg have been lauded by two presidents (Bush and Obama) as “envisioning and implementing a national model for rebuilding to create new vitality”.⁶¹

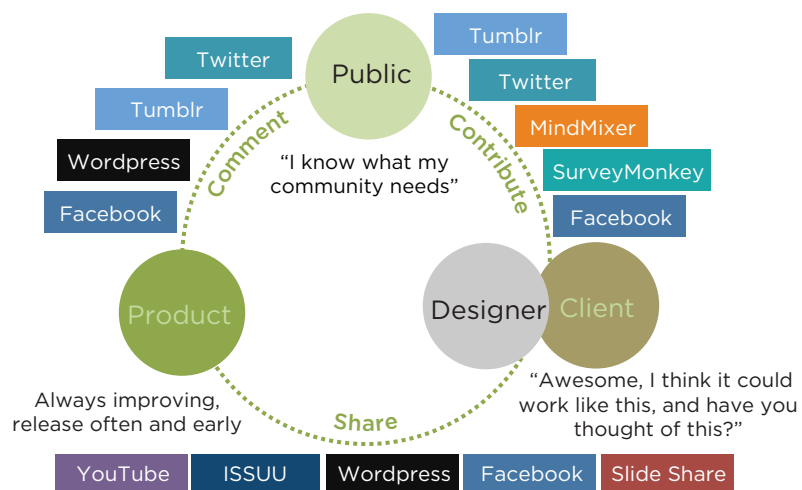


Figure 10: Iterative Designer/Client//Community Mind-Meld Model.⁶²

The experience at Greensburg prompted BNIM to ask: “Now what if we can touch literally everyone and allow them to communicate, whether it is three in the morning or two in the afternoon?”⁶³ Social media became an obvious answer, with the firm starting to use a wide variety of social media platforms to kickstart the initial dialogue before the first public meeting, and then to continue developing and testing ideas. This approach is described in the *Iterative Designer/Client/Community Mind-Meld Model* presented in Figure 10, illustrating the different freely available social media platforms that can be used for conversations, generating ideas, feedback and publishing plans and strategies.

In 2011 large sections of the city of Tuscaloosa in Alabama was devastated by an EF4 multiple vortex tornado. BNIM was invited via Twitter to submit a Request for Proposal. After winning the bid, the team needed to put together a city recovery plan in a matter of weeks. To speed up the process, the team used a tool called MindMixer to create a virtual townhall meeting. By the time the first face-to-face meeting was held, the site had received over 39 000 hits and over the rest of the project (which lasted less than two months) the site generated more than 74 000 page views and 275 original ideas.⁶⁴ Christina Hoxie and Bob Berkebile describe the outcomes.



Tuscaloosa Forward – using social media for broad community engagement

“We launched a website that asked some poignant questions on various topics of interest that we determined from the outcomes of this tornado and the baseline conditions of the community. And it stimulated so much response from that community. People did not have homes, but they had access to public places where they could tap into this new resource of collecting their ideas and commenting on other people’s ideas and taking it to the best solution they could collaboratively come up with through this real negotiation we could see happening online. By the time we got to that first real actual in-face public meeting, there were over 39 000 hits on that website, of people going and seeing and commenting, giving ideas, really giving of themselves. These were loud and soft voices, these were old and young, these were everyone.”⁶⁵

At the public meeting, more than double the expected ‘best case scenario’ number arrived. Bob Berkebile recounts how during the meeting, the mayor whispered in his ear that this was the most diverse meeting in the history of Tuscaloosa. The diversity of people attending and submitting ideas and comments on the website had a profound effect on the eventual decisions taken by the city. As Bob explains: “While it was a little scary for them to take in all this raw information directly, it so informed their leadership. Because heretofore they were taking input from people with very strong vested interests (the usual suspects), and now they were getting raw input from the entire community. This empowered them to make much more informed decisions and to be more courageous in making the tough decisions going forward.”⁶⁶

Screenshot from Tuscaloosa Forward website. IMAGE: BNIM⁶⁷

“Integral approaches to any field attempt to be exactly that: to include as many perspectives, styles, and methodologies as possible within a coherent view of the topic. In a certain sense, integral approaches are “meta-paradigms,” or ways to draw together an already existing number of separate paradigms into an interrelated network of approaches that are mutually enriching.”

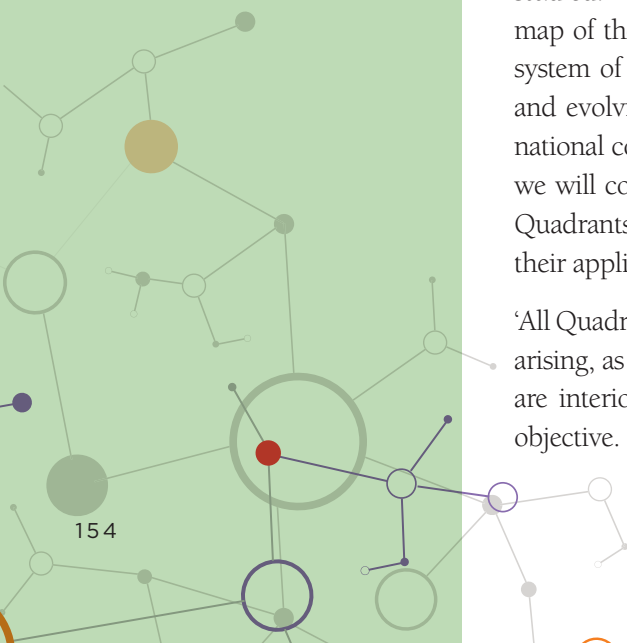
Ken Wilber⁶⁸

The use of social media is really changing the possibilities for meaningful engagement between communities, clients and the professional team. The experience of BNIM in a number of projects has illustrated its usefulness in getting many diverse voices to contribute and consider issues outside their normal interests. The excitement generated by the process also prompted more people to attend the public meetings, and continues to support the ongoing evolution of the project. Using social media helps speed up processes which could take several months, or even years, thus saving time and money. But its real power lies in reaching those voices that would normally remain silent because they do not have the time or inclination to attend public meetings, and even if they do attend, they may be drowned out by other, louder voices. Social media offer a great equalizing platform, providing a safe space for people to present their hopes and dreams, be honest about their values and the things that matter to them, and find unexpected alliances. By building bridges between individual and community concerns and how these concerns are addressed to enhance the well-being of both the individual and the larger social-ecological system of which he or she forms part, social media also enable a truly integral approach to development.

Integral thinking – working with the whole

The term ‘whole system’ is being used quite casually, as if everyone should understand what it means. But what really constitutes the whole system? In Chapter 2 we proposed that the foundational driver of the ecological worldview is an impulse towards increasing wholeness. Thus when we talk about working with the whole, we talk about both the whole in its entirety and in its state of wholeness – intact, healthy and integrated. Integral thinking provides a structure that captures as much of the whole system as we can possibly comprehend at the moment. There is a long tradition of integral thinkers such as Sri Aurobindo, Lev Vygotsky, Roy Bashkar and Edgar Morin, to name a few. However, the concept was popularized by American psychologist/philosopher Ken Wilber, who has developed what is probably one of the more comprehensive frameworks to integrate matter, life and mind (as well as spirit) from a synthesis of all the hundreds of developmental holarchies (hierarchies of nested systems) he studied.⁶⁹ The intent of this framework was to provide an integrative cognitive map of the structure and evolution of the Kosmos.⁷⁰ The result is an intricate system of quadrants, levels, lines, states, types and zones that keeps growing and evolving through Wilber’s work and the collaborative efforts of an international cohort of integral thinkers. For the sake of simplicity and accessibility, we will confine this discussion to the two aspects of the four-dimensional All Quadrants All Levels (AQAL) Map of the Kosmos – quadrants and levels – and their application in regenerative work (Fig. 10).

‘All Quadrants’ refers to four perspectives on a holon that are co-arising (or tetra-arising, as Wilber has it) facets of the same reality. The two left-hand quadrants are interior and subjective, while the right-hand quadrants are exterior and objective. The top quadrants refer to interior awareness or consciousness, and



the exterior form and behaviour associated with the corresponding interior level. For example, this could refer to the cell (exterior) and irritability (the interior level of awareness of a cell); or to the ability to understand abstract concepts (left-hand) and the complex neocortex in humans (right-hand) that allows this level of consciousness. Q1, the domain of the subjective self or 'I', contains individual motivations, thoughts, feelings, ideals and worldviews. Q3, the objective domain of the individual or 'It', contains everything that can be observed about an individual such as measurable data, behaviours, actions and their results. Each quadrant is a different perspective on the same holon.

The bottom two quadrants refer to the interior and exterior of the collective. Q2 is the domain of the intersubjective interior collective, or 'We'. This is the realm of collective motivations, cultural norms and value systems and identities shared within communities (the shared workspace) that exist at a similar level (e.g. a 'community' of atoms or a 'community' of humans). Shared workspace refers to the shared space of what entities can respond to; for example, quarks register a very narrow range of stimuli. Wolves, on the other hand, have a much larger workspace or range of stimuli they respond to, including an emotional workspace, because they possess a limbic system, the interior correlate of which comprises certain basic emotions.⁷¹ Q4, the exterior collective quadrant, is the domain of the exterior, material or institutional forms of the community and includes system behaviours and characteristics, collective expressions of culture such as ritual, technology, music and architectural styles, and forces of production – in fact, all observable aspects of social systems.⁷² Working with the quadrants as a guiding framework, facilitates us to consciously consider (and honour) first, second and third-person perspectives on the issues discussed; developing compassion for the perspectives and values of other participants; and enabling participation by silent stakeholders such as other species.

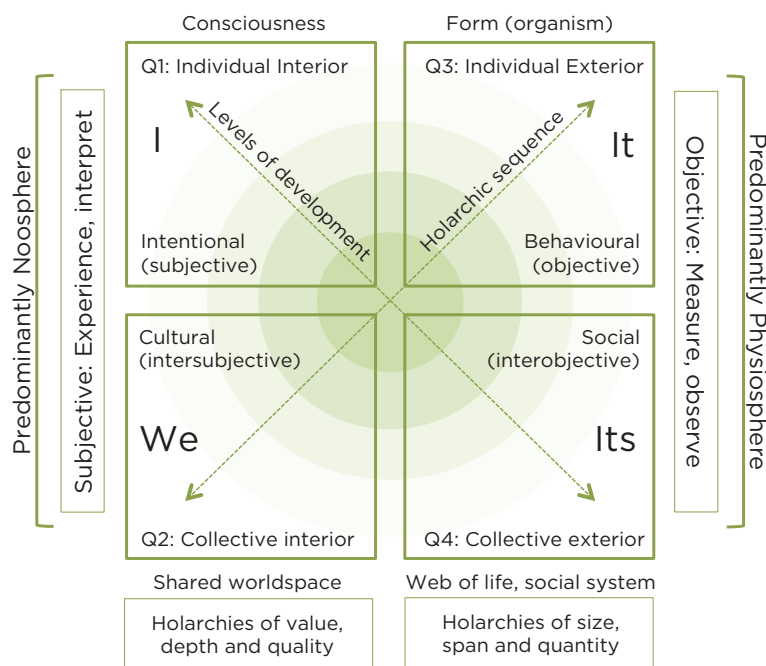


Figure 11: Wilber's All Quadrants All Levels Map of the Kosmos⁷³

Key concepts:

- **Holon:** A holon is a structure that displays characteristics of both part and whole. It behaves as a whole when 'looking down', or as a part when 'looking up'. Holons consist of many active parts in relationships or interactions of one kind or another and the parts themselves are lower-level holons.
- **Holarchy:** This describes the hierarchy of nested systems created by holons. A holarchy is constructed when different holons at the same level interact with one another to create a higher-level holon. A holarchy is therefore a dynamic hierarchy, as its structure and constituent parts are constantly being created through the interactions of holons at different levels.

Understanding that in any conversation people will be at different altitudes, allows the project team to meet people at their level and speak to their values, using language to which they can relate.

Within each of these quadrants we find levels of development. Those in the right hand quadrants exhibit increasing complexity, while those in the left hand quadrants exhibit increasing depth and capacity to deal with complexity. Each new level transcends the limits of the previous levels, but still includes the essential aspects of all previous levels. For example, in the top right quadrant would be a holarchy consisting of molecules, cells, tissues and organism, while the bottom right quadrant can see a holarchy consisting of family, village, nation, and world. In the upper left corner we will find the psychological stages of development we undergo as we move from infant to adult, while the lower left presents us with cultural stages of development such as the worldview transition from animistic-magical to scientific-rational, to pluralistic, to holistic and beyond.

To date most of the work in green or sustainable building has focused on the right-hand (exterior) side of the model – buildings, technologies, cities, infrastructure systems, ecosystems. A shift to regenerative sustainability requires an equal engagement with the left hand (interior) side, as is amply illustrated by the projects discussed in this and the preceding chapter. And in regenerative work, the ultimate objective of this engagement is to honour and see the value of all preceding levels, and include responses to each of them in the design strategy. What does this mean?

To answer, we need to sidestep for a moment to constructive-developmental theory, which suggests that individuals and societies undergo a sequential process of developmental complexity. Examples are Abraham Maslow's hierarchy of needs, Jean Piaget's cognitive development stages, Jean Gebser's epochs of cultural evolution/ worldviews, and Clare Graves and Don Beck's worldview-linked values. These tend to follow a pattern described by Sean Esbjörn-Hargens as "the general movement of a widening identity: from 'me' (egocentric) to 'my group' (ethnocentric) to 'my country' (sociocentric) to 'all of us' (worldcentric) to 'all beings' (planetcentric) to finally 'all of reality' (Kosmoscentric).⁷⁴ As one's identity expands, so does one's view of the world. It is like seeing the world from the ground, or the roof, or an aeroplane, or the international space station – with each change in altitude, more of the world is revealed and our perceptions of the world change. With these changed perceptions also comes a change in values, behaviours and possible leverage points. However, it is not possible for someone



World from the street PHOTO: C DU PLESSIS



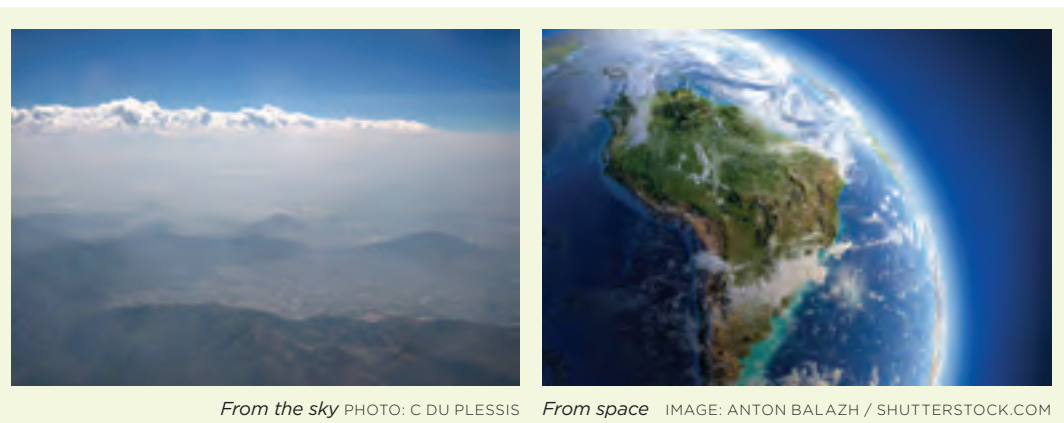
From the roof PHOTO: C DU PLESSIS

standing on the roof, even if it is the roof of a skyscraper, to even imagine the view from space if they have never been exposed to images from that altitude. Part of the regenerative development and design process is to subtly prompt the client, project team, and stakeholders to shift their viewpoint to a higher altitude by providing images of what the world looks like from such a higher altitude. It is important to realise that ‘higher’ does not mean better, it is simply a different perspective that reveals more of the world. And each level is foundational to the next – failing to fully integrate a lower level leads to pathologies in the individual or society, in both left and right quadrant expressions. The web of relationships between people and place revealed through *Story of Place*, is one way of helping people to see a bigger picture revealing possibilities for healing and regeneration that are invisible from their current altitude.

Understanding that in any conversation people will each be primarily viewing the world from different altitudes, individually orienting from a band within a wider spectrum, allows the project team to speak to specific values, tailoring language to which they can relate. *Spiral Dynamics*, developed by Clare Graves offers a comprehensive model to structure the emergence of human mental systems, as it describes developmental stages applicable to both individuals and the collective (e.g. organization or society) to which the individual belongs. Graves⁷⁵ proposed that:

The psychology of the mature human being is an unfolding, emergent, oscillating, spiralling process marked by progressive subordination of older, lower-order behaviour systems to newer, higher-order systems as man's existential problems change... When a person is centralized in one state of existence, he has a total psychology which is particular to that state. His feelings, motivations, ethics and values, biochemistry, degree of neurological activation, learning systems, belief systems, conceptions of mental health... preferences for and conceptions of management, education, economic and political theory and practice, etc., are all appropriate to that state.

The full Integral Map presents a colour-coded schematic of these altitudes, providing the characteristics, concerns and levers for change of the respective levels.⁷⁶ To guide the rest of the discussion, Table 2 provides a very simplistic outline of these stages of development, based on *Spiral Dynamics*.



From the sky PHOTO: C DU PLESSIS *From space* IMAGE: ANTON BALAZH / SHUTTERSTOCK.COM

Table 2: Stages of development⁷⁷

Names	Basic motives	Where found	Values
GlobalView (Holistic self) Transpersonal SD*: Turquoise/KW**: Turquoise	Attention to whole earth dynamics		Collective individualism, transpersonal perceptions
FlexFlow (Integral self) Integral SD: Yellow/KW:Teal	Flexible adaptation to change through connected views	Global free agents	Whole system, integration of multiple perspectives and diversity
TIER 2			
Pluralistic/HumanBond (Sensitive self) Postmodern SD: Green/KW: Green	Well-being of people and building consensus	Social democracies	Sharing, consensus, global commons, political correctness, community.
Rational/StriveDrive (Achiever self) Modern SD: Orange/KW: Orange	Making things better for self, playing the game to win	Entrepreneurs; capitalist democracies	Progress, prosperity, independence, science, universal rights
Authoritarian/TruthForce (Rule/Role self) Traditional SD: Blue/KW: Amber	Absolute belief in one right way and obeying authority	Nation states; conformist religion	Maintaining order, following laws and rules, harmony and stability
Mythic/PowerGods (Impulsive self) SD:Red/KW: Red	Enforce power over others and Nature	Feudal societies; gangs	Power, toughness, freedom from system
Magical/KinSpirits (Magic/animistic self) SD:Purple/KW:Magenta	Blood relationships	Tribal	Family, ancestral ways, customs and rituals
Archaic/ SurvivalSense (Instinctive self) SD:Beige/KW:Infrared	Staying alive	Survival bands	What is needed to stay alive
TIER 1			

* SD = Spiral Dynamics; ** KW = Ken Wilber

Graves sketched out a series of developmental stages, arranged in a three-dimensional spiral to suggest that this is not a hierarchical model, but rather a continuum where each 'level' includes all the previous levels but also transcends these levels. These stages he arranged in two tiers. The first tier describes the 'subsistence' levels of human development, ranging from survival/archaic-instinctual (beige in the colour system assigned by Don Beck and Christopher Cowan), to mythic/animistic-tribalistic (purple), to power/egocentric (red), to absolutist-religious (blue), to individualistic-achiever (orange), to humanistic/relativistic (green).⁷⁸ These subsistence levels "have as their overall goal the establishment of individual survival and dignity".⁷⁹ Currently the bulk of humanity and its societies spans across these levels, with progressively fewer individuals at higher levels.

However, Graves identified a second tier that comes into play "once an individual has become reasonably secure, both physically and psychologically... and free to experience the wonder and interdependence of all life".⁸⁰ In the 21st century society, these second-tier stages are also emerging in response partly to the growth in human population (resulting in much larger social clusters than the human brain has evolved to comfortably deal with, as explained by Gladwell⁸¹), and partly to an increasing awareness of global

interconnectedness through ecosystems and, enabled through advancement in transport, information and communication technologies, also economic and cultural systems). This second tier contains what Graves terms the 'being' levels of systemic-integrative (yellow) and holistic global view (turquoise). The ecological worldview described so far emerges from this second tier. The levels in this tier take a globally integrated view, acknowledging and integrating diversity and previous levels of development, focusing on the long-term future of the world system. At these levels, the individual works towards "stabilizing the essential functions of interdependent life... and forming communities of knowledge to ensure the survival of all viable life upon this Earth".⁸² However, the turquoise level takes a more collective and macro-view, allowing an integral sense of a global community of life in which the fate of all of life is connected. It is also the level at which deeper mental and spiritual capacities are awakened, resulting in a "great step in development" akin to the evolution towards transpersonal awareness.⁸³

It is important to recognize that while the individual or society may have transcended certain levels, the previous levels remain accessible to them and can be used to deal with situations that require a response from that level. As an individual, one may be driven to succeed at all costs, at times bending the rules (orange values), but expect the government to uphold the rule of law (blue values), insist on ruling the household (red value), and not hesitate to defend one's family in a survival scenario (beige values). At each of these levels there are one's motivators and de-motivators that can be used as levers for change.

Working with integral thinking

Green home building pioneer, David Johnston, describes how, in the 1990s, his team used integral thinking to establish a Green Building Programme in the San Francisco Bay area through cultural change.⁸⁴ They began with a series of lectures on green building during which they would ask the audience what their drivers are: more space, healthier kids, schools, status, prestige, and so forth. This allowed them to understand at what level of development the individual members of their audience were primarily orienting from, and helped them to develop a communications strategy that targeted the specific interests or motivating factors of different stakeholder groups. For example, on the demand side, they used the health and safety concerns of mothers to promote green building as providing a healthier environment for their kids (using the beige lever); or the fact that using renewable energy would mean they have more money to spend in their community and grow its economic health so that local government can provide better services (using the green lever). On the supply side, they would set up and support green builders, promote them as 'heroes' of the industry through the press. The result was that their projects sold out much faster than other, non-green projects. This got the attention of other builders who now became open to learning from these heroes who are out-competing them (using the orange lever). The initial learning from the demand side assisted the team in developing marketing materials for the newly minted green builders that responded to

"Doing a post-occupancy survey of green homes, we found that six months after people moved into these homes, they found themselves shopping at Whole Foods, they were eating organic, they were doing yoga, they were doing all those things they have never thought about doing before."

David Johnston, personal communication

the specific motivators for change in their market segment. The result was that 5 years later, California developed the first state wide green building code in the USA.

We can also see how different societies used different levers to drive green building and other sustainability issues. In Northern-European countries with predominantly social democratic green values, sustainability was seen as ‘the right thing to do’ for the benefit of all, and those countries very early and voluntarily moved to clean energy sources, recycling programmes and green buildings. In a country such as Great Britain, with its strong traditional blue values, similar initiatives were most successfully driven by laws and regulations after agreeing to international commitments.⁸⁵ On the other hand, countries with strong orange values, such as the USA and Australia, saw the development of voluntary rating schemes such as LEED or Green Star which feed on the entrepreneurial and competitive spirit of orange.

Integral sustainable design

Mark DeKay uses the four quadrants and the currently prevalent (in Western/ industrialised countries, at least) blue to turquoise levels of development (traditional, modern, post-modern, integral and transpersonal) as a guide for meeting people where they are and then reconnecting them to nature through design strategies appropriate to these different levels of development in each of the quadrants (see Fig. 12).⁸⁶ He proposes that each of the four integral perspectives (provided by the quadrants) have “different intentions for form-making and different criteria for good form”.⁸⁷ Integral sustainable design would then consider “multiple levels of developing complexity in the intersecting domains of self, culture and Nature”.

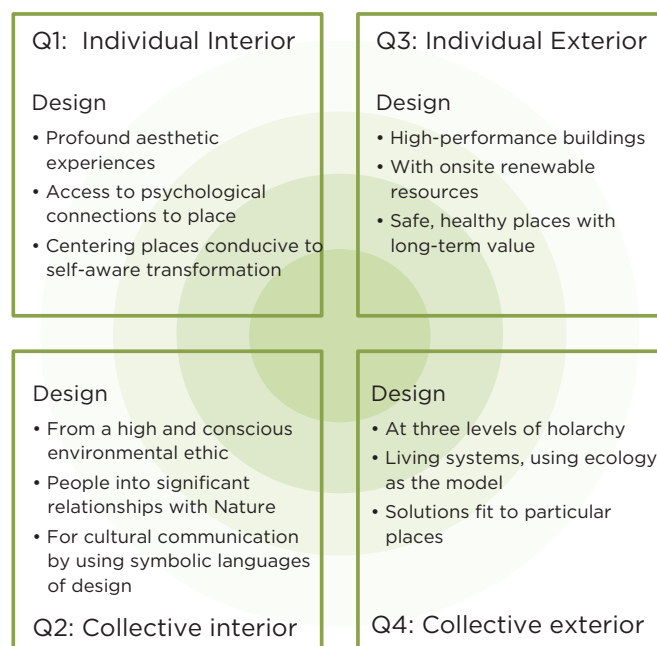


Figure 12: Integral Sustainable Design from four perspectives⁸⁸

Furthermore, he suggests that different sustainable design strategies correspond to different levels of development. For example, if designers were to engage with sustainable building from the traditional level perspective, they would most likely use vernacular technologies; from a modern perspective, they would focus on including high-efficiency technologies and recycled materials; from a post-modern perspective they would approach the design within the context of its natural flows, site-based, passive design solutions, and renewable energy; from an integral perspective they would place the building as living part within the patterns of its ecosystem, using technologies such as biological sewage treatment, and water and energy balancing and cycling. They could also use all of these approaches in a building to engage with the different altitudes found in the users of the building, thus providing each with an entry point into sustainability that meets them where they are.

Just as the technologies considered change as the designer works from the perspective of different levels, the designer's role in relationship to nature also shifts from level to level. Working from the traditional level, he suggests, the designer's role is that of eco-manager intent on conserving nature; from the modern level this role shifts to eco-strategist, thinking about how best to make use of nature as resource; from the post-modern level the designer becomes an eco-pluralist, using many different approaches to create artefacts meant to heal nature; lastly, the eco-integralist designer integrate the multiple processes of nature and meet people where they are, valuing all perspectives and emphasizing personal responsibility.

De Kay's work is not without its critics and, apart from ignoring the importance of the foundational levels, it simplifies what are very complex expressions of thought. A more nuanced use of the development spiral as guiding framework for design that meets people 'where they are', is the Greenshops Project in Centani, South Africa.

Case study: Developing a healthy spiral – The Greenshops Project, Centani, Eastern Cape, South Africa⁸⁹

Centani is a rural hamlet in the beautiful, but extremely poor and environmentally degraded Eastern Cape province of South Africa. It hosts the District Magistrate's Court and police station, and is where the residents of the small villages dotting the surrounding hills come to collect their social grants (the main source of income in the area) and purchase essentials such as maize and paraffin. Most people subsist on a combination of foraging and early agricultural practices. The area, once part of one of the infamous apartheid-era 'bantustans', uncomfortably straddles the divide between ancient traditions and the modern – while part of a modern cash economy and subject to the rule of law, it also falls under tribal authority and subscribes to the traditional cattle economy. Residents are as likely to buy aspirin from the general dealer as consulting the *sangoma* (traditional healer) for an herbal cure. Traditional round *rondavels* made from locally sourced natural materials are gradually replaced by the more aspirational, but expensive and ecologically destructive symbol of democracy and freedom, the concrete block and tinned roofed house.





Homestead outside Centani. PHOTO: V COLLIS

An inquiry into the prevalent belief systems and worldviews in the area revealed that the archaic, magic and early mythic worldviews are predominant, which is congruent with the main forms of cultural organisation (tribes, villages, early nation-states) and modes of production (foraging, horticultural and early agricultural) found in the area. Mapped to Wilber's developmental altitudes, these respectively correlate to infrared, magenta, and red, with a leading edge nudging into amber altitude (roughly corresponding to beige, purple, red and blue in the Beck and Cowan scheme).

It is in this context that architect, urbanist and integral practitioner Anna Cowen and engineer and architect Vernon Collis (Anna Cowen Architects and Vernon Collis and Associates, in association) were asked by one of the country's largest financial and insurance institutions, the Old Mutual Group, to design and build a rural financial services centre and meeting place for tribal chiefs, employing sustainable design principles and ensuring an experience of financial services that did not alienate rural people. Anna Cowen has been developing a body of inquiry over the past ten years on how health at each structure-stage of the development spiral translates into physical expression in the built form. This was used as a guiding framework for meeting each structure-stage where it is and supporting it, while simultaneously inviting growth up the development spiral. The result was "integrally informed design intentions for each structure-stage, arrived at by asking for each stage: What does health in Centani (personal, communal and planetary) look and feel like?"⁹⁰

At *infrared*, the focus is on survival and meeting basic needs. The project therefore aimed to build self-sufficiency and self-reliance in the community by imparting transferable skills such as permaculture, integrated water conservation and harvesting, and improving traditional building techniques such as wattle-and-daub. The landscaping of the project was based on permaculture principles – interweaving hardy indigenous perennials with fruit and vegetable crops meant to supply a small restaurant and produce surplus for sale. Building this into the project demonstrated a new way and easily transferable way of growing food in the harsh local conditions.



Wattle and daub meeting house of the tribal elders. PHOTO: A COWEN

At *magenta* the magical worldview was acknowledged by honouring local traditions and addressing superstition. The meeting place for the tribal elders was primarily constructed using traditional building materials (wattle and daub for the walls and locally harvested timber for the roofing members). While the traditional grass thatching would have been preferred, and was accepted by the community, time constraints forced the use of sheet-metal as roofing material. Superstitions around the ‘haunted’ eucalyptus forest surrounding the town, and traditional taboos around the re-use of old and derelict buildings were overcome by integrating these into the project as sources of building materials. Re-appropriating the ruined apartheid-era magistrate’s court for the financial centre allowed a metaphorical cleansing of the past and replacing it with a positive future.

At *red* the status of the client’s corporate brand, and the use of a contemporary architectural idiom with straight lines, were used to legitimize the use of locally available, ecologically sound materials – satisfying the desire for modernity in a healthy way.

At *amber* the need for familiar structure and purpose was addressed both by the built product and the construction process. While traditional building technologies were honoured, this was done in a contemporary fashion that revealed the structural logic of the construction. Using exclusively local labour that included both genders, the construction process was seen as an opportunity to develop interiors. Inspired by resilience training (the Nova Scotia Sea School in Halifax) and the embodied learning process of medieval guilds, with its progression from apprentice to journeyman to master, the construction process was used to encourage discipline, order, structure, and self-worth, and so nudge the community towards expressions of healthy amber. With days structured and ordered, and people being rotated through different tasks, individual understanding of the construction process deepened and “a sense of ownership and care for place began to emerge”.⁹¹

At *orange* the intentions were to demonstrate the economic benefits of sustainable design and construction and develop entrepreneurial skills and financial independence. It was hoped the training in use of local traditional

Women cleaning bricks for re-use
PHOTO: V COLLIS





A different banking environment
PHOTO: V COLLIS

materials would provide an impetus for future small businesses. To enable harvesting of the alien eucalyptus plantation to support future construction, a Lucas Mill, used to mill construction timber from large pieces of raw timber, as well as a boron tank to treat and protect the timber, was purchased for future use by the community. The client's intention was to introduce modern banking and insurance products in a non-threatening way. This was achieved by creating a nurturing physical environment that made use of familiar materials, provided sheltered seating and connected to nature in the form of a green internal courtyard and links to the surrounding gardens. The result was a marked contrast to the usual clinical business environments of modern financial service outlets.

At *green* the designers demonstrate a systemic approach of an interwoven suite of sustainable design mechanisms and strategies such as the integration of off-the-grid water design, passive heating and cooling, daylighting, permaculture gardens, and shade planting that encourage biodiversity and food security, as well as provision for future photovoltaic and wind power generation.

Table 3 describes how the integral design objectives correlates with Wilber's altitudes. Comments gathered in a series of ongoing interviews during construction and six months after completions illustrate how the community responded to these objectives from different altitudes.

Revisiting the project a year after completion, Cowen found that some elements of the project were successfully adopted and continue to be maintained: the permaculture garden was functioning well and the buildings well cared for. However, the aspects put in place to foster entrepreneurial activities were neglected and unused. Cowen responds to this as follows:⁹²

However, and on deeper reflection, perhaps some of our intentions were quite literally "over the heads" of the Centani community, and that the level of entrepreneurial flair we were hoping to see emerge really does require solid amber foundations in order to flourish. And yet in so many other ways, our integral design intentions were realized, and both the process and the finished product provided a demonstration of a way of doing and being that is not business as usual.



Site of The Greenshops Project, Centani, Eastern Cape, South Africa. PHOTO: V COLLIS

Table 3. A healthy spiral (USED WITH PERMISSION)⁹³

Altitude	Integral Design Objectives	Views from Centani
Green	• Demonstrating green technologies and strategies as didactic measure • Systemic design	Tim Wiggely: Permaculture Garden Trainer “The way the building was made and the gardens are the same. They really work well together. They have been made using the same principles. It makes so much sense. They fit together so well in the landscape. I haven’t seen it done to this level before.”
Orange	• Demonstrating economic benefits, efficiencies and effectiveness of sustainable construction • Imparting entrepreneurial skills and fostering healthy autonomy and financial independence • Introduction of modern banking and insurance products in a non-threatening manner	Mike: Project Electrician “Passive cooling and natural lighting? Solar Geysers? Hmm! I find this very interesting. Nobody is thinking like this around here. It is very new. I need to do my house like this. Eskom cannot supply enough power any more. They say that there is a problem at least until 2014. I think that this is the only way to go.” Jon Bosazza: Project Wattle & Daub Trainer and Pole Sub-contractor “The process of building, of recycling, was so efficient. Also, I have been involved in many projects where they say that the money will get back to the community. It hardly ever happens that way. But in this project it really did happen, it was very effective, the community actually did benefit. Also people were trained.” Simele Baza: Nedbank Employee “They (the clients) say that it is peaceful and that they feel at home here and that they are not intimidated like the city buildings. The banks in the cities are so ‘up there’ but this is friendly.”
Amber	• Process of construction to impart discipline, structure and self-worth • Honouring and preserving traditions in a contemporary way • Bold, legible architecture	Sipho Mboyi: Labourer “I used to work on the Gold Mines in the Free State. It was very hard work, but I got sick. I like this work here much better. It is hard work but it is very interesting. I learn a lot because I can build at home like this. I like building with the planks and the ceilings. I also like how Cameron made the doors. The doors are strong.” Mandla: Businessman “This place seems modern and traditional. It is both. I like it because everyone just wants modern. But now you have used traditional ways to build as well. The people who go to the city are forgetting our culture. I like this way of building. It is is Xhosa.”
Red	• Meet yearnings for artifacts of Modernity in a healthy way • Leveraging status of corporate brand to legitimize local building techniques and materials	Margaret: Nurse “The community is talking. They didn’t know that you could build something so beautiful from that forest. It is something so nice, it is like America.”
Magenta	• Meeting place for tribal elders • Healthy reinterpretation of magical beliefs • The AmaXhosa Calendar Garden	Sipho: Elder “This Court Endala used to be a place of Zombies. But now you have turned it into a place of Engelosi (angels). It is a very beautiful place now. I didn’t know that you could make something new like this from something old.” Maphelo: Bank Employee “I don’t like the roofs. You must paint the amazinc roofs. When the storm comes from there (the east) it can easily see the roofs and then the storm will take the roofs off.”
Infra-Red	• Permaculture garden and courses offer food security • Transferable skills to make own shelter • Water harvesting	Agnes: Client “I like it. It is very peaceful. The buildings are traditional, isiXhosa. I like the lantye ceilings and the poles. Maybe my house can be built like this.” Nosisa: Wavecrest Manager It is peaceful and a nice place. Most of all I love the gardens. The way that you make the [food] gardens is very different. I want to understand. They are very beautiful.”

Conclusions

In this chapter we looked at a range of very different tools and techniques for supporting regenerative practice. These are tools for thinking about whole systems, making connections within the system, and enabling conversations that will result in the ongoing regenerative development of the place in which the practitioner may be working. Because they are dealing with complexity, the tools themselves tend to be complex, challenging to work with, and time and labour intensive. To use them effectively, they also require much from the practitioner in terms of skills development and personal transformation. In Chapter 9 we will discuss this in more detail.

The temptation is always there to look at the demands that will be made on everyone involved in the planning and design of a regenerative project, and step back, saying: “it’s too difficult; we do not have the time; we do not have the money”. *Regenesi*s is familiar with clients firing them early on in a project, only to rehire them a year later when they’ve had time to assimilate this new way of thinking and doing, and could understand the value of doing the hard work.⁹⁴ The type of regenerative work done by groups such as *Regenesi*s and BNIM, requires the ability to see the world from a second tier altitude, and this ability takes time to evolve.

In the meantime there are a number of design and planning practitioners who are working from an orange to green altitude and who are looking for a tool that fits within their worldview, but that will go beyond green rating systems to help them envision a future that is “socially just, culturally rich and ecologically restorative”.⁹⁵ To meet this need, *The International Living Future Institute* developed the tool we’ll be discussing in the next chapter – the *Living Building Challenge*, billed as the most advanced measure of sustainability in the built environment.

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Chapter 8

The Living Building Challenge

“What if every single act of design and construction made the world a better place?”

International Living Future Institute¹

As discussed in the first chapter, working in the ecological worldview aims to create a built environment that has a positive ecological and social footprint. This requires that practitioners work in interdisciplinary teams, integrating knowledge from both the human and the ecological aspects of a project. Although exciting, and providing more holistic solutions, this consideration of a broader context makes it more difficult to define the boundaries of the project.

Green buildings have been the built environment industry's attempt to move towards a more ecologically responsible, 'sustainable' city from within the mechanistic worldview. Over the last few decades, a number of rating tools, such as LEED, Green Star and BREEAM, have been created as roadmaps or design guidelines for green buildings, providing a framework for supporting the integration of multi-layered knowledge domains into one project. Though criticized for their reductionist technological approaches, they have facilitated the creation of a language and a business case for green buildings.² A similar tool could be useful for building from the ecological worldview, i.e. one that facilitates contributive, restorative and regenerative practice.

Inspired by work with BNIM on the EpiCenter in Bozeman, Montana, and later the David and Lucile Packard Foundation, Jason F. McLennan worked with Bob Berkebile and Kath Williams to conceive the idea of Living Buildings. This led to the development of the *Living Building Challenge* (LBC) programme (launched in 2006) by McLennan, who is also CEO of the *International Living Future Institute*. He wanted to challenge what was possible by developing “a green building certification programme that will be the most advanced measure of sustainability in the built environment





Eva Lanxmeer, Netherlands.
PHOTO: D HES

possible today and act to diminish the gap between current limits and ideal solutions”.³ The first buildings achieving LBC certification – the Omega Centre for Sustainable Living in Rhinebeck, New York; and the Tyson Living Learning Centre, Eureka, Missouri – were certified in 2010. Since then, a set of social prerequisites have been added to the programme. To date (2014), five projects have achieved full certification, and another nine partial Petals certification or for being net-zero energy buildings. In this chapter we explore the *Living Building Challenge* programme and Standard as a tool for supporting and facilitating “a future that [could be] Socially Just, Culturally Rich and Ecologically Restorative”.⁴

The Living Building Challenge

The Living Building Challenge is a philosophy, an advocacy tool, as well as a certification programme that covers building projects ranging in scale from single buildings to neighbourhoods. It draws on “thinking from the worlds of architecture, engineering, planning, landscape design” to set a cohesive standards which provides “a framework for design, construction and the symbiotic relationship between people and all aspects of the built environment”.⁵

The philosophy driving the *Living Building Challenge* aligns with the ecological worldview in that it challenges humanity to “reconcile the built environment with the natural environment, into a civilization that creates greater biodiversity, resilience and opportunities for life with each adaptation and development”.⁶ It asks questions such as: “What if every intervention resulted in greater biodiversity; increased soil health; additional outlets for beauty and personal expression; a deeper understanding of climate, culture and place; a realignment of our food and transportation systems; and a more profound sense of what it means to be a citizen of a planet where resources and opportunities are provided fairly and equitably?”⁷

The *Living Building Challenge* vision⁸

- Imagine a building designed and constructed to function as elegantly and efficiently as a flower: a building informed by its bioregion’s characteristics, and that generates all of its own energy with renewable resources, captures and treats all of its water, and operates efficiently and for maximum beauty.
- Imagine a city block or a college campus sharing resources from building to building, growing food, and functioning without a dependency on fossil fuel-based transportation.
- Imagine true sustainability in our homes, workplaces, neighbourhoods, villages, towns and cities – Socially Just, Culturally Rich and Ecologically Restorative.

The *Living Building Challenge* aims to create communities that are car free and generate their own energy and process their own waste; it encourages urban agriculture and habitat exchange; and limits urban sprawl. To achieve these aims not only requires that those working on a project need to collaborate closely; it means that planning, design, industry, community, science and government need to come together. Without such collaboration, barriers and delays may be encountered.

There are a number of factors differentiating the *Living Building Challenge* from rating systems such as LEED, Green Star and BREAAM. Firstly, certification is based on actual performance, measured over a 12 month period prior to certification, instead of modelled or anticipated performance. Secondly, instead of cherry-picking and trading off between criteria to achieve a specific rating, a Living Building has to

meet *all* the mandatory Imperatives for its type and transect. Third, instead of setting narrowly defined performance parameters, goals such as Net Zero energy and water mean that the design team can use their experience and genius to solve how this is achieved, uninhibited by specific requirements that may limit synergy. The fourth differentiator is that it allows multiple buildings or projects to operate cooperatively in sharing larger-scale green infrastructure where this would be more optimal. This acknowledgement that a project is not an isolated independent entity allows transformative impact across scales of development from buildings to neighbourhoods. This is called *scale jumping*. For example living machines and local water treatment may be more effective at a community scale than at an individual scale. A project that integrates this into its design is scale jumping within the Water and Energy Petals, as well as within other Imperatives. Finally, unlike any other green rating system, there is a list of structures that may not seek certification due to occupancy types that are inherently in conflict with the overarching goals of the *Living Building Challenge*.⁹

It is clear that there is increasing demand for a tool that will help clients and professionals go beyond best practice green building, and the *Living Building Challenge* is providing exactly the challenge they need, as can be seen from the testimony below by Caroline Pidcock, a Sydney based architect who introduced her clients to the *Living Building Challenge* partway through a project. She found that, although it required some redesign, the benefit in the response from the client was well worth the extra effort.

“The main project that we have been looking at using the LBC [Living Building Challenge] for is called First Steps Count – Child and Family Centre. This is a community project in the country town of Taree, New South Wales and will provide regional integrated early childhood services for families with children 0-12 years. It has a particular focus on Aboriginal children and their families, and outreach extension, including via digital technology, to the wider Mid North Coast community. A few months into the design process I reacquainted myself with the LBC and presented it to the clients, as their project is centrally about social restoration and regeneration.

Their reaction was inspiring. They said this was exactly what they were about, what underpinned their philosophy. I presented it with all the caveats that this might be difficult, take longer, cost more, but they said: ‘No this is perfect! We want it and it will just be part of the budgeting process.’ After a long delay as we addressed bush fire issues, we lodged the application for planning approval with Greater Taree Council in early 2014. The committee is actively involved in raising the money required to build, buoyed by the Vincent Fairfax Foundation’s promise of [AUD]\$1m towards the construction costs when the remainder of the money is raised.¹⁰



Renders of the proposed project. IMAGES: PIDCOCK ARCHITECTS

Structuring elements of the Living Building Challenge



PHOTO: D HES

The Living Building Challenge 2.1 consists of twenty *Imperatives*, each of which focuses on a specific sphere of influence, that are applicable in some way to most built environment projects. These are arranged according to seven performance areas, or *Petals*: Site, Water, Energy, Health, Materials, Equity and Beauty. The Imperatives can be mandatory or optional, and there are some temporary exemptions due to market conditions or context (such as in developing countries). To determine which Imperatives are mandatory, the project needs to be classified into one of four *typologies*: neighbourhoods, building, landscape and infrastructure (e.g. natural amphitheatres), and renovations. The matrix in Figure 1 indicates which Imperatives are mandatory for which type of project; which are optional; and which can jump scale. It is also possible to achieve a Petals certification or a Net Zero Energy Building certification; both are less stringent than full Living Building certification, but still requires meeting the requirements of a number of Imperatives.

Summary Matrix

	NEIGHBOURHOOD	BUILDING	LANDSCAPE+ INFRASTRUCTURE	RENOVATION	
SITE					LIMITS TO GROWTH
					URBAN AGRICULTURE
					HABITAT EXCHANGE
					CAR FREE LIVING
WATER					NET ZERO WATER
					ECOLOGICAL WATER FLOW
ENERGY					NET ZERO ENERGY
HEALTH					CIVILIZED ENVIROMENT
					HEALTHY AIR
					BIOPHILIA
MATERIALS					RED LIST
					EMBODIED CARBON FOOTPRINT
					RESPONSIBLE INDUSTRY
					APPROPRIATE + REUSE
EQUITY					CONSERVATION + REUSE
					HUMAN SCALE + HUMAN PLACES
					DEMOCRACY + SOCIAL JUSTICE
BEAUTY					RIGHTS TO NATURE
					BEAUTY + SPIRIT
					INSPIRATION + EDUCATION

Figure 1: Summary of the Petals, Typologies, Imperatives and Scale Jumping concepts and their relationships

GRAPHICS COURTESY OF THE LIVING BUILDING CHALLENGE STANDARD 2.1

To guide appropriate development in relation to a project's setting, the *Living Building Challenge* makes use of *Living transects*, a series of categories defining areas of development from rural to dense urban adapted from the New Urbanist work of Andres Duany, Elizabeth Plater-Zybek and Company (see Fig. 2).¹¹ When applying for the *Living Building Challenge*, a project has to indicate the Living Transect in which it is situated. Development in L1 sites, or land set aside as nature preserve or ecologically sensitive habitat, can only be developed under highly unusual circumstances. For the moment, newly industrialized or other countries with a low Human Development Index are allowed to build a neighbourhood type project in such an area, subject to specific conditions.¹²

One of the identifying characteristics of a Living Transect is the Floor Area Ratio (also known as the floor space ratio, or site ratio): i.e. the ratio of the total covered area of all floors of all buildings on a plot to the overall size of the plot. The *Living Building Challenge* promotes the transition of suburban zones to either new urban areas with greater density (increasing the FAR), or to be repurposed as new rural zones for food production, habitat and ecosystem services (decreasing the FAR).



Imperative is optional
for corresponding
Typology

scale

Solutions beyond project
area are permissible



Figure 2: Living transects (L1-L6) based on Duany, Plater-Zyberk and Company's transects (T1-T6). PHOTOS: C DU PLESSIS

The Petals

As the *International Living Future Institute* provides detailed guidelines for the application of each of the Petals, the objective of this chapter is not to describe the Petals and their corresponding Imperatives in detail, but rather to examine how the *Living Building Challenge* supports transformation to, and working within, an ecological worldview.

The Site Petal

The intention of the Site Petal is to determine where people can build what type of development, and how to restore a place. It also requires some commitment to agricultural production and reducing reliance on automotive transport. Guiding the achievement of the Site Petal are four Imperatives: Limits to Growth, Urban Agriculture, Habitat Exchange and Car Free Living

Discussions around limiting urban sprawl have gained momentum over the last twenty years. Yet, sprawl continues because the industries and systems that support and are rewarded by this type of development remain in place. The aspiration of new home ownership, the reduced risk of green field development, dictates of financial backers and the way the industry is rewarded, all create a form of development that is ecologically and socially unsustainable. Challenging this is difficult because of the vested interests of

the stakeholders. The **Limits to Growth Imperative** offers a way to challenge this status quo by only supporting projects on previously developed or degraded land, with certain exceptions. The tool provides clarification on what this means, as well as the exceptions depending on the context of the development as mentioned earlier. For practitioners, identifying the site is the first step, and site assessments need to be documented for certification purposes. This provides a key opportunity to link the *Living Building Challenge* process with regenerative development processes such as the *Integral Assessment* and *Story of Place*. In documenting the site, there are opportunities for extending the process beyond merely capturing current images and rudimentary site analysis (sun, wind, landscape, soil, water etc.). Stories about historical and social significance can also be included. Ecological and geological investigations of the site and its surrounding context can provide inspiration and engagement. Combining these strands of the broader *Story of Place* with the rudimentary site analysis required by the *Living Building Challenge* could provide unexpected emergent solutions and opportunities for the project team and improved long-term social and environmental outcomes and/or contributions.

Caveat

Using previously developed areas does not come without potential problems, such as present and future liability associated with the need for environmental clean-up. The fear of potential future liability and environmental costs can make potential financiers wary, limiting available development finance. Other potential problems include costs overruns and delays due to environmental regulations, lack of information and uncertain market potential.

Some municipalities have specific programs to help reduce these barriers, for example, The City of Hamilton in Canada has the *ERASE* (Environmental Remediation and Site Enhancement) plan. Designed to erase unsightly brownfield sites, this program aims to support redevelopment by providing incentives to clean them up and replace unused with economically productive sites. The finance is in the form of grants for redevelopment, environmental study or rebates on fees.¹³

The **Urban Agriculture Imperative** requires that projects contribute to local and regional food production. The area to be set aside for food production depends on the Living Transect in which the project is situated. In L1, which refers to natural habitat zones, there are no agriculture requirements; while in L3 (suburbia) a project will be required to set aside 30-35% of the project area for agricultural purposes; and in L6, the urban core, there are no food production requirements. As density increases, the potential food growing area decreases. This has implications for a project's ability to move towards independent and self-sufficient food-production. Irrespective of, and potentially because of this, there is a potential opportunity for both innovation and contribution. A project team could consider green vegetated roofs, walls, facades, rain-gardens and so forth for productive landscaping. This could also contribute to increasing the biophilic effect of denser areas, so meeting another Imperative.

Docklands agriculture – Moyo Urban Farm, V&A Waterfront, Cape Town¹⁴

Restaurant chain *Moyo* and *Tsai Design Studio* illustrate the potential for growing food in unusual spaces with a restaurant *cum* urban farm situated on the docks in Cape Town's popular V&A Waterfront development. The project combines hydroponics and aquaculture to provide fresh greens and trout or tilapia (depending on the season) for the restaurant. The customized system circulates nutrient-rich water from the fish tanks through a series of aquaponic green walls inside the restaurant and vertical planters on the outside decks, where the salad greens and herbs grown in the planters clean the water, which is returned to the fish tanks.



PHOTOS: C DU PLESSIS

Increased density limits not only agricultural and green opportunities, but also reduces the amount of natural habitat available to other species. The third Imperative, **Habitat Exchange**, requires a project to set aside an amount of land equal to the development for ecological preservation in perpetuity. As setting aside such land on the project site presents several problems, not least of which is to ensure that the area will continue to be protected in the future, this off-set should be in a suitably established and managed conservation project. While this Imperative still functions from the old worldview which separates humans and nature into clearly delineated spaces, with humans seen as stewards of nature, it encourages the protection of sensitive ecosystems and preserving true wilderness for species other than humans, while we explore and understand how we can become partners with nature within our built environments.

Car Free Living, the fourth Imperative within the Site Petal, encourages the connections between health (both physical and social) and ecological sustainability. It requires project teams to consider the potential for people to lead a car free lifestyle within their community. 'Car free' does not mean without cars, but rather the potential for people to live rich and productive lives within their neighbourhoods without needing individual motorized transport. Research shows that being able to walk or cycle creates a level of connection to place that benefits the community: improving not only individual health, but also aspects such as safety, reduction in crime and reduction in vandalism.¹⁵ The *Living Building Challenge* guides project teams working in neighbourhood typologies in optimizing the potential for car free living by aiming to balance occupancy types (i.e. residential, light industrial development and commercial/assembly/educational/institutional). For example, in L6 (urban core), any single occupancy type within the

‘catchment area’ of the project should not exceed 40% of the occupancy of that area; while in lower-density L3 (suburbs) any single type should be limited to less than 70% of the occupancy. This requires that a project should consider the contribution it makes to balance of occupancy types within a one kilometre radius from the project site (the catchment area). These requirements support mixed use, as well as access to services, which reduce the need for travel.



Medina in Fez PHOTO: C DU PLESSIS

Car free living in practice

In the older cities of the world, car free living is imposed on people by the existing urban morphology. For example, it would be impossible to drive a car in the narrow streets of Fez in Morocco; and in many older cities, cars are actively discouraged from the central parts of town through physical barriers or expensive permits. The walkability of these old towns has been a source of inspiration for more sustainable city models. However, the challenge remains of creating new neighbourhoods that would result in the same degree of walkability in today's car-addicted society. The two projects discussed below illustrate that this is indeed possible. However, such projects still rely on an effective and reliable public transport system and the committed participation of the residents.

Vauban, Germany – Community leadership delivering sustainable urban renewal¹⁶

The physical and financial separation of car parking from buildings in this German development, has been an important component of a sustainable transport strategy. It incorporates a variety of measures to support residents in living a car free lifestyle, including streets that favour walking and cycling over driving, access to high-quality public transport, local provision of services such as shops and schools, and a car-share scheme.

Centralized garages provide parking for residents and businesses within the precinct, removing parking from almost all residential streets and private garages. People can choose to lease or purchase a space as a separate cost, making this cost overt and upfront. Coupled with the provision of good alternatives, this has led to fewer families choosing to own a car. The *Association for Car Free Living* is a key support mechanism put into place to facilitate access to communal cars when necessary. Finally, rationalizing car parking spaces released valuable land for riding bikes, playing, gardens and neighbourhood space. Further, due to the ease of walking, riding, and nearby public transport, cars are only used for 16% of journeys.¹⁷

EVA-Lanxmeer, Culemborg, the Netherlands – a community driven project

In 1993, before the *Living Building Challenge* was conceived, a sustainable urban development and building project embodying many of the principles of living buildings was established in the Netherlands. EVA Lanxmeer started as a private initiative of Marleen Kaptein, who conceptualized it as a pilot programme to inspire ordinary citizens. The project inception phase took three years and involved twelve parties (bureaucrats, power and water companies and last but not least, a group of future residents that heard of the project and wanted to live in a community). The planning stage took another two years and six new parties joined in (designers and building contractors). It took another three years before in 2000 the first residents were able to move in.

Today the development hosts the following: 300 houses and apartments, ecological office buildings, a biological city farm, a visitors centre, an integral water treatment centre (including a 'Living Machine'), an energy concept based on reduction of energy and renewable energy sources, permaculture gardens and an 'Edible Landscape' in private and public areas. EVA Lanxmeer is now demonstrating that initiatives that offer practical and economical solutions to avoid the environmental problems often caused by the built environment; solutions that show the industry that it is possible to restore and add value to the environment. The residents provided input into the design and planning processes, foregrounding the concept of car free living. There is still an allowance for one car

per household, but the parking spaces are at the edges of the development. The resulting environment is peaceful, quiet and enjoyable. Most homes overlook public green spaces containing fruit and vegetable gardens, covered meeting places and play areas. Children safely play with neighbours due to the car free environment and passive surveillance facilitated by the design.



PHOTOS: M KAPTEIN

The Water Petal

The Water Petal encourages projects that respect water as a resource that should never be wasted. As in the other Petals, the aim is a future where all buildings, communities and projects are designed around the carrying capacity of the site. For water it means designing with sensitivity towards the local hydrology, ecology and climatic conditions. The Water Petal aims to ensure all water is sourced on site, whether recycled or captured (the **Net Zero Water** Imperative), and that natural ecological flows are protected (the **Ecological Water Flow** Imperative). The first requires that 100% of a project's water use should come from harvested rainwater or on-site water recycled using natural treatment systems; while the second requires that 100% of storm water or released project water be managed on site through acceptable natural processes such as groundwater recharge or slow release into natural flows where it becomes available to other users.

Key to achieving these two Imperatives is consideration of water sources and the purpose they fulfil. Called the water quality cascade,¹⁸ this approach links the water source and its purity to the use for which it is required: fit-for-purpose water. Project teams need to consider all water sources including potable water from the main centralized system, rain, storm water, grey water (showers, washing machines etc.), black water (toilets), and wastewater from cooling towers. They also need to consider all end uses for the water: toilet flushing, irrigation, drinking, washing, cooling, heating and ecological flows. Through effective use and source matching, it is estimated that there could be a drop in the potable water consumed by 80% or more and reduce effluent discharge by more than 90%.¹⁹

The Water Petal is one of the areas where there is the greatest opportunity for scale jumping because many of the efficiencies are achieved through combining flows in an ecologically inspired fashion, rather than trying to treat and reuse water per individual building.

The Energy Petal

The Energy Petal is similar to the Water Petal in that it aims to use the energy budget of the site. It “envisions a safe, reliable and decentralized power grid, founded on renewable energy that supplies incredibly efficient buildings and infrastructure without the crutch of combustion”.²⁰ The Petal has only one Imperative: **Net Zero Energy**, which requires that all energy is generated on site on an annual basis. This gives room for a project to draw from the grid in times of low renewable yield (for example, in winter or at night).

The Eva-Lanxmeer example given below, aimed to integrate both the Water and Energy Petals. The planning for the project included the design of a system for treating black water and green waste, creating methane and then using this to produce energy. The system was integrated with a living machine, the production of district heat and power, and compost. However, the plant was not built. Interestingly, if it had, it would not have met the *Living Building Challenge* requirements for the Energy Petal, as it would have used combustion. To limit a project's contribution to climate change, the *Living Building Challenge* accepts only energy from solar, wind, hydro, and geothermal sources, as well as hydrogen fuel cells. The only exceptions allowing combustion are in small projects in Living Transects 1 and 2, and in commercial kitchens or laboratories where gas may be required for key activities.

Energy positive community development – EVA-Lanxmeer, Culemborg, the Netherlands



PHOTO: M KAPTEIN

While this project dates from before the *Living Building Challenge*, it provides a good example of how to achieve, and exceed, the Energy Petal. The starting point for this project is good passive solar energy design, ensuring excellent levels of insulation and capturing waste heat through heat exchange ventilation. Secondly, it aimed to meet demand with renewable onsite generation, primarily through solar power, with some wind power and a waste treatment plant. Heating was provided primarily through low temperature hydronic pipes in the walls. A high efficiency boiler in the initial stages was upgraded to a central district system. The bulk of the renewable energy came from solar, either through photovoltaic or solar water heating, which was used for both hot water and the heating system.

The Health Petal

There is a strong link between the built environments' effect on mental and physical health. The Health Petal addresses this through the Imperatives of a **Civilized Environment**, **Healthy Air** and **Biophilia**.

The **Civilized Environment** Imperative acknowledges the rights of people to have access to natural light, operable windows and fresh air. The **Healthy Air** Imperative includes guidance on strategies to minimize pollutants and particulates in the air and requires strict monitoring and measurement. This Imperative is very strongly linked to the Materials Petal through the Red List, a list of materials and chemicals that must be avoided to effectively minimize the toxins entering the project in the first place (see Table 1). The **Biophilia** Imperative requires that each of the six established Biophilic Design Elements (see Chapter 3) must be represented for every 2 000 m² of the project.

The Materials Petal

The Materials Petal is well known as posing the most onerous set of Imperatives. However, it is a crucial aspect of creating the industry change that will promote the ability to effectively build within an ecological worldview. If ecologically harmful chemicals are being used, if rare ecosystems are being destroyed to make materials, if materials are unable to biodegrade or are designed for obsolescence, then the system is working for short-term gain, rather than for long-term benefits. The stringent requirements in this Petal are driven as much by the need for advocacy and market transformation, as by the need for a healthy environment. As the *International Living Future Institute* states:

*While there are a huge number of “green” products for sale, there is also a shortage of good, publicly available data that backs up manufacturer claims and provides consumers with the ability to make conscious, informed choices. Transparency is vital; as a global community the only way we can transform into a truly sustainable society is through open communication and honest information sharing...*²¹

Some organizations are attempting to set up such transparent frameworks for product information, for example *EcoSpecifier* in Australia and Asia, and the *Declare* and the *Pharos* projects in North America. The *Living Building Challenge* provides an impetus to have a dialogue with industry, prompting acknowledgement of the bigger impact of the built environment, and suggesting a way of thinking about buildings and their materials as part of a larger system.

The Imperatives within this Petal include the **Red List** of materials to avoid (see Table 1), requirements to offset embodied carbon (**Embodied Carbon Footprint**); industrial responsibility through advocacy for third party certification (**Responsible Industry**); **Appropriate Sourcing** through specifying distance from site for materials; and **Conservation and Reuse**, setting targets for waste elimination.

Asbestos
Cadmium
Chlorinated Polyethylene and Chlorosulfonated Polyethylene
Chlorofluorocarbons (CFCs)
Chloroprene (Neoprene)
Formaldehyde (added)
Halogenated Flame Retardants
Hydrochlorofluorocarbons (HCFCs)
Lead (added)
Mercury
Petrochemical Fertilizers and Pesticides ⁴⁵
Phthalates
Polyvinyl Chloride (PVC)
Wood treatments containing Creosote, Arsenic or Pentachlorophenol

Table 1 - Materials Red List²²

The Health and Materials Petals are still embedded within mechanistic approaches of limits, specific requirements and directives. This is understandable, as the *Living Building Challenge* must ensure compliance to provide certification.

The Equity Petal

The second last Petal is Equity. Here the *Living Building Challenge* moves away from the traditional ecological sustainability or green building areas, to address social aspects. In an ecological worldview this is logical. Divorcing ecological impacts and social impacts is counterproductive because the built environment affects both and they affect each other. This Petal's intent is to provide guidance towards creating a sense of community, providing systems that allow people from all ages and walks of life to live with dignity. In doing so, this set of Imperatives aims to create global buy-in to creating a positive, thriving and irresistible future. The *Living Building Challenge* claims that empowerment and belonging to community is part of the holistic approach to minimizing many of the social and ecological problems.

The Equity Petal addresses one of the main negative outcomes of the mechanistic worldview – that of the problems caused by the ‘us and them’, and ‘mine not yours’ mentality – by challenging the right of people to own nature and public space, through common examples such as gated communities; private beaches; ownership of resources such as water rights; and claiming or having the right to pollute. The *Living Building Challenge* aim to confront this thinking by changing the way development is looked at, and privileging the citizen over the consumer.

The first Imperative under this Petal is for the design of the project to be at a **Human and Humane Scale** – building neighbourhoods for people and not for cars and corporations. How this is achieved, is context dependent and will differ for each of the Living Transects. The *Living Building Challenge* provides a set of design guidelines that set requirements for surface cover, proportions, signage and streets for each transect (see Fig. 3).



PHOTO: C DU PLESSIS

The project must implement the following design guidelines:

Transect		L1	L2	L3	L4	L5	L8
Surface Cover	Maximum dimension of surface parking lot before a separation is required on all four sides (e.g., building, wall or 3m wide minumum planted median or bioswale)	7m x 10m					
	Total area of surface parking lot allowed. All other parking requirements must be handled in structured or underground parking.	65m ²	270m ²	195m ²	130m ²	65m ²	0m ²
Streets + Intersections	Maximum street width, measured either shoulder-to-shoulder or curb-to-curb	5m		7.5m	10m	15m	22.5m
	Maximum street width before driving lanes must be separated by a pedestrian strip and planting median (Additional lanes may be included on the other side of median to a maximum of 22.5 m total width of driving aread)	Not applicable Development of this kind is not permitted in a Natural Habitat Preserve or Rural Agricultural Zone		15m			
	7.5m						
	9m						
	45m			60m			
	60m x 120m			120m x 120m			
	Signage	Number of free-standing signs per development	1				
Maximum dimensions of free-standing sign(s)		2m x 2.5m		2m x 3m		3.5m x 6m	
Maximum elevation of sign's bottom edge above ground		2m	3m	6m	9m	12m	12m or roof-mounted
Proportion	Maximum distance between facade openings (e.g., doors and windows)	N/A	30m				
	Maximum footprint for any building with a single use, single owner or single tenant (Acceptable to provide additional floor area for tenant on upper/lower floor(s))	3750m ² excludes floor area of atriums, courtyards and daylight shafts					

Figure 3: Requirements to meet human scale imperative²³

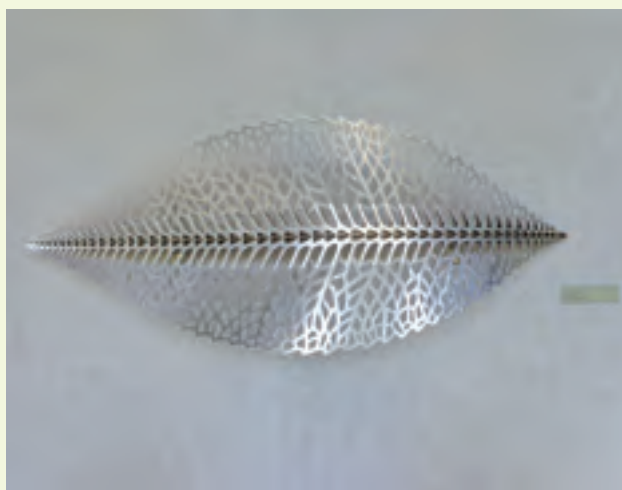
The **Democracy and Social Justice** Imperative outlines ways of ensuring equitable access for all people, giving guidance on aspects such as street furniture, accessibility, and affordable housing. Again, the requirements are dependent on the Living Transect in which the project is being developed. Key to this Imperative is that projects must make all reasonable attempts to ensure that all stakeholders benefit from the project. As well as protecting the rights of people within the project, the next Imperative, **Rights to Nature**, protects those around the site, including nature, by defining standards for access to sunlight, clean water, clean air and so forth.

The Beauty Petal

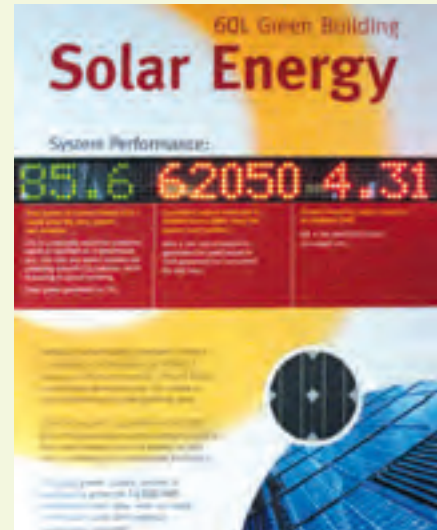
The seventh and final Petal is that of Beauty. This is a highly contested concept because beauty is an interpretation founded on many factors including aesthetics, culture, history and education. If beauty is in the eye of the beholder, how can it be incorporated into an Imperative or requirement? The *Living Building Challenge* approaches this not by mandating what beauty is, but by seeking to understand the conversations that took place within the project to create delight. The *International Living Futures Institute* describes the rationale behind this Petal as follows:

To recognize the need for beauty as a precursor to caring enough to preserve, conserve and serve the greater good. As a society we are often surrounded by ugly and inhumane physical environments. If we do not care for our homes, streets, offices and neighbourhoods then why should we extend care outward to our farms, forests and fields?²⁴

The first Imperative under this Petal, **Beauty and Spirit**, simply states that every project must have elements of pure delight, celebrating spirit and culture in an appropriate fashion.



PHOTOS: C DU PLESSIS



Building performance information provided in New Belgium Brewery (left) and 60L Building, Melbourne (right). PHOTOS: C DU PLESSIS

The last Imperative is **Inspiration and Education**. This recognizes the potential for every project to inspire not only those in and around it, but also the international community of practitioners working in the built environment. It requires that educational materials about the operation and performance of the project be made available to the public, and that the project is open to visitors at least once a year.

Case study – Sustainable Buildings Research Centre, Wollongong

The Sustainable Buildings Research Centre (SBRC) at the University of Wollongong, NSW, Australia, is a multi-disciplinary facility that brings together a wide range of researchers to holistically address the challenges of creating buildings that are both sustainable environments and effective places in which to live and work. Designed by Cox Richardson, the project will start its *Living Building Challenge* certification process in 2014.

Joe Agius, Design Director, Cox Richardson, explains that the project has a strong connection to the campus as well as the larger Story of Place: “A strong collaborative and meeting space is strategically placed at the point the building addresses the campus pedestrian spine ... the building is responsive to the surrounding context and topography sitting between mountain range and ocean, adjacent a wetland. The building’s landscape integrates local flora and interprets traditional custodian practices through its bush-tucker garden.”²⁵



SBRC bush tucker and vegetable gardens PHOTOS: D HES

When interviewed about their experience with introducing the *Living Building Challenge*, Michael Bradburn, the Project Architect, said the following:

What was nice about the LBC was its holistic approach; it meant we weren't chasing points ... It was interesting to experience the difference between the LBC and Green Star – the holistic and the more fragmented. For example, certain PMV (Predicted Mean Vote) criteria need to be met in Green Star for thermal comfort. Yet the client, the University of Wollongong, wanted to push and understand the boundaries of occupant comfort, actually researching comfort and so forth. But to meet the Green Star [requirement], systems needed to be put in place to meet this credit that would have meant much higher energy consumption. It was lucky we had credits to spare so we choose not to meet the PMV requirement and forgo that credit.²⁶

Bradburn also described how those involved in the SBRC came to understand the advantages of engaging authorities and stakeholders early:

One of the lessons we learnt is to liaise with authorities and stakeholders as early into the process as is possible. For example, even though the technology, filters, living machines, tests, etc. could be provided to ensure excellent quality drinking water, there is a NSW Health guideline that recommends you do not use rainwater for drinking water when mains water is available. In its duty of care the University could not ignore this, so we requested an exemption.. Only three taps were connected to the mains supply, all showers and wet area basins are supplied from treated rainwater, this outcome was only possible due to the dialogue with the client.²⁷

Professor Paul Cooper director of the SBRC:

We wanted to bring into being a building that we could look back on, from at least 10 years into the future, and know that we pushed the sustainability envelope as much as we could, and challenged current approaches to sustainable building design. The LBC provided us with a clear framework with which to develop our vision and allowed us to achieve ambitious, and tangible, outcomes with our design team.²⁸

The team found the Materials Petal most challenging, as Andy Marlow, the materials researcher for Cox Richardson, describes:

The one lesson from implementing the LBC at the Wollongong project is the amount of time and research that needed to go into meeting the Materials Petal. This should not be underestimated. Often there were days of having the same conversation with manufacturers who themselves did not have many of the answers. It would have been great to have a database of materials the design could have responded to rather than cold calling manufacturers to match the design.²⁹



Reused timber and bricks. PHOTOS: D HES



Acoustic fire and thermal treatment. PHOTO: D HES

Joe Agius concurred:

The compliance requirements for the Materials Petal, particularly the Red List and appropriate sourcing, meant we needed to put in a lot of additional work. In any other project this would have added 20-25% to our fees. This is of course because we were the first project to do the LBC in Australia. Just like the older rating schemes, the first projects have the greatest amount of new ground to break and this costs time and money.³⁰

Michael Bradburn had some recommendations for future use of the Living Building Challenge Standard:

The Materials aspect especially needs to be made more streamlined through a publically accessible knowledge base. It is extremely important when approaching an LBC project to have a good understanding of the available materials palette. In our project we were already partly down the path of the design and had signed off on the design so we had to retrospectively look at the materials palette. This meant some positive changes to the design, the aesthetic of the building is a direct response to the constraints of the materials petal.

Acoustic insulation is another example. We needed to manage the acoustic, thermal, fire requirements and ensure compliance to the Red List and appropriate sourcing imperatives. If we had understood the constraints earlier we would have approached it differently and it would have been less time consuming and frustrating.

Through the countless conversations we had with manufacturers, it was interesting to see there were two distinct responses to our requests for information. The first group engaged with the process and did their best to provide the required information, in some cases finding that they actually would not meet the LBC requirements. The second group did not feel any need to be involved and basically told us not to use their products. It will be interesting to see how many LBC projects it will take to create the critical mass for this second group to change.³¹

The *Living Building Challenge* provides opportunities for various disciplines to come together and work towards a single, integrated solution. In the SBRC project, this process began before the *Living Building Challenge* was applied, and was driven by a brief from the University that had already set the bar very high. Several months into the design process, the *Living Building Challenge* (LBC) was mandated by the University after the SBRC Director and Project Manager were introduced to LBC by Monique Alfris. The University could see the alignment of their intentions – a world leading research facility for sustainable buildings – with those of the challenge. Though certification is not officially attained until the building has been in operation for 12 months, it is useful to reflect on four of the project team's main learning experiences:

1. Start thinking about materials early and let the design respond to the materials palette
2. Think through the consequences of material decisions
3. Talk to all the stakeholders at the beginning to define and test the limits of what is possible for the project.
4. The *Living Building Challenge* can be retrospectively applied to a project, even part way through the design process.

Lessons 1 and 2 arose out of the novelty of the *Living Building Challenge* in the market. Materials that meet the requirements are often limited and therefore, in the short-term, having an understanding of a range of materials that can be used is crucial to facilitating the design process. In this way the project team can save the time and frustration of trying to match materials to design intent and avoid unintended (and perhaps costly) consequences. Andy Marlow offered an example of Lesson 2 from the project:

*It is worth thinking through the consequences of decisions, for example we did not use sprinklers in the building for fire prevention – saves materials – which is great. But this meant the project needed to meet stricter fire spread rating requirements for finishes.*³²

Lesson 3 pointed out the importance of knowing what could be designed into the project. For example, as explained earlier on, a whole water neutral system had been designed for the project, capturing rainwater from the roofs of the SBRC, before it was discovered that water from the centrally controlled mains system would be required for three drinking water outlets.

Lesson 4 was that a project team can apply the *Living Building Challenge* later in the design process. Andy Marlow described the consequences of the shift from a Green Star project to a *Living Building Challenge* project: “In this project we applied the LBC part way through the design process. And the changes were mainly in the detailing, not the function. It took time and so forth, but I feel the LBC is definitely retrofit-able.”³³ However, it must be taken into account that the original project brief already had very high sustainability requirements.

Conclusion

As discussed in Chapter One, sustainability in an ecological worldview is a journey not a destination. Similarly, the *Living Building Challenge* is itself a 'journey' that is by no means over. Its administering body, the *International Living Future Institute*, sees the tool evolving as it is used in varied projects in different contexts and as market conditions change, allowing ever-more stringent criteria. The *Living Building Challenge* provides an interesting bridge between the old and new worldviews, using the tools of the mechanistic worldview to pull clients and project teams into a deeper understanding of a project's relationships with its Place, helping them almost imperceptibly to shift towards an ecological worldview. In some ways it presents a much more rigid 'checklist' than any of the Green Building rating schemes, but it also allows much greater freedom in meeting the requirements of that checklist. The strength of the program is that it provides both a vision and definite limits – but not by prescribing process. This is left to the genius of the design team – allowing experts to put all their energy into doing what they have a passion for, and bringing them together around key opportunities, outcomes or challenges to create a deeper, more holistic solution. It will be interesting to see how the Standard evolves over time and if it will expand to include some of the Regenerative Development processes.

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ALUM.

GLASS

PLASTIC
BOTTLES



Chapter 9

Lessons for the reflective practitioner

“If we could change ourselves, the
tendencies in the world would also change.”

Ghandi

A central premise of this book is the need to shift towards an ecological worldview. In Chapter Two we considered what this would mean for the way we engage with the world and made some suggestions about the values that would align with the kind of world revealed by this worldview. In preparing for this book, we interviewed many people we consider pioneers in working within an ecological worldview to find out how they express these values and guidelines for action in their work. They were a mixed bunch: architects, planners, builders, engineers, sociologists, ecologists, developers, farmers, practitioners and academics, but they had two things in common. The first is a commitment to heal the fractured relationship between humans and the living systems of which they are part, and so participate in creating “a state of evolutionary health”¹ in these systems. The second is the profound conviction that humans can play a positive role in the development, regeneration and evolution of the global social-ecological system; that we can be a force for good. For ease of reference, we will appropriate a term from Pamela Mang, and call this group *The Regenerates*. Although not all of them may refer to themselves as practitioners of regenerative development and design, their ideas and approaches all helped shape the regenerative sustainability paradigm.

The Regenerates had a strong message: to do regenerative and contributive work, we need a new mind, a new way of being that leads to change in how we practice and the role and purpose of the built environment practitioner.² There were very clear themes indicating how design practice needs to change and the changing roles of the various stakeholders in a project, and we will discuss some of these in this chapter. However, the most interesting finding to emerge from these interviews was the profound interweaving of changing practice and personal transformation. As their work shifted deeper



into the ecological worldview, they found a parallel personal transformation happening, which in turn allowed them to work at deeper levels and express more of the ecological worldview values. This transformation did not just happen for the practitioners, but also for their clients and the communities within which they were working.

In this chapter we pull out the key lessons we learnt from *The Regenerates*. These are structured in three sets: the lessons that can be learnt about changes in design practice; about the changing roles and relationships of the professional team; and about the associated need for conscious engagement with self.

Changing practice

In the preceding chapters, there were many lessons on how to use the different approaches, either on their own or as part of a larger toolkit. However, five central lessons stood out that referred to how we need to do things differently and what this means for how we engage in practice as designers, planners and developers.

Lesson 1: Take time to listen

Developing and maintaining healthy, respectful and mutually beneficial relationships is one of the main objectives of development in the ecological worldview. And key to building such relationships is to really listen to those with whom we are entering into relationship: listen to what matters to them, to their history, their values and their dreams. In current built environment practice, the emphasis is on the object that is being built and its completion on time and on budget according to a brief and a schedule decided in a boardroom somewhere. Building relationships is not usually on the agenda; and stakeholder engagement something to avoid if possible, or reduced to mere information sessions if it cannot be avoided.

One of the fundamental lessons we learnt from *The Regenerates* was the importance of taking time to really listen; to get to know the system in which we are working, and to let the system get to know itself. For example, the *Story of Place* is a profound exercise in 'listening' to the personal narratives of the landscape and the people living in that place about who they are, how they live, what they want to be and what it is that they value. The value of this process, and the stakeholder engagement processes used by BNIM, lies not just in what they reveal to the professional team, but in helping the community to get to know and value their Place and its unique characteristics, and to build a common purpose for which the project can become a catalyst and vision holder. This requires 'listening' at different levels: listening to the sign language of pattern, listening with the heart to what is not being voiced, and listening to your

own inner voice about how you, as the developer or practitioner, can contribute to the health and evolution of the relationships in that place.

In a world where time equals money, there is often resistance to taking the kind of time that is necessary for deep listening. However, the right process of listening, asking the right questions, taking the time for a more thoughtful engagement, and working not with what people think, but what they value, does have benefits. As Bill Reed explains, asking people how they live, what they love about a place, and why they are there, helps to identify common values in people who may be coming to the project from opposing points of view.³ Once those values have been brought to the surface, alignment between these parties can happen quickly, rallying them around a common vision of how best to nurture and grow the potential of their Place through the project. This can avoid many years of fighting opposition to a project and the associated costs in professional and legal fees. A process making use of social media, such as that developed by BNIM, can also reduce the time needed to identify solutions that will have on-going community support and participation. A further benefit is that regenerative interventions are not limited to the knowledge and experience of the professional team or the demands of the project brief, but can emerge in surprising ways from the conversation.

Making time for deep listening – the story of Curitiba

Curitiba in Brazil has long been promoted as an example of a city that managed to reconcile its modernization needs with its historical character and the principles of human-scale and ecological-based development through a number of very innovative programmes. Nicholas Mang, in his analysis of why the Curitiba initiatives were so successful in turning around many of the city's problems, points to a key practice of the planning team:⁴

“One of the most distinctive and outstanding aspects of Jaime Lerner and his associates’ approach to city planning was their unique work process. Every morning, Lerner and his core team of planners would meet in a log cabin retreat in the middle of a forested city park. There, according to one of the leaders interviewed for this study, they worked only ‘on what (was) fundamental, on what would affect a large number of people and could create change for the better.’ Then, in the afternoons, they would return to city hall to meet with their constituents and to deal with the city’s day-to-day needs.

By structuring their workdays in this way, these planners put a much greater daily emphasis on large scale, visionary planning than most city governments do. Yet, at the same time, they sought to temper this deeper, visioning work with continual interaction and exchange with the needs of the people. In other words, the mornings helped them continue to see and work on the bigger picture of the city and its evolution, while the afternoons helped them to stay grounded in the needs and pressing issues that the people of their city faced on a day-to-day basis.

According to the planners that were interviewed, this balance between needs and potentials was critical to their success: For me, a good strategy is a daily balance between needs and potentials. Why? Because if you are working only with the needs and going every night and asking what are the needs of this neighbourhood or that, you won’t change anything. On the other hand, if you are just looking at a large number of people, the big problems, you’ll be far from the people. So you have to keep a daily balance.”

This process is a good example of deep listening. In the morning they gave themselves time to understand, learn, and dream; listening to the larger concerns of their city and its relationship with its citizens, its living systems and the planet, and what it said to their hearts and imaginations. This allowed them to see the potential. In the afternoon they would transfer this 'listening' to a smaller scale – the concerns of their constituents and what they are saying to the larger processes at work. Because they took the time to listen to the small voices, they could come up with initiatives that spoke to both the needs of the individual and the potential of the city.



Pedestrianisation of the Curitiba inner city.
PHOTO: N MANG



The world-famous Curitiba Rapid Bus Transfer system
PHOTO: SHUTTERSTOCK.COM

“So are architects in the business to deliver objects? Yes. Are sustainable architects in the business to deliver objects? No and yes. They’re really in the business to create sustainability... the building is merely a leverage point.”

Bill Reed⁵

Lesson 2: It’s not about the building

We referred earlier to a phrase that surfaced in each and every one of the interviews: that it is not about the building. This suggests a radical departure from current approaches to architecture, which is centred on the building as object. Even green building focuses on the performance of the building as object. Clients appointing a design team understandably expect a building at the end of the process. So what do *The Regenerates* mean when they say it is not about the building?

If it is not about the building, then what is it about?

Phaedra Svec of BNIM explains it as follows: “It’s not about the building anymore or this object that’s going to house a particular function. It’s really more about: this is a quality of life that we think is possible and this is what you are telling us you want and this is what you are telling us is important about your place. And this is what you biologists are telling us is important about your place. Let’s build all of those things together and create the best vitality that we can create in this place and let’s do it in a way that it will continue to inspire and evolve.”⁶

It is therefore about the building being more than an object. An object is still delivered, but the building serves only as a catalyst for far larger systemic interventions. *Regenes* provides many examples of where the building design or development master plan became almost incidental to the value that was created. The Willow School became about regenerating a forest and developing an environmentally conscious curriculum; Playa Viva not only provides a tourist experience, but restored the estuary and regenerated the local village economy; the Brattleboro Co-op became a sustainable local food production strategy, and not just a LEED certified supermarket. When Stephanie Barr, of the *Institute for the Built Environment* at Colorado State

University, talks about their work with green schools, it is not the energy efficiency or the heat pumps or the good indoor air quality that excites her, but how interacting with these buildings becomes a catalyst for changing the way the students think and engage with their world.⁷

Brattleboro Co-op, Vermont



PHOTO: D HES

Bill Reed tells the story of their engagement with Brattleboro Co-op.

"We were invited by the Co-op and Michael Singer, the artist, to look at this becoming a LEED Gold grocery store. And one of the things we asked them at the time was do you want to be a LEED Gold grocery store or do you want to be sustainable? So they said: 'We would prefer to exercise our efforts to be sustainable'. We approached them by looking first at the nature of the food shed and what a grocery store is about. So we looked at how far food had to travel in the United States, and at the time the average was about 3500

miles per forkful of food. So obviously transportation was important. So we looked at the nature of the farming in the area and found that most of the farms had been abandoned within a 30 mile radius. One of the activities we did before we went into the first meeting with the Executive Committee was to take a walk through the grocery store. And we found apples from New Zealand, strawberries from California and blueberries from Chile...So it quickly became apparent that the first question we have to ask is what happens if there is a trucker's strike? Are you sustainable? And of course the answer was no.

So that was a pretty big clue that the first thing we needed to look at was not the building, but the larger food system they were a part of. So we looked at the health of the watershed, the health of the soil, and found that after many extraction periods of resources in this area, the soil was depleted and polluted, and the creek was polluted. So then we asked the question: Where else is good arable land? We found that the best soil was in downtown Brattleboro. The reaction from most everybody was: 'Well, we've built there'. In fact we haven't, we've only built over 35 per cent of the arable land. So the opportunity was to teach people to grow food in their backyards, in the garden... So we presented a brief that basically said: develop an agricultural and soil extension service, a forest extension service, a credit union to loan money for farmers to re-establish themselves, a cannery so people could can their own produce, an abattoir so hunters could dress their own meat, a day care centre so the kids could be taken care of, and by the way, a grocery store. The slack-jawed reaction of one of the board members was: 'All we wanted was a grocery store'.



PHOTO: D HES

So we wrote a fairly lengthy report and left it with them, and about a year later we got a phone call saying: 'Bill, this is really great stuff. We're beginning to extend our resources out beyond ourselves in a truly cooperative fashion, we're beginning to embrace other co-ops in the region and we've developed a 100 year plan to begin to incorporate these larger ideas.' So the point of this is that the building may be a green building, but it is not sustainable. The real point is that the human aspects were brought into a new relationship with the potential of this place. Which is why the real picture of the Brattleboro Co-op is not the building you see, but is the farming, the land, the watershed, the health of the system of the community that will allow them to work as a whole and bring them back into the food cycle.¹⁸



Bill Reed telling the story of the Brattleboro Co-op (in the background) PHOTO: C DU PLESSIS



Encouraging people to grow food - ready-bagged, locally sourced organic potting soil at the Brattleboro Co-op PHOTO: C DU PLESSIS

To understand this fully, we have to rethink our understanding of what a building is. Ben Haggard suggests that a building is only a temporary nexus in the flow; it is a place where the flows of energy, people, materials, ideas and so forth come together.⁹ A building allows us to intervene in that web of interconnected dynamics. The way in which we intervene can disconnect these systems from their context or it can allow them to manifest their potential. If we are working from an ecological worldview, the objective is always to enable the manifestation of the full potential of the systems in which we are intervening. And sometimes that may mean that a building is not the right answer.

When would a building not be the right answer?

Understanding why a building would sometimes not be the right answer, means considering what the real objective of the project is and if a new building is the best way of meeting this objective. For example, a client's need for more office space can be met by allowing people to work from home. It also means taking the perspective of the larger system, and not just considering the immediate needs and objectives of the client. As Ben Haggard explains:¹⁰

"If we want buildings to be a reflection of an ecological or living systems perspective, then architects and other designers are going to need to start thinking in terms of what is the pattern that evolves this particular living system, to become more adaptive, resilient, able to manifest the full potential of the people living here, the full potential of the water, the hydrological systems, the full potential of biological systems. If I'm really aware of the building as a kind of temporary nexus in the flow, this allows me to ask what is the best way to intervene in that web of interconnected dynamics to allow them to manifest their potential? So to some extent a building is commissioned, it is brought into existence to serve some kind of unrealised potential. They allow us to do better, to live better, and engage in our business better, it somehow enables something, right? But if I allow the building to separate from its context, then I lose track of what that better is that's trying to be brought into existence. And if I can become clearer about what the real potential is in the context, then the question of whether a building or street or some other aspect of material infrastructure is the right solution to the problem that's being solved, that's being posed by the context, emerge.

So all of a sudden a designer has the opportunity to begin looking at potential first of all, and advising the client system or the community context with regard to what really enables it to achieve its potential value. So this often means in practical terms a shift in what the nature of the program or the building actually is or should be. And sometimes it means shifting entirely off the idea of building something. So the questions we begin with, have to do with what is the potential that this system is uniquely trying to express? And whether or not we get a perfect or even satisfactory answer, we've started with that question. And it always leads to secondary questions like well is this the best way to get there? Is building a city here appropriate? Is building a park or a playground or whatever it is appropriate, given what this system is really trying to express?"

Thus the change to which this lesson refers, is to think past how to make the most 'sustainable' object, to how the process of creating the object can become a catalyst for developing the potential of the larger system. And this brings its own benefit to the client, as developer Robert Mang explains:

So the developer would then be thinking about what is it that I can not only produce in terms of making money for myself but what is that I can produce that actually generates more in the community? And the return of it from that, is that more people are going to want to patronise my hotel or my restaurant or my storefront retail business because what I've done is actually increase a reciprocal value in the community.¹¹

Lesson 3: It is not about everything, but about what is important

One of the real challenges with working in the ecological worldview is the need for whole systems thinking. In trying to 'see' the whole system, one can easily get lost in vast amounts of data without ever really getting to know or understand the system within which you are working. This happens particularly if one tries to understand the whole system using the tools and thinking of the mechanistic worldview, as Ben Haggard of *Regenesi*s describes:

Sustainability practitioners assemble a laundry list of all the things they want in their 'sustainable' project. And when they map these things, you've seen these spaghetti maps, a hundred bubbles showing all of the connections among all of the bubbles. And all they do is make it worse. So in a sense they've mapped the whole, right? But it's an unintelligible whole; it's an accretion of hundreds of parts, none of which have meaningful relationship to one another.¹²

However, working with whole systems does not mean trying to know everything about the system or mapping all the relationships, for this is patently impossible. Rather it is about being able to separate what is important from the background noise by looking for patterns. The key is to understand which aspects are pivotal, or as *Regenesi*s puts it, 'core' to a problem. Understanding what is core, helps to identify the aspects and relationships of the system which are important and integral to the project. Joel Glanzberg describes this process of identifying the core aspects of the Place, as tracking.¹³ It is about more than looking at the features of the landscape, but rather about identifying and understanding the processes



Seeing the whole system helps to identify important leverage points.
PHOTO: C DU PLESSIS

“Actually that’s the big shift that we’re working on with our clients: to shift from an answer to participation.”

Bill Reed¹⁵

that created the place as it is now, and then follow these to talk about the potential of where it could go. This is done by looking at maps and historical accounts, but also by interviewing and talking to people; constantly looking for reoccurring patterns in the geology, in the plant and animal communities, in the natural history, in the human history and in how people live in that place. It is about “seeing how life works in this place, seeing how this community works, seeing how your organisation works and what each is valuing for its own survival and its own ability to thrive”.¹⁴

Lesson 4: Collaborate to co-create new potential

The efficiencies and added value that can be achieved through project delivery processes that rely on collaboration between key project stakeholders early in the design process are well-known; and integrated design and delivery has become standard practice in green building projects aiming for a high performance.¹⁶ It is therefore no longer strange to find the client, the design team, the contractor, and even the facilities manager all participating in the design of a project at a very early stage. However, when we work from an ecological worldview, collaboration becomes a much broader concept. Ecological values such as mutuality, fellowship and positive reciprocity are derived from the importance of reciprocal relationships to the healthy functioning of a system. Collaboration then becomes about developing reciprocal relationships that will maintain and grow the health and potential of the larger system; and that system includes not only the broader community, but the organisms and living systems of the place within which we work.

This changes who is called on to collaborate, with the community and the place itself becoming key partners in defining design solutions that would grow the potential of the place and enable the development of new systems. Consciously including the knowledge, insight and creativity of a broad range of disciplines (such as ecologists, hydrologists, sociologists, anthropologists and artists), and creating platforms for sharing this knowledge and inviting the voices of those not often heard in stakeholder engagement processes, such as children or the elderly, opens up unexpected relationships and opportunities from which innovative solutions and new potential can emerge. This empowers people to become co-creators of the future of their place. As Pamela Mang explains:

*If we to begin to give people an understanding of the working of their place, how it is living and working, how it could be working, they can better begin to identify if they do something over here, no matter how small it is, it can have actually significant implications. So suddenly they begin to see themselves as called to actually beginning to create something that has systemic implications, even though for their role it may be very small.*¹⁷

Who should be around the table?



Carol Sanford suggests that there are five stakeholders that should be around the table in a responsible business: the customer, the co-creators who contribute to the development of the product, Earth, Community, and investors.¹⁸ She arranges them into a systemic framework that illustrates the dynamic nature of the relationships between these stakeholders, called the Stakeholder System Pentad.

Through this process of co-creation, a sense of ownership is established, which is an important element of creating an enduring outcome. If the users of the project feel they had a part in developing the solution, they will cherish it, look after it, and build a more successful relationship with it, which enables future adaptation and resilience.

The scope of collaboration depends on the kind of project – obviously the development of a post-disaster reconstruction plan, or a sustainability strategy for a city, would require far more extensive processes to enable the co-creation of solutions than a school, or a commercial building. But irrespective of scale, aside from the professional team, the process should include the community and the natural systems with which the project will be in relationship, as well as the people who will be responsible for holding the vision into the future. Collaboration is also not a once-off charette or public workshop, but an iterative process of identifying common values, testing ideas, and reflecting on whether the project continues to support those values, and what new relationships and opportunities have emerged. It is an on-going process of co-creation and co-evolution.

Lesson 5: Let go

Working with collaborative processes is challenging at the best of times, especially for developers and designers who may already have a strong vision. Working with development and design processes in which the solutions are allowed to evolve from an understanding of the potential of place, one has to be prepared for unexpected things to emerge. There is often also a time delay, and the real magic only manifests long after the project team has departed. Further, as this work can only be truly appreciated through personal experience, it can be frustrating to sit back and let people develop a new way of thinking and working, to discover for themselves how they can contribute to developing the potential of their place.

Developing the values of humility and non-attachment becomes critical, as this process obliges both the practitioner and client to let go of the need to be in absolute control of the outcome and the expectation that the answer

“So one of the biggest transformations I’ve had to make in doing this work is to be unattached to the physical manifestation of the project, and to learn to look beyond that to what is actually really being developed, that maybe is more necessary to develop to have ramifying impacts in the world.”

Joel Glanzberg¹⁹

in his or her mind, is the right answer. Often it is necessary to let go of a design, an idea, a concept, or a solution as it may not be in the long term interest of the larger system, or letting go of this particular idea will enable a solution with a multiplier effect – addressing multiple opportunities and problems simultaneously.

The changes in how the design process unfolds and the role of the designer in this process have profound, if perhaps uncomfortable, implications for what it means to be a design practitioner. Ben Haggard sees this as having to do with moving up the scale of influence in terms of what designers are taking into account and the problems they are willing to address; as well as with the changing objective of design, which he sees as enabling the living system in which one is working to manifest more potential than it is currently manifesting, irrespective of whether this results in a building.²⁰

Taking on a different role

The projects we showcased can be divided into two types. The first are object-orientated projects, in which a design or planning consultant is appointed by a private client to design a building or a physical master plan for a campus. The second are projects where a public sector client would appoint a consultant to develop a strategic plan, which may include suggestions for built environment interventions. Traditionally the role of the consultant would be to identify and interpret the requirements of the client and translate that into a product (a design or a plan), which is then ‘sold’ to the client and any stakeholders the client may want to include.

Working from the ecological worldview, the ‘client’ is not only the person or group paying the consultant’s fees, but also include the systems within which the project is situated; and the responsibility of the consultant is to make sure the project enhances the potential of these larger systems and the flows through the site by building mutually beneficial and reciprocal relationships between the parties involved. The first new role of the consultant then becomes that of matchmaker, mediator and facilitator of the dialogue between these parties, including the ecological systems of the place. Facilitation is not a skill that is commonly taught to designers, as it is the antithesis of the current expert-driven design culture in which the consultant knows best. Skilful facilitation requires an adroit dance between prompting questions and discussions from a position of expertise, creating tension; stepping back to let conflicting and concurring thoughts and ideas emerge; and stepping in again to reconcile these ideas, translating them into a product (a summary, a draft plan, a concept design) that becomes the basis for the next round of dialogue.

The second new role of the design team is that of story teller. As *Regenesis* illustrates, the best way to deal with the complexity of a whole system, is to identify its patterns and turn these into story. Stories can be used to teach, to provide meaning, to find common values and to incite action.²² They help us to capture and make sense of complexity and interconnectedness,

“Narrative is the human way of working through a chaotic and unforgiving world. The stories we tell ourselves and others are our survival manuals.”

Edward O. Wilson²¹

integrating different viewpoints to build empathy; and their telling and hearing can be transformative.²³ However, storytelling is also a position of power – the narrator constructs the story by purposefully selecting what is to be included and what excluded, often doing this from a normative position.²⁴ In developing the *Story of Place*, the consultants already shape the way people perceive their place and their role in that place. But they also encourage them to place their own stories within the larger narrative, seeing how these different stories weave together, and allowing them to open up to previously unimagined possibilities of how they can contribute to well-being and development of their place. It can be argued that planning is “a matter of persuasive storytelling about the future”, enabling us to envision different stories of what the future could be.²⁵ One of the key findings from our research showed that those practitioners who were working ecologically did something beyond what can be learnt from nature. They had visions of how things could be better. Where nature experiments randomly, people can act and experiment mindfully. Not only did these practitioners see potential and work towards it they gave themselves time to understand, learn, dream and develop before taking concrete action. We saw this process at work in the example of Curitiba discussed earlier. Rewriting stories are a powerful way of making people aware of the potential of not only their place, but of their own ability to envision and create a different future, as illustrated by the Picnic by the River organised in Mexico City by a group of young people determined on regenerating the living waters of the city.

“And I think that’s really a lot of what we work on, is how do we get people to understand the places that they are and where they’re trying to work, so they know how to work in an appropriate way.”

Joel Glanzberg²⁶

Picnic by the River de la Piedad, Mexico City



PHOTO: TALLER 13

In April 2012, the citizens of Mexico City were invited to a picnic by the River de la Piedad by a group of more than 70 organizations. The only problem was that the river was encapsulated in a concrete viaduct in the middle of a highway. This did not stop more than 300 people from having a picnic on the river anyway – insisting on living a future they strongly envision. What prompted this? Ben Haggard tells the story of how the idea of the Picnic by the River was born.

“So our thought was “how do we plant a seed in this community of young very dynamic people, in a very young and dynamic city, that allows them to actually transform the way urban planning takes place in this city and beyond it. Because Mexico City is a hub for a lot of Latin America. So we did a series of these workshops where we looked at “ok what is this city? How did it form here? What is its significance? Why is it important? How does it really operate? What’s its story of place?” And then we looked at how would you begin to translate that story of place into proposals? So many of them were looking at taking that thinking and applying it to projects they were working on. They were working on all different kinds of things from major infrastructure projects to buildings and development projects and so on. So they immediately could see the relationship between this big picture context that they could now see and understand, and what they were working on.

But there was a small handful of them, who wanted to change the city itself. That was their passion, was how do we actually transform the city? And so we had realised early on that the city, it's in a bowl, so it collects all of its water to the centre, and there were nearly 30 watersheds all moving towards the centre where the old city is. So it was really clear that water was one of the central organising principles and one of the central challenges and problems there. The city has pipes, huge infrastructure projects to pipe water out of the city to make it habitable, but it suffers from a lack of water. They don't have enough water to actually service all the people that live there.

So they said 'okay we've got to really focus people's attention on the water'. And so they said okay, there is a river that used to run through this important section of this city that is now in a pipe. It's a viaduct, a big pipe that runs down the middle of a freeway called the Viaducto and it's very visible in a way, if you know what you're looking at. There's this big freeway with I don't know how many lanes of traffic and this big box. And then there's some grass on the top of this box. So they put out these outrageous proposals to dig up the freeway, put it back into a river, and create a totally transformative idea for the city. It's an outrageous proposal that is intelligible on the face of it, you get it immediately, 'oh yeah it was a river and now it's a freeway, turn it back into a river, I get it. It'll never happen, but I get it'. And they took it on the radio, in the newspapers, took it on television, they put it out there and people loved this idea because it's outrageous and obvious on the face of it. So they're working away on that. And then this is when it really went over the top. They called for a picnic at the river, and they put out this call that 'we're all going to meet on such-and-such a Sunday and we're going to have a picnic at the river'. And I happened to be in town the day that this happened. And so there are hundreds and hundreds and hundreds of people gathered on top of this box in the middle of the freeway with tents and umbrellas and food and music and signs and their bicycles lined up along the side and so on, throwing a big picnic at the river. And you can imagine, it was a beautiful publicity stunt, but it was also a beautiful cultural psychology stunt because they were living into the future that they had been proposing. It's like 'we're not going to wait for you to build it, we're going to do it, and we're going to live it. And naturally it made all of the national media, it looked great because it was so outrageous, people had a great time, it mobilised and activated all kinds of people. And so they are building a kind of inevitability about a different pattern of living in their city. And whether it happens at that particular spot is far less important than the fact that it is becoming. What couldn't even have been conceived of is becoming common place.²⁷



IMAGE: TALLER 13

As Elif Shafak puts it: “Stories can punch holes in our mental walls. And through those holes, we can get a glimpse of the other, and sometimes even like what we see.”²⁸ Punching holes in mental walls brings us to the third new role of the design consultant, which is that of mentor to the people in the conversation. In Joseph Campbell’s monomyth of the Hero’s Journey, the mentor appears early in the journey to nudge the hero across the threshold into a different world, and so help him towards personal transformation.²⁹ Part of the design consultant’s role as mentor is to shepherd the stakeholder group into the world of the ecological worldview, “to help people become in a new way”, developing not just new mental models, but a new mind”.³⁰ Pamela Mang explains: “It begins with them literally seeing a different world than the world they thought they were working in before”.³¹ Part of this new mind is to see the role of the project not as the delivery of an object, but as delivering the capability and the potential for life.³² However, to be effective in this role, the practitioner self must have made this inner journey. The fact that doing this work changes who you are at a deep level, requiring the practitioner to also do inner work, describes the third set of lessons we learnt.

Becoming a reflective practitioner

The need for on-going inner work and personal development was one of the strong undercurrents running through our interviews with *The Regenerates*. The ecological worldview describes a world that is not a fixed and permanent reality, but an ever-fluctuating process of change and transformation brought about through interactions between entities and their responses to changes in their environment, with the outcomes of these changes largely unpredictable and therefore uncertain. To work effectively in such a world requires a particular way of being and thinking that can only be developed through conscious effort and reflection on the relationship between our beliefs and actions and the world around us. This is the context within which *The Regenerates* hold personal development, as Bill Reed said: “it’s not just about making ourselves better people, it’s that the work I want to do in the world is requiring me to face this thorny issue.”³⁴

Central to personal development, as well as working in the uncertain environment of living systems, is the cultivation of reflective practices. At the simplest level, this means spending time reflecting on projects, decisions and information. Asking questions such as: Were there opportunities for learning missed? Were there unexpected results? Were there points of discomfort? Why? How was I feeling, thinking, behaving, why? Who said and did what, why? Such questions help improve both personal practice and project progression. With these insights the practitioner can then learn, further explore, take action or in other ways also progress in their own development. Making time for reflection furthermore provides a framework for capturing the learning from each project, experience and experiment. A structured reflective practice also allows for experimentation, reducing

“So one of the things that for us is key, is that personal development is never separate from the work you’re doing. And the work you’re doing is the best opportunity, environment and arena in which to do work on self.”

Pamela Mang³³

**“Reflective practice is
‘the capacity to reflect
on action so as to
engage in a process of
continuous learning’.”**

Donald Schön ³⁵

some of the risks associated with experimenting in the built environment, where new approaches and technologies affect people and ecosystems directly. Through conscious decision making and reflection, taking small steps and taking time to look for consequences, progress can be made quite quickly and with minimal risk.

However, it is important that reflection be a continuous process, with actors (designers, clients, communities) reflecting also on the consequence of actions, the changing environment, and how a course of action should be adapted in response to new knowledge and changes in the environment. This means that planning or even design is not a singular event (as in a five- or twenty-five year plan), but becomes a constantly iterative and flexible process that can evaluate the continued relevance of certain courses of action and change these as necessary, incorporate new knowledge and requirements, and respond to surprises as the need arises.

The steady development and deepening of the ecological worldview and the regenerative sustainability paradigm is also the result of the reflective practices of many thinkers and practitioners. The approaches we described in Chapters 4 to 6 illustrate how ideas from one approach, such as biomimicry or permaculture, would be included in other approaches, and the learning from this in turn informing and deepening these and other approaches. In the interviews there was also constant cross-referencing, people citing similar sources of inspiration as well as each other's work, often referring to the strong intellectual and even spiritual transformations their thoughtful engagement with these knowledge sources brought about. This constant seeding, weeding and grafting of ideas onto each other is a co-evolutionary process driven by the conscious reflective practices of people whose main driver is the ‘desire to actually create something of value and of greater value than it is currently delivering into the world.’ ³⁶ It is a process that transforms and evolves both the practitioners and the conceptual basis of their practice.



Dominique, the reflective practitioner PHOTO: C DU PLESSIS

The idea of reflection as path to personal development is not new. It forms the basis of most of our contemplative spiritual and philosophical practices. Yet doing it consciously, and making time to do it regularly, is often not a priority in our lives. An outstanding feature of the practitioners interviewed in this book, is that they made time for reflection: to not only think about their projects and how these were progressing, but also to ask about how they themselves were doing. For them, becoming involved in work that aims to shift the world into an ecological and thus regenerative paradigm, is both the result of their own reflective processes, and the driver for their on-going personal quest to get to the essence of who they are and what value they bring to the world. Robert Mang, one of the wise elders of *The Regenerates*, explained to us his own inner reflective processes and how it relates to his work as developer.

Robert Mang on personal development³⁷

And so personal development to me is about how do I shift from dominating the environment I'm trying to work in, or being victimised by the environment (that's the other side of that), to understanding how I develop myself to be able to be of value to it. So in terms of human transformation what I found is that the more I can think out beyond what I'm trying to do, in terms of what is its value to the larger whole, to the larger system, to the community, I also need to think about what is it that I am bringing that's unique? What is my role, and how do I develop that internally? And that has to do with not just being able to function well, but what is my will or purpose, what's the value that I'm trying to bring to the world? What's my state of being, the sense of being resonate with the world and what is it that is unique about me that adds to that world? That's a very important aspect of thinking regeneratively.

One way regenerative thinking needs to be aware of, is the importance of systems. And systems we often think of as out there, out in the environment around us and how those things influence each other, and that's then the way I've been describing ecology. But what also is part of this system, is understanding the internal aspect of each entity... And the transformation for me was making the connection between what's inside me and what's out there, and how do we influence each other in a beneficial way. So personal development in terms of being able to be more conscious – to have a broader scope of understanding of how things work, but also how I work – is a very important part of being a developer.

First of all, how I can become better at knowledge, at understanding (which is a little different from knowledge), at adding value to the world? How I can become better at those aspects is what I need to develop within myself? So if I'm trying to do something and I'm hit with all kinds of resistance or opposition to it, I need to maintain my state of being and try to understand why that's happening. And in the process I call upon my own sense of who I am, and what are the values that I was holding when I met this opposition, as to how I work with that. Not beat it or defeat it, but how I work with it. It's the way I would approach working with a difficult site that has a lot of stuff on it that could be pollution or could be a rugged wilderness, but whatever it is, how I not just try to either deny it or overcome it or bulldoze it, but how I work with it in terms of achieving my own value, the value that I want to bring to this, but also how it could be enhanced.

'Personal development' has become one of the big businesses of the 21st century and it is important that we ask ourselves what personal development from an ecological worldview perspective would require from us, as our ideas of what and how we want to develop depend on our worldviews, our values and the main developmental altitude from which we work. We asked *The Regenerates* what they think are the internal qualities necessary for a person to effectively engage in the regenerative sustainability paradigm. As we had the opportunity to spend time with most of them in an informal setting outside of the interviews, we also observed their behaviour and expressed values. From this we identified five main lessons for reflective living for those working from an ecological worldview.

Be prepared to integrate levels and cross lines

The first is their ability to see levels: that there is a hierarchy of development that one can pursue over time, with different levels of increasing value from which one can learn.³⁸ And coupled with that, their ability to transcend and include levels and to cross lines. What does this mean? *Regenesi*s spoke about the work of Charles Krone and the need for both ‘below the line’ and ‘above the line work’. The personal development path lies in moving beyond that which is in the manifest world. To cross the line between that which already exists and that which has the potential to exist, and work on developing and unfolding that potential, bringing it to below the line where it can transform the world. The LENSES team and Bill Reed speaks about transcending the levels of the evolutionary trajectory of sustainable building – realising that green building is still at a lower level of development, situated below the baseline of sustainability. The personal development path of the practitioner lies in crossing that baseline and moving into increasingly regenerative levels of work. This does not mean that the lessons of standard building practice and green building practices are no longer useful and therefore should be abandoned. Instead, they are enriched and evolved as the design practitioner works from increasingly regenerative levels.

The third set of levels is the stages of development we, as individuals, move through as the altitude of our worldview shifts from egocentric to planet-

centric and beyond, as described in Chapter 7. This is where the true inner development work happens, as we deal with the discomfort of pushing ourselves to see more and more of the world and affiliate ourselves with it. Again, this is a matter of accessing higher levels, while still maintaining the lessons learnt and understanding we acquired while at lower levels. To be fully whole, we need to accept and integrate all these aspects of ourselves, for the lower levels provide the foundation upon which we continue to build. Knowing that we hold all these worldviews within ourselves is really important if we are to be effective facilitators, as it allows us to have patience with and compassion for actions and beliefs at lower levels, even though we may not condone these. The line that needs to be crossed to move us fully into an ecological worldview, is the line between what Graves refers to as the First (or subsistence) and Second (or being) tiers of the development spiral.³⁹ Making this transition allows us to see that we are irrevocably part of a complex, multi-dimensional, irreducible whole and that our ultimate purpose is to develop and evolve this whole to its fullest potential. This is what regenerative work is about – working on the Whole through working on the wholes within our sphere of influence.

To get to the top, each rung of the ladder has to be there



PHOTO: SHUTTERSTOCK.COM

Working with the Whole requires also that we consciously integrate the interior aspects and exterior aspects of our lives, and ourselves as individuals within the collectives of which we are part. As Pamela Mang explains, the main hazards we face in the world arise from “our tendency to get fragmented, to not be able to be an integrated human being, as we pursue what we’re trying to accomplish, and our inability to see ourselves in a context and in a relationship that’s a reciprocal relationship”.⁴⁰ This work of integrating more and more levels and crossing lines into new territory, is the critical personal inner work we need to do so that we can work with the whole.

Live like an impeccable warrior

Opening up new territory requires great courage, and working in an ecological worldview opens up a number of new territories and threatens many existing ones. Practitioners therefore need to work on developing the fearlessness of an impeccable warrior, not to fight, but to be true to their quest and to their own values. The Shambhala tradition of Buddhism teaches that to become an impeccable warrior one has to embrace ‘the genuine heart of sadness’. This is not sadness in the sense of feeling mistreated or having lost something or someone. It is the incredible sense of tenderness that is the result of a heart that is totally exposed to the world, free from all the barriers we put up to protect ourselves, and which, perversely allows the warrior to be fearless. Chögyam Trungpa describes this as follows:⁴¹

Real fearlessness is the product of tenderness. It comes from letting the world tickle your heart, your raw and beautiful heart. You are willing to open up, without resistance or shyness, and face the world. You are willing to share your heart with others.

One of the most remarkable characteristics of *The Regenerates* is their courage to be vulnerable to the world, to allow themselves to be truly moved by the joy and sorrows surrounding them, and not be afraid to show it. The ability to be open and share who you are is essential to facilitation work that aims to find the common values between disparate parties and allow them to connect through their common humanity. As April Brown explains it: “Where you’re bringing in the values, you’re connecting with story, and it’s less about agendas and it’s more about your heart... And you can’t find that stuff until you start sharing yourself.”⁴² But developing this tender heart also makes the warrior more resilient. Trungpa likens this to the difference between a china cup and one made of lacquered wood. Without that softness, bravery is brittle, like the china cup and will easily break, while the lacquered cup, being both soft and hard, will bounce when dropped.

Put down roots to anchor and sustain you

An important component of personal development is to learn to take care of self – to take the time to nurture not just the body, but also the spirit, so that

**Values expressed:
Integrity, Inclusivity
and Humility**

**Values
expressed: Respect,
Mutuality and Non-
Attachment**

one has the mental and physical resources to help others. The ecological worldview proposes that an important part of self-care is to build and nurture relationships. Stephen Kellert explains why relationships are important:

*There's no such thing as an organism that lives as a self-contained and autonomous entity. They're all the product of their contextual relationships... the organism, in this case myself, depends upon a complex suite of relationships to other individuals of my kind, and to the habitat in which we exist. And so everything is a product of these complex ecological interdependencies.*⁴³



Walking the dog with Stephen Kellert PHOTO: C DU PLESSIS

A characteristic *The Regenerates* share is that they are really rooted in their own Place. While many of them work all over the world, they maintain a strong connection to their local communities and to the ecological systems of their place. They talk of taking the dog for walks in the green spaces available to them (we walked a lot of dogs) and regularly taking time in wilderness areas, but they also nurture nature in their own backyards: growing vegetables, creating insect hotels, establishing indigenous landscapes. All of these things serve to connect them to nature and keep them grounded, feeding their need for affiliation with nature. But they also talk of being active in the community: organising events, tutoring children, assisting local communities in need, supporting businesses that have common values, shopping locally, and so forth. This creates strong social connections and a sense of meaning that supports and nurtures them, but also their communities. Having these connections also encourages them to walk the talk – to put into practice the strategies for a more regenerative way of living that they are trying to infuse in their projects.

**Values
expressed:
Positive reciprocity,
fellowship and
responsibility**



Robert and Pamela Mang's native landscaping with stealth vegetable planting. PHOTO: C DU PLESSIS



Walking the talk in Fort Collins. PHOTO: C DU PLESSIS



Shopping at a community garden market with Bob Birkebille. PHOTO: D HES



Bill and Ellen Reed's tomatoes and herbs to share with the neighbours. PHOTO: C DU PLESSIS

Live with integrity

In Chapter 2 we suggested a list of ecological worldview values. The first of these values is *Integrity*, which refers to the behaviour of a system (or a person) according to an internally consistent framework of principles (the core values, modalities or aspects that define its identity), and the integration of various parts of, for instance, the personality of a person, into a “harmonious, intact whole”.⁴⁴ The lessons in this section guide the practitioner to developing integrity, but living with integrity is also a requirement in the work place. The New Belgium Brewery in Fort Collins, Colorado provides an inspiring example of how a business can function with integrity.

Living and working with integrity – New Belgium Brewery, Fort Collins, Colorado

*To manifest our love and talent by crafting our customers' favourite brands and proving business can be a force for good.*⁴⁵ New Belgium Brewery Purpose Statement

Former husband and wife team Jeff Lebesch and Kim Jordan founded *New Belgium Brewery* in their basement after an inspirational bicycle trip by Jeff through Belgium. In 1991 they moved to commercial premises, but remained true to their original purpose statement and core values, developed on a hike through the Rocky Mountains. Apart from brewing fine beer, they saw their purpose as manifesting love and talent, and proving that a business can be a force of good. This led to ten core values and beliefs that include kindling social, environmental and cultural change as a business role model; environmental stewardship; cultivating potential through learning, a high involvement culture and the pursuit of opportunities; trusting each other and committing to authentic relationships and communications; and very importantly, having fun. These values continue to guide the way the company does business. Director of Strategy and Sustainability Jennifer Vervier bundles these values into the environmental/natural resource aspects, and the cultural/community aspects.



New Belgium Brewery PHOTO: A MELCK

In terms of the company's environmental performance the emphasis is on reducing waste streams, as well as energy and water use. They work in the community to protect the health of the Colorado watersheds and to raise awareness around water use in the arid southwest. The brewery is constantly working on their processes to capture heat/waste streams and reuse those, and also generate a lot of energy on site. There is a 200 kilowatt solar photovoltaic array, as well as two engines with a

combined output of 900 kilowatt that run solely on the methane produced from the processed water treatment plant. They also use a lot of thermal storage, to make cold water or ice at night to use during peak times, both in the HVAC system (an ambient cooling system), as well as in the brewing process. Employees are made aware of the real-time consumption of energy and water through quirky art installations. The brewery is also diverting 99.9% of their waste from the landfill, and has opened up its recycling facility to employees who can bring their domestic recyclable waste to work. These practices build mutual accountability. As Jennifer Vervier recounts: "we've heard people say 'I've never recycled before, then I learned what the larger impacts are and now I recycle at home'. So it certainly carries over, and not just to our co-workers but then to their families and their communities."⁴⁶



Informative art installation encouraging employees to save energy PHOTO: A MELCK

The brewery will be transplanting many of the lessons learnt to their new facility in Asheville, North Carolina, where by designing the system right from the start, it is expected the plant will achieve water and energy efficiencies exceeding those of the Fort Collins plant. The company also takes its environmental concerns and knowledge into the broader community. Firstly, their suppliers are expected to be able to show how they measure and minimize the environmental footprint of their operations and products by looking at transportation, packaging, waste, energy, toxic substances, water, and CO₂ emissions. They should also have a management system which demonstrates environmental commitment by setting goals and regular reporting. Secondly, they work with their barley and hop growers to improve farming practices of brewing ingredients.

The community side of things starts internally with the company culture. As Jennifer Vervier puts it: "Making our love and talent manifest, that's about being passionate about what we do, and using work as a place where we show up on the planet and put our talents to work", and the company inspires this passion through its labour practices.⁴⁷ The company is 100% employee owned, with ownership conferred after one year of employment (together with a personal 'fat tire' bicycle). There is open book management, with complete transparency about financial performance. And not only do employees have access to the financial statements, but they also receive education on what they mean, empowering them in their personal lives as well. Employees are also involved in decision making from the highest level and all are included in the annual strategic planning breakaway. But there are also a number of other benefits to employees rarely found in companies, such as a four week paid sabbatical after every ten years of service, and a one week trip to Belgium after five years of service. Employees are also rewarded for their volunteer time, with an hour of personal time off for every two hours of volunteer work they contribute to the company's many philanthropic and outreach programmes. And New Belgium requires the same values from their business partners, desiring that they have a high-involvement corporate culture which values and rewards everyone's contributions, and are working with others to improve the sustainability of their industry.



Commandments from the 'Church of Fermentology' PHOTOS: C DU PLESSIS

Part of the ethos of the company is to give back to the communities in which they operate. For every barrel of beer sold New Belgium donates a dollar to non-profits. They have also joined the *One per cent for the Planet* programme, ensuring that one per cent of their net profit goes back into the community. In the communities where they sell beer, they also focus on supporting issues such as water stewardship, sustainable agriculture, youth environmental education, and alternative transportation and bike advocacy.

Perhaps the biggest metric of New Belgium Brewery's commitment to live and work with integrity comes from their popularity as an employer, as related by Jennifer Vervier.

*We get hundreds and hundreds of applicants for every position, which I think really speaks to how much people want to work in a values driven company. Where you bring your whole self to work, you're not just an employee, but you are a person.*⁴⁸



Employee bicycles – the colour indicates when the person joined the company. PHOTO: A MELCK



Climbing wall in the brewing hall. PHOTO A MELCK



Providing electrical charge points for customers and staff from rooftop solar. PHOTO: A MELCK



Recycling centre for the company and employees' domestic recyclable waste. PHOTO: A MELCK

**Values
expressed: Humility,
non-attachment
and responsibility**

Don't be a lazy thinker

This last lesson was taught to us by Anna Cowen, who reminded us that you cannot be a lazy thinker if you want to deal with complexity.⁴⁹ The approaches and tools we present in this book require that the practitioner builds some mental muscle. There are no easy recipes or ten-step plans, and most require skilful negotiation of vast amounts of data and many competing knowledge claims from which the practitioner has to extract nuanced meaning, without falling into the trap of reductionist thinking. This is a tall order for brains that have been rewired to think in sound bites and tweets. Sometimes it simply is not possible to summarize something into a two-page Executive Summary for Dummies. You have to do the hard work of really studying and contemplating the theoretical basis of the tools you use, moving your engagement with the subject from knowledge to understanding and finally wisdom. But you also have to critically reflect on your own thinking, being constantly vigilant against logical fallacies, dangerous assumptions and specious argumentation. And extend this same critical reflection to the work of others. Learn from the practice of Sufism, “whose emphasis is on never taking anything that’s given to you at face value: always test it against your own experience”.⁵⁰ This is not just for your own benefit, but is your responsibility to the Whole.

Conclusion

In the writing of this book we were fortunate in meeting many people who are practicing from within the ecological worldview. They not only taught us about their theoretical approaches, tools and techniques and how they apply these in practice, but also about what working and living from the ecological worldview perspective means for the individual practitioner as a person. In this chapter we explored these lessons, reflecting on what working from an ecological worldview would mean for the practitioner: how would it change the way we do things and our role as designers and planners, as well as the personal changes it would require. After focusing on the inner aspects of this work, in our last chapter we look at some examples of how we can bring this transformation out to the world as contributive practitioners: a person looking at the world and any moment in it as an opportunity to share, collaborate, engage and look for potential.

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Chapter 10

On being a hummingbird

“If you think you’re too small to have an impact, try going to bed with a mosquito in the room.”

Anita Roddick¹

There is a Quechuan fable about a great forest fire. All the animals rushed from the forest, watching helplessly as it is consumed by the fire. All but the little hummingbird, who flew to the river, picked up a few drops of water in its beak and dropped it on the fire. It went back and forth, while the other animals laughed at it: “What do you think you are doing? The fire is too big, and your little drops of water are not enough to put it out.” The hummingbird turned to them and said: “I am doing the best I can”, and continued with its pathetic effort. In the story, the Great Being heard the little hummingbird, took pity on it and sent a rainstorm to put the fire out.²

This chapter is about being like the hummingbird: stepping up to do what you can to change things. We explore the possibilities and implications of contribution in everyday practice, illustrating how every action, no matter how small, can be potentially inspiring, life-affirming and potentially game-changing. Like the hummingbird, it is a small chapter – its intention only to inspire, stimulate and illustrate what is possible once we decide to step out of our comfort zones and dare to live the values of the ecological worldview.

One of the questions our students often ask is: “The problems we face are so big, how can I possibly make any difference?” We answer them by referring to three interdependent principles. The first principle is to work with what is in your sphere of influence, taking inspiration from German poet Rilke’s observation that “I live my life in widening circles that reach out across the world.” While you only have the power to directly change that which is within your influence, it is like dropping a pebble in the pond – the ripples of your actions can spread far and wide, inspiring others to also change their behaviour and contribute to the creation of a life-enhancing



world. The second principle draws on the Butterfly Effect discussed in Chapter 2, which proposes that a small action can build up enough momentum to affect the behaviour of the larger system. The third principle is that the world we live in is constantly being created not by governments or big organisations, but by the individual actions of people and other organisms (agents) and their responses to the actions of other agents and changes in their environment. This is a foundational principle of the ecological worldview. As these agents respond and adapt to what is happening around them, they can spread ideas and new behaviour through the system; or they can cause the system to self-organize to create collective behaviours (such as the swarming of bees or the way a school of fish change shape and direction); or they can create new structures (or order) out of the seemingly chaotic behaviour of complex systems such as ant colonies or economic systems.³ In this chapter we provide some examples of these principles in action, but our favourite example of a simple, whimsical action that caused ripples far beyond what its originator intended, is the story of The Twirly.

The Story of The Twirly



Road fix with style by Richard Johnke, Fort Collins Streets Department, Colorado, USA.
PHOTO: D HES

One morning during our visit in Fort Collins, Dominique went for a walk and found The Twirly. A road maintenance person in Fort Collins, in a fit of inspired boredom, had painted a swirl on the road he was fixing. The playfulness of the gesture, and his gumption in doing it, put a smile on our faces that lasted all day. But it went much further – The Twirly has become a symbol of what we mean with contributive practice. It is something that anyone can do, anywhere, within their work or everyday life, to make the world a better place, express their love of the world, and express their creativity in a way that gives to world. The Twirly is now a standard inspirational feature in our speaking engagements,

making people across the world smile and think about what they can do to bring joy and beauty to the world – an outcome that its creator could not possibly have foreseen. Richard Johnke, we thank you for your contribution.

These little contributions are occurring all over the world, from ‘guerrilla’ gardening and yarn bombing, to 100 mile clubs, community garden blitz groups, flash mobs, art in degraded areas, free hugs, growing an extra row of veggies for those in need, suspended coffee and many other initiatives. The power of social media and the internet is helping to self-organize these into a vast global network of individuals and small groups who are changing the world one small action at a time, creating what Paul Hawken sees as the largest social movement in history consisting of “coherent, organic, self-organized congregations of tens of millions of people dedicated to change”.⁴ So we also tell our students: “you are not alone, you just have to find your people; and if you take that first step, if you drop your pebble in the pond, they just may find you”.

Drop your pebble in the pond

To be able to cause ripples, one first has to drop a pebble in the pond; and the pebble we need to drop is to live every day according to the values of the ecological worldview. One of the values of the ecological worldview is responsibility: we are responsible for the impact of our actions, as well as the wellbeing of ourselves and other beings and living systems with which we are in relationship. A second core value is integrity – to live and work in a way that is true to your beliefs and values. The third core value is positive reciprocity, which is not just about reciprocating in kind, but about reciprocating in a way that is of benefit to and advances the relationship between self and extended self. By living according to these values, we are not only changing our relationship with our immediate environment for the better, but we are also setting an example for others to follow and change their relationships. There are many practical ways we can live according to these values, and we will use some examples from our own lives to illustrate.

“We choose the world we live in, by choosing how we live in the world.”

Chrisna du Plessis³



Dominique's garden. PHOTOS: D HES

Dominique does this on several fronts: she aims to eventually produce her own vegetables, fruit, nuts, honey and eggs, does not drive a car and most of her clothes are pre-loved. But she is not perfect, there are flights, paper tissues, and the cracking fires she loves; and there are disposable nappies and other compromises she has made. The point is that living in an ecological way does not require that we have no impact. A tree does not have zero impact, it takes up nutrients, and uses energy, water and CO₂. But it also gives back: emitting oxygen, providing habitat, shelter, shade and food. The important thing is to be mindful of what you use and what your footprint is, and to make sure that you also give back. Like the hummingbird, you do what you can. And sometimes the example you set can cause ripples out into far larger systems, as Chrisna found.

The recycling ripple

Chrisna is a bit of a recycling fanatic. Many years ago she went to a friend's birthday party and, not wanting to drink and drive, she stayed the night; which meant being roped into the big clean-up of the morning after. As she collected the empty bottles, she noticed that many people had dropped their bottles into the rubbish bin. She promptly started rescuing the bottles from the rubbish, as one does – much to the horror of her friend who sheepishly admitted that no, she does not have a recycling bin. Chrisna took all the bottles to the recycle depot and thought that was the end of it. The friend got a recycling bin. Move on a few years and the friend is in a fairly important position at the Architecture Faculty of a large university, where she could influence institutional changes such as the introduction of a recycling strategy at the university. She also instituted an annual Green Design Week and invited Chrisna as guest speaker to the first of these. As part of her introduction, she shared the story of that long ago party and how ashamed it made her of the fact that she did not recycle her waste. For her it was a pivotal moment that set her on a path that changed the way an entire university looks at its waste.

In our interviews with the *Regenerates*, we found that many of them had experienced similar moments, where someone said something that made them question “what if we are not thinking about the consequences; what if what we are doing, is not enough; what if we stop focusing on the negative and explore the positive?” These moments of clarity set them on a lifelong path that influenced many clients, co-workers and students, yet the people who inspired these mental shifts often have no idea of the effect their words had.



Heitseeibib, the praying mantis, supervising the writing of this book
PHOTO: C DU PLESSIS

However, living in an ecological way is about much more than the usual suspects of recycling, using public transport and switching to renewable energy systems. It is also about your relationships with the community of life in which you live. Most of us profess to love nature, but are very quick to haul out the bug spray. However, your house can also become a functioning ecosystem that keeps itself in balance.

The part of our lives where our choices are likely to have the largest positive impact on our own well-being, as well as that of the greater community of life, is in our food supply. Most of us are aware of the negative impacts of factory farming on both the environment and our health, and from an ecological worldview perspective, the practices employed are downright unethical.⁶ However, our food choices are much more complex. Organic food production reduces soil pollution and improves soil health, and is a healthier food choice for a number of reasons, not least of which is the lack of pesticide residues. However, if we look at the examples of organic produce available in a Singapore food market (Fig. 2), this is no longer a simple choice. Flown from Holland, Israel and Australia, and individually packaged in plastic and polystyrene, the environmental footprint of these

three vegetables negates any positive impacts as a result of organic farming. The packaging and refrigeration further negate the possible health benefits. So what are the alternatives?



Figure 1: Organic produce from around the world converge in Singapore. PHOTOS: C DU PLESSIS

First choice is obviously to grow your own food. However, few of us have the space or time to grow more than a few salad ingredients and potted herbs, and trying to provide the bulk of your food needs can be quite a challenge, as Barbara Kingsolver so brilliantly describes in *Animal, Vegetable Miracle*.⁷ An alternative is to support local suppliers at farmers markets. The food miles are considerably less, you can talk to the farmers about how they farm and what fertilizers and pesticides they use, and the produce is fresh. Buying heirloom varieties protects biodiversity in the agricultural system, and supporting artisanal foods protects the global food heritage. These are all considerations of the *Slow Food* movement.



PHOTO: SHUTTERSTOCK.COM

Slow Food – eating local, seasonal and with pleasure

Homo sapiens must regain wisdom and liberate itself from the 'velocity' that is propelling it on the road to extinction. Let us defend ourselves against the universal madness of 'the fast life' with tranquil material pleasure. Against those – or, rather, the vast majority – who confuse efficiency with frenzy, we propose the vaccine of an adequate portion of sensual gourmandise pleasures, to be taken with slow and prolonged enjoyment... In the name of productivity, the 'fast life' has changed our lifestyle and now threatens our environment and our land (and city) scapes. Slow Food is the alternative, the avant-garde's riposte. Slow Food Manifesto⁸

The *Slow Food* movement is an example of a pebble in a pond that caused ripples around the world. It started in 1986 when McDonald's dared to open an outlet in Rome, right next to the famous Spanish Steps. This outraged many Italians who saw in McDonald's the end of their cherished culture of *mangiare bene* (good eating). A local food writer, Carlo Petrini, launched *Slow Food* to counteract the threat of fast food. The movement is about everything that makes eating an enjoyable and memorable experience: "fresh, local, seasonal produce; recipes handed down through the generations; sustainable farming; artisanal production; leisurely dining with family and friends".⁹ By 2012, the movement has grown to include more than 100 000 members and over 2 000 food communities operating in more than a 150 countries. It continues to promote "the right to pleasure, the importance of consciously; living life at the right pace, and the value of cultural biodiversity".¹⁰ Amongst other objectives, it encourages farming of plants, seeds and livestock characteristic of the local ecosystem; forming and sustaining seed banks to preserve heirloom varieties in cooperation with local food systems; preserving and promoting local and traditional food products, along with their lore and preparation; and organizing small-scale processing (including facilities for slaughtering and short run products).¹¹



Slow Food®



PHOTOS: C DU PLESSIS

Join the kindness revolution

Another example of a pebble that created a tsunami, is when Anne Herbert famously wrote: "Practise random kindness and acts of senseless beauty" on a place mat in a Sausilto restaurant in the early 1980s.¹² Soon her words started appearing as graffiti and on bumper stickers, and with the advent of the internet and social media, the idea has spread around the world. Today a Google search for random acts of kindness results in over 7 million hits. Online communities like KindSpring have been going for over a decade, providing a place for more than 40 000 members to connect and share acts of kindness they either performed or received with the sole purpose of making others feel better.¹³ Visitors to the site can also find suggestions on kindness acts for, amongst others, the elderly, the environment, or public places. The site itself is an act of kindness, as it is totally volunteer-based. The kindness revolution is an excellent example of the power of self-organization at work.



PHOTO: C DU PLESSIS

Some ideas for Random Acts of Kindness¹⁴

For the environment

- Plant a tree in a place where it will thrive
- Support local markets and farmers
- Clean up litter in a park or on your street
- Research eco-friendly materials
- Gift a reusable grocery bag
- Hug a tree

In public restaurants

- Order someone desert
- Leave a note for the next guest
- Share your table with someone
- Order desert or coffee for someone else
- Compliment your server



Free Hugs and Free Shop – Occupy Melbourne PHOTO: C DU PLESSIS

The Free Hugs Campaign

The Free Hugs Campaign was started in 2004 by an Australian, Juan Mann (a pseudonym), who had been going through a difficult time and was feeling lonely and depressed. What motivated him to offer free hugs to passers-by in Sydney's busy Pitt Street Mall, is unclear. In one version of the story, he had just arrived home from living abroad and at the airport felt really lonely when there was no one there to welcome him with a hug. In another version, a random stranger gave him a hug at a party and, inspired by how good he felt after the hug, decided to hand out free hugs to random people. His story was captured in a music video on YouTube which became an overnight sensation, and he found himself the leader of an international movement. You can join International Free Hugs month, which runs through July.¹⁵

Research has shown that performing acts of kindness also benefits the person doing the act.¹⁶ Further, the more of these acts occur the more likely others are to start contributing as well.¹⁷ It would appear that kindness has a domino effect: "Those who are treated to a kind word or a kind deed are significantly more likely to behave kindly than those who have not received the same kind treatment".¹⁸ One of the more popular, and perhaps oldest, random acts of kindness is to 'pay it forward'. The idea is that the beneficiary of a good deed repays it to someone else, instead of to the original benefactor. Another popular act is based on the *caffè sospeso*, a practice that started in Italy, and has since spread across the world, taking many new forms.



PHOTO: C DU PLESSIS

May I have a suspended coffee please

Many years ago a tradition started in the working-class cafés of Naples. If someone experienced good luck, or felt generous, they would pay for two coffees, but only drink one. The second coffee would be 'suspended' until a person down on their luck, would ask for a *sospeso*. They would then be served a coffee for free. The idea has spread to coffee shops across the world, and would sometimes include a meal as well.¹⁹

A different way of doing an act of kindness is through crowdfunding, where people get an opportunity to donate or invest often small amounts in ventures via the web. These small amounts add up: \$2.7 billion was raised this way in 2012, with an expected increase to \$ 5.1 billion in 2013.²⁰ Crowdfunding can be either donation-based funding or investment funding. In the first model funders have a collaborative goal such as supporting a cause, a charity or a creative project and they may or may not receive a return in form of products, perks or rewards. Sites like *Kickstarter*²¹ and *Indiegogo*²² focus specifically on funding these kinds of activities. In the second model, businesses sell shares or ownership stakes online and the funders can potentially receive a financial return. Sites like *Crowdrise*²³ and *AngelList*²⁴ target this market.²⁵ *Start some good*²⁶ is a site focusing specifically on social enterprises.

Do not forget the senseless acts of beauty



Switch box, Brisbane and Yarn bombed bench, Santa Fe. PHOTOS: C DU PLESSIS



Activities such as yarn bombing, certain types of graffiti, and guerrilla transformations of ordinary objects such as telephone booths or electric switch boxes are examples of ‘senseless acts of beauty’ that may make a social or political comment. The bench in Mexico City is another form of these acts – senseless in the way that it goes far beyond the requirements of a utilitarian object such as a public bench, but it is also an act of generosity.



Telephone booth, Sao Paulo. Public bench, Mexico City. PHOTO: C DU PLESSIS

It can also be about creating an experience of beauty in an otherwise derelict space, such as the art installation in an alley in Sydney which comes complete with an audio experience of the songs of the missing birds. Or it can be about creating a numinous space for contemplation like the labyrinth built in a Pretoria parking lot.



Freedom Songs, Sydney



Labyrinth, Pretoria

PHOTOS: C DU PLESSIS

Become a Tactical Urbanist

How can we use the power of self-organization and the ‘small actions, big effects’ impetus of what Jaime Lerner terms urban acupuncture, to bring about a larger purpose? That is the question Tactical Urbanism is asking.²⁷ The dreaming forward project such as the Picnic on the River in Mexico City, discussed previously, is an example of such an action, as is the beach in Federation Square, Melbourne. Other examples of how tactical urban interventions can integrate real change through collaboration and engagement are provided by the Street Plans Collaborative²⁸ and Codesign Studio.²⁹



Pop-up public beach, Federation Square, Melbourne. PHOTO: C DU PLESSIS

Tactical urbanism has five characteristics:

- A deliberate, phased approach to instigating change;
- The offering of local solutions for local planning challenges;
- Short-term commitment and realistic expectations;
- Low risks, with a possibly high reward; and
- The development of social capital between citizens and the building of organizational capacity between public-private institutions, non-profits, and their constituents.³⁰

The two projects discussed below are examples of tactical intervention in an urban landscape with the intent of improving a small corner of the city. Both projects are examples of guerrilla gardening, but at vastly different scales and with different intentions. The first project is a small community garden in a Boston suburb. The second project tackles a much larger dilemma – the rehabilitation of urban wastelands.

200 foot garden – Brookline (Boston), Massachusetts

This community project, a commuter garden initiated and managed by a couple of local residents, aims to connect the community back to the ability to grow their own food. Not only is it visually present, through simple communication media it connects to those walking past, answering many of the questions that often stop people from starting their own gardens. The signs also invite people to pick vegetables for their own use, telling them how to know if a particular vegetable is ready to harvest, and informing them about the toxicity levels of the soil – a common concern with kerbside urban agriculture. The instigators of the garden, Patrick and Tracy Gabridge, describe their intentions for the gardens:

*Our hope is to add some beauty and delight to a very everyday stretch of sidewalk and chain-link fence. It's also our hope to remind people that healthy vegetables can be grown in all sorts of environments, not just farms or big yards or community garden plots. The 200 Foot Garden is also a way to bring together neighbours in a project designed to share good things with the people around us.*³¹



PHOTO: D HES



PHOTOS: C DU PLESSIS



Fieldwork – Melbourne, Australia

In this public art project designed and implemented by Ben Morieson, the artist aimed to bring beauty to a dilapidated industrial site, while cleaning the soil and engaging the community. The site in Alfred St, Kensington, close to the Melbourne CBD, is considered one of the most polluted in Melbourne. With the help of local schools, businesses, and community groups, he converted the site into a living art work for a season – a field of sunflowers. The community pitched in to care for the 'field', through its various stages.³² The sunflowers not only delighted the commuters arriving into Melbourne each day by car, bus or train, but cleaned the soil as well. While the soil tests are not yet available, international studies suggest that he can expected the flowers to remove lead, arsenic and other trace pollutants.³³



PHOTO: B MORIESON



PHOTO: CAROLINE KENNEDY

Conclusion

The objective of this chapter was to illustrate that even though the challenges we face are big, and the work of regenerative sustainability is complex and demanding, there are things we can do within our own spheres of influence in our homes, in our communities and in our practices, that can bring about meaningful change. And though we may feel as if we are working alone, there is a vast community out there of individuals and small groups who are struggling with the same things and finding creative and inspiring ways to express the values of the ecological worldview in their personal and professional lives. Finding them and connecting into this web is but a mouse click away. Knowing that they are there, is what gives us hope that the world we dream about, is not only possible, but emerging.

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Epilogue

Finding hope

“The future belongs to those who give the next generation hope.”

Teilhard de Chardin

We entered this journey with two objectives. The first was to find a hopeful message to counteract the gloomy contraction mentality of the prevailing sustainability discourse. We had a strong hunch that we would find it where people are working from an ecological worldview, and we were right. We found that when people start thinking of themselves as nature and can see themselves as in relationship with all around them, they open up to possibilities of abundance and thriveability that is inherent in the pattern of life giving rise to new life, and the striving of all living things to flourish and become more.¹ And the people we found doing this work firmly believe that life can be better, that the world can be richer, more abundant and more beautiful – they dare to hope.

Our second objective was to find the pathways that would lead us into a thriving future in a regenerative world, and make them visible. Because so much of this thinking is still developing, there is a perception that it is still theoretical and experimental. We wanted to show through concrete examples that the theory can and has already been applied, and that this is an on-going process of experimentation and refinement. That these pathways are evolving in the same way that nature evolves, and we should therefore not be afraid to play a co-creative part in their evolution – that it is in fact our responsibility to do so.

In this book we present a number of different approaches to and theories about what it means to engage with the built environment from an ecological worldview perspective, without being too critical of any of them. We are well aware that these are all imperfect and can be critiqued on any number of points, which is as it should be in a constantly evolving world. So we invite you to put on your thinking caps and test them against your own experience, then join the dialogue that helps us to further refine the regenerative sustainability paradigm.



PHOTO: D HES

“What I am seeing now is a new sense of community and a new sense of: ok nice start, but not really good enough, and so now what can we do together that we didn’t accomplish with our separate competitive green ideas.”

Bob Berkebile⁴

For one thing has become clear, the ecological worldview and the associated regenerative paradigm is a collective effort: the emergent product of many people independently working through the same questions; delving deep into the collective unconscious to come to similar conclusions; hybridising and honing each other’s work, always pushing to go further, delve deeper, include more. No one person can claim ownership of the concepts and insights that emerge, despite the proliferation of trademarked phrases that is a product of the late 20th century’s colonisation of the intellectual commons by the business sector. But this is a passing phase as practitioners struggle to reconcile a planetcentric worldview with the StriveDrive entrepreneurial altitude of the societies in which they work, until they realise this is the wrong impulse. That, as Charles Eisenstein puts it:

*The desire to own, to control, is the desire of the self of separation, the self that seeks to manipulate others to its own advantage, to extract wealth from nature and people and all that is other. The connected self grows rich by giving, by playing its role to the fullest in the nourishment of that which extends beyond self.*²

With that comes the understanding that we not only have to change ourselves and our practice as built environment professionals and other designers, but we also need to create “the economic structures that support the connective self living in co-creative partnership with earth”.³

It has been interesting to explore the careers of the older *Regenerates*, seeing how they moved through structure-stages of development and adopting more and more of the ecological worldview values, until they reach a point where they realise it is not a competition, and it is not about who is the ultimate guru, and it is not about what is in it for me. But that it is about how I can contribute and grow wisdom in the world. That our real purpose is about pursuing and bringing about new orders of potential in ourselves, our families, our communities, our work and our Place – contributing to the ongoing regeneration and evolution of a beautiful, thriving and nourishing world. Witnessing the personal journeys of people gradually transcending the self-centred demands of the ego to embrace the wholeness of the extended Self, has been both humbling and inspiring. They proved to us that it is as Charles Eisenstein suggests: “The Age of Separation is winding to a close, and we are beginning to relearn how to live the truth of our connectedness.”⁵ And this realization is core to the message of hope we found.

What gives us hope?

First we have to explain what kind of hope we are talking about, for hope has two sides. There is the dark side of foolish hope, which as Plato claims, is a false counsellor, seducing humankind with false promise; and which can be seen as the worst of all evils prolonging the torments of humankind, as Nietzsche suggests. It is the kind of blind hope that has us trusting in some weird ostrich magic to keep the worst from happening as long as we

pretend it is not possible, that everything will be OK as long as we don't look the truth in the eye. It is the hope that keeps us trapped in inaction.

The hope we are talking about, is the hope that gives us the courage to act, for as Napoleon said: "Courage is like love; it must have hope for nourishment". And we will need courage to face the fact that the world is changing rapidly and at a scale we have not experienced before, and yes some of these changes will be dramatic. It is the way of nature – if a system becomes dysfunctional it will collapse so that it could be healed. That is the lesson the children of Springfield have taught us: we can embrace these changes as an opportunity to fix those things that were not working, that were harming the whole. What we cannot do, is cling to the foolish hope that they will not happen.

Although science is providing us with some understanding of what the changes in our natural environment will be, there remains a level of uncertainty in the predictions. This uncertainty is because what ultimately happens depends largely on our collective actions and the changes in ourselves and our social systems. This is the hopeful part, because we have the power to change, to "shift ourselves, to transform who we are in terms of who we are meant to be in this world".⁶

In our interviews we asked *The Regenerates* what gives them hope. And two strong themes emerged. The first is the capacity of nature to regenerate itself and find paths for life to survive. And the second is that they can already see how people are changing the way they approach their lives and their work and their relationship with nature.

"The capacity for hope is the most significant fact of life. It provides human beings with a sense of destination and the energy to get started."

Norman Cousins

"Just seeing nature living always gives me a lot of hope and reassurance, and particularly the regenerative capacity of natural systems, that they can heal, that they can come back in unimaginable ways, and unimaginably beautiful ways. And I think the same thing gives me hope amongst human beings, to be able to see people transform, to be able to see the continuing caring that comes out of people, and the love that comes out of people, and people willing to step up to do things they didn't think they could, but no-one else is doing them, so they see that they need to." Joel Glanzberg⁷

"There is an emerging new world order in some ways I would say, but it is not a world order that's from the top down or some power, it's really coming from individual people's lives, individual communities. And you start seeing patterns over and over again of people brutally starting to reclaim their own places, their own communities, their families, their ecosystems in really personal and very amazingly powerful ways." Nicholas Mang⁸

"There is an unconscious knowledge, a growing discomfort with the way things are. We may not understand why it's not all working, we are starting to realise as a civilisation it's not working! And in that environment there's more capacity for connecting as a human community, a large community full of life and beauty and seeing 'oh I am part of that, I could maybe engage in a different way to make more beauty.' That's exciting and gives me a lot of hope." Bob Berkebile⁹

"And hope is when you see people vibrating with newfound discoveries about relationship and potential for their engagement and the health of their children and the health of the ecosystem they're participating in. They can see a way forward. I think that would be one way of describing what hope means to me. People can see a way forward. It doesn't mean that you have an answer, but you can see "oh I need to be engaged this way. I need to be thinking about things this way. I have a way of waking up in the morning and looking at new relationships." Bill Reed¹⁰

The psychological definition of hope is as “a positive motivational state based on an interactively derived sense of a) successful agency (goal-directed energy) and b) pathways (planning to meet goals)”.¹¹ This means hope will act as a motivational force if we feel we can do something and that there is a way for us to do so, i.e. if one can look for a different path to the future. Much of the current sustainability discourse is not about finding a different path, but about finding ways of driving slower on the current path. This is neither helpful nor hopeful, and because the destination of the current path remains pretty much the same, people feel that they cannot do much to change the outcome. This is not a great motivation for behaviour change.

However, we have found that there is a different path and that it is possible for us to do something, to switch to such a path. Indeed there are millions of people already working to make that happen, opening up the path to a regenerative and thriving world. As Paul Hawken points out in *Blessed Unrest*: “What I see are ordinary and some-not so-ordinary individuals willing to confront despair, power, and incalculable odds in an attempt to restore some semblance of grace, justice, and beauty to this world.”¹²

We would like to invite you to join the ranks of *The Regenerates* and help us to open up that path to a thriving future so it becomes clearly visible to the world.

“Hope is like a road in the country;
there was never a road, but when
many people walk on it, the road
comes into existence.”

Lin Yutang



PHOTO: C DU PLESSIS

ENDNOTES

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Resources

We have included a key set of resources and further reading which speaks to us, but this is not exhaustive and we apologise to the hundreds of great references and resources out there which we have not included. There are five sections, 'I want to know more about'; 'I want to be trained'; 'I want to connect'; 'useful tools and guides'; and, 'key books we would recommend'.

I want to know more about:

The Ecological worldview

A number of authors have attempted to outline the attributes of an ecological worldview. They come to the discussion from many different perspectives. The first concerted effort to organise the conceptual understanding of how an ecological worldview would describe and order the world was provided by Edward Goldsmith (1988). He proposed a set of 67 laws or principles which, according to him, govern cosmological processes. These principles describe what ecology is and its properties (e.g. it is non-disciplinary, holistic, and subjective), how ecological knowledge is acquired (through subconscious, intuitive processes), and how it looks at the world (in a subjective and emotional way). Further principles describe Gaia (seen as the ecosphere and the fundamental unit of evolution), touching on concepts such as the unity of all things, Gaia as a spatial-temporal system, humans as part of nature, and inherent order in complexity, cooperation and competition as fundamental relationships, holarchic structure and self-regulation. With this work Goldsmith provided a valuable foundation to the development of an ecological worldview. Six other scholars have been quite influential in developing our understanding of the ecological worldview. They are Fritjof Capra, Thomas Berry, Ken Wilber, Ervin Lazlo, William Rees and Stephen Sterling. Each of these scholars also brings a specific disciplinary and epistemological point of departure to the table.

Capra (1997), moving from a theoretical physics and systems science position, identifies the roots of this worldview in quantum physics, systems thinking, organismic biology, ecology and Gestalt psychology, but also points out that many of the theories proposed by these new sciences mirror concepts found in ancient traditions.

Berry (1990; 1999) moves from a social-spiritual tradition and identifies the roots of this new worldview in the spiritual traditions of indigenous



peoples and ancient and Eastern religious and philosophical traditions, but advocates also the knowledge generated through scientific discovery. He talks about making use of “a fourfold wisdom to guide the future: the wisdom of indigenous peoples, the wisdom of women, the wisdom of classical traditions, and the wisdom of science” (Berry, 1999:176).

Wilber (2000:23), moving from a philosophical and psychological basis, describes the basis of what he terms the ‘new integral worldview’ as a unification of the three great realms of evolution: the physiosphere (matter), the biosphere (life) and the noosphere (mind), and names as basis for this worldview both what he terms the evolutionary sciences (which includes ecology and the various systems sciences) and those sciences dealing with the mind and society, as well as the world’s spiritual traditions. He further indicates that the evolutionary impulse continues into the realm of spirit.

Lazlo (1987:9), from a cosmological and metaphysical starting point, describes what he terms the evolutionary paradigm as “a grand synthesis that unites physical, biological and social evolution in a consistent framework with its own laws and logic”. All four these authors take a further position that this integration will be possible only through “the return of humans as participating members of the earth community” and the establishment of a human-earth relationship that is mutually enhancing (Berry, 1990:166). This will be achieved when humans accept that the geosphere and biosphere should be honoured not just because of their own intrinsic worth, but because “they are components of our own being, and destroying them is literally suicidal for us” (Wilber, 2000a:35).

Rees, coming from ecological economics and human ecology, and Sterling, coming from education, made initial attempts to structure the key themes which together would “weave the ‘theory of relationship’ that underpins the post-modernist ecological worldview” (Sterling, 2003:157).

From their different disciplinary positions, these authors (and many others) have identified a common set of patterns or stories from which a new worldview is being fashioned. These stories come from both new scientific discoveries, as well as other, much older knowledge systems. The first set of patterns lie within the sources of knowledge seen as the basis of this new worldview: new physics and the systems sciences including ecology (matter and life); neuroscience and psychology (life and mind); and philosophy and indigenous and spiritual traditions (mind and spirit). These patterns have in common the idea of the interconnectedness and interdependence of all aspects of being at both an individual and collective level.

The second set of patterns, emerging from the first, but influenced also by the growing awareness and experience of human influence on the biosphere and a global socio-economic interconnectedness, is that of interdependence between all living beings. In essence these patterns describe a world where entities not only co-exist, but co-evolve and co-create.

The third pattern that emerges is one of integration between different sources of knowledge (and epistemologies), as well as a re-integration of the different dimensions of existence and, by implication, of the human interior

and exterior experience. This trinity (interconnection, interdependence, integration) provides the facets of the lens through which the new worldview looks at the world.

The worldview is thus shaped through identifying common patterns found in the different branches of science, as well as in wisdom traditions that predate the Age of Enlightenment, whether these be from so-called indigenous knowledge sources, the great religious traditions or ancient schools of philosophy. As such, it can be described as a transdisciplinary etiology that requires not only a dialogue, but also a reconciliation between the exact sciences, the humanities, the social sciences, the arts and spiritual experience, and a worldview which recognises “the existence of different levels of reality governed by different types of logic”, as explained by De Freitas *et al.* (2007:89).

The following list includes the above cited sources, as well as some additional writings on the subject:

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De Freitas, L., Morin, E. and Nicolescu, B. (Eds.). (2007). Charter of transdisciplinarity. *First World Congress of Transdisciplinarity*, Convento Arrábida, Portugal, November 2-4, 1994. Reproduced in Volckmann, R., ‘Transdisciplinarity: Basarab Nicolescu Talks with Russ Volckmann.’ *Integral Review* 4: 73-90.

Elgin, D. and Le Drew, C. (1997). *Global consciousness change: Indicators of an emerging paradigm*, California: Millennium Project.

Goldsmith, E. (1988). ‘The Way: An ecological worldview.’ *The Ecologist*, 18:4/5. [Online] URL: <http://www.edwardgoldsmith.com/page138.html>, Accessed 29/01/2008.

Harman, W. (1994). Toward a “Science of Wholeness”. In Harman, W. (Ed.), *New metaphysical foundations of modern science*. California: Institute of Noetic Sciences.

Harman, W. (1998) *Global Mind Change: The Promise of the 21st Century*. San Francisco: Berrett-Koehler Publishers Inc.

Korten, D. (1993). Competing development visions. Lecture handout sheet, 2nd September 1993, The People-Centred Development Forum, Bainbridge Island, WA, USA.

Lazlo, E. (1987). *Evolution: The grand synthesis*. Boston: Shambhala.

Lazlo, E. (2004). *Science and the Akashic Field*. Rochester, Vermont: Inner Traditions.

Lazlo, E. (2006). *Science and the re-enchantment of the cosmos*. Rochester, Vermont: Inner Traditions.

Rees, W. E. (1999). Achieving sustainability: Reform or transformation? In Satterthwaite, D. (Ed.), *The EARTHSCAN reader in sustainable cities*. London: Earthscan.

Spretnak, C. (1997). *The resurgence of the real*. Reading MA: Addison-Wesley.

Sterling, S. (2003). *Whole systems thinking as a basis for paradigm change in education: Explorations in the context of sustainability*. PhD Dissertation: University of Bath, UK.

Wilber, K. (2000). *Sex, ecology, spirituality*. Boston: Shambhala. 2nd edition.

Alternate economic approaches that could be used to move to the Ecological Worldview

- 1. Concurrent currencies** – creating resilience in the process of exchange by creating options beyond a single monetary method.

The intention of the economy is to create wealth, not wealth in the sense of money, but in the sense of ‘the possession of wellbeing’ as Gwendolyn Hallsmith says. Together with her co-author Bernard Lietaer, they outline many ways in which communities are creating wealth outside the traditional economic monetary system. This is one of the challenges of working in the ecological worldview: it is still emerging into a world predominantly situated in the mechanistic worldview and therefore the current economic approach.

There are many of these alternative wealth creating initiatives such as a time bank, where irrespective of what people do, they build up time credit, so a physics professor could tutor for several hours and in return ‘purchase’ the equivalent in babysitting hours. A similar initiative in Japan is centred around care for elderly family members. Often a person’s immediate family does not live in the same city, so using this *Fureai Kippu* – roughly translated to ‘caring relationship tickets’ – a person can look after another’s family in their city, while their family member is looked after by someone else in their home town. The system is administered by the unions, and they have found that the level of care received by the people involved is much higher than that through traditional home care, which is often done by low paid carers with many other competing pressures.

In Brazil, a system called Saber is proposed to organise older students at school to tutor the younger ones, building up credits for their college or university tuition. Though not implemented as yet, the benefits of this system are many: firstly, it supports the learning of both older and younger children, teaching being one of the best ways to learn; secondly, it supports older children to go into further education; and thirdly, it uses limited resources effectively and connects kids to each other and their community.

What these alternative currencies, called concurrent currencies do, is create resilience for local businesses and systems. They allow for business to continue if the larger economic system becomes unstable, for example in Switzerland the WIR (Wirtschaftsring Genossenschaft), created in the 30's depression allowed for businesses to continue to trade and supply locals through exchange instead of money, when the economy picked up the systems shifted back to currency. This continues today through the other shocks, World War II, the 90s depression and 2008/9 recession and will continue into the future.

Hallsmith, G. and Lietaer, B. (2010). *Creating Wealth: Growing Local Economies with Local Currencies*. Vancouver Island: New Society Press

- 2. Economics of Change** – The *Economics of Change* project is based on a unique collaborative effort that unites the theoretical approaches of ecological economics and the practical techniques of real estate appraisal and valuation. The project expands the methodologies used to evaluate the multiple benefits of high performance green buildings and infrastructure. The research report and a trial valuation tool are available for people to use. <http://living-future.org/lbc/economicsofchange>

- 3. Handprinting** – a way to measure the good we do – the above the line part of our footprint. This idea is being developed concurrently in Australia and the USA. In Boston, Gregory Norris states the reason why he started down the handprinter path: *“I work and teach in the field of “Life Cycle Assessment” (LCA) which is the science of footprints. I realized years ago that we can never reduce our footprints to zero. But I still wanted to figure out how I – and everyone – could be a net benefit to the planet and its people. So I created the concept of handprints, and have operationalized it by extending the same methods of LCA which underlie footprints. I had the honour to share this idea with His Holiness the Dalai Lama in 2011 and have started to bring it to life with a beta web app.”*

See: <http://www.handprinter.org/>

Meanwhile in Australia, Kathryn Ananda developed the same idea but from a design perspective, calling it Positive handprinting, in her words: *Basically, the idea brought together existing thoughts of non-zero-sum integrated & holistic core practices for organising ourselves, that reflected the authentic, whole systems practices and perspectives that were such a natural conclusion of personal development work. The positive handprint concept came to me in early 2010 when I was trying to describe the fact that my business was using 300% renewable energy – the footprint idea did not extend itself to net credits, nor to the humanist and social positive benefits we were creating through embedded giving programs. Very quickly the idea grabbed me, and over time had informed itself into a full system for understanding, measuring and designing for thriving and positive impact, including the Thrivability Templates, Design-to-Thrive process, and the 5ps of thriving: people, place, profit, purpose, passion. We have been prototyping our processes, which draw on design thinking, strategic foresight and systems sciences.*

See: <http://positivehandprints.org/>

4. Gross National Happiness – no discussion of alternate methods of thinking about the economy is complete without a brief mention of Gross National Happiness, an alternate measure to Gross Domestic Product. Though in many ways still in development and having many issues fitting into the current worldview, its essence is that of valuing happiness and people's wellbeing. From the official site of GNH: *GNH is a holistic and sustainable approach to development which balances between material and non-material values with the conviction that humans want to search for happiness. The objective of GNH is to achieve a balanced development in all facets of life which is essential to our happiness. The goal of GNH is happiness. One of several means to achieve this goal is sustainable economic growth.*

See: <http://www.gnhbhutan.org/about/>

5. The Gift Economy – in a gift economy people exchange their goods and services as if it is a gift – given with no expectation of immediate or future rewards. Although seemingly counter-intuitive, it is the currency that has kept communities together for as long as humans have existed. The work of Charles Eisenstein provides a fascinating overview of the different types of gift economies already in existence, many of them powered by the ability of the internet to connect people; as well as the positive consequences of adopting a gift economy, such as the strengthening of social ties, building an appreciative society based on generosity and gratitude, and forcing the shift of our current economic thinking to other ways of defining and measuring wealth and the 'worth of intangibles such as creativity. His book, *Sacred Economics*, provides a good entry point into the world of the Gift Economy, as does the ServiceSpace community (<http://www.servicespace.org>).

Eisenstein, C. (2011). *Sacred Economics: Money, Gift & Society in the Age of Transition*. Berkeley, CA: Evolver Editions.

Want to get your hands dirty? The next sections shows where you can get trained, connected and involved, and suggest more books to read.

I want to learn about:

There are a number of training options available for some of the tools and approaches we discussed, many of which are online and accessible from anywhere with a decent internet connection. We point you in the direction of some, but also look for branches of these organisations in your own country.

Systems thinking

A good entry point is STIA+ which hosts dozens of online training events throughout the year on applying Systems Thinking. Website: <http://stiatemenos.com/events/>



PHOTO: D HES

The *Santa Fe Institute* offers Summer Schools on Complex Systems Website: <http://www.santafe.edu/>

There is an excellent Systems Thinking group on LinkedIn, called *Systems Thinking World*, that links the systems thinking community, and you may want to connect to the *International Society for Systems Sciences* at Website: <http://isss.org/world/index.php>

Integral thinking

The *Integral Institute* provides graduate training courses, as well as links to other courses. Website: <http://www.integralinstitute.org/>

Integral Without Borders provides a link to the integral community and information on courses and workshops, as well as opportunities to put integral thinking into practice in development work. Website: <http://integralwithoutborders.org/>

The Ecological Worldview

The Schumacher Institute in the UK provides a variety of courses on many of the approaches, tools and theories we discussed in this book, offered by the best minds in the field. Website: <http://www.schumacherinstitute.org.uk/>

LENSES

Training on the use of LENSES can be done through CLEAR, Fort Collins. Website: <http://www.clearrevolution.org>

Regenerative Design

*Regenesi*s offers various training options: there is the Regenerative Practitioner series, Continuing Practicum, Distance units on specific aspects such as Regenerative Client Development and an annual gathering. Website: <http://www.regenesisgroup.com/RegenerativeDevelopment/RegenesiEducation>

Biomimicry

The Biomimicry 3.8 Institute offers training from children to professionals, the training is both online and face to face. Training can be casual to full professional credentials. Website: <http://biomimicry.net/educating>

Permaculture

Permaculture is taught in many countries through host organisations, there are online courses, face to face courses, academic courses and practitioner courses. An example is website: <http://www.permaculture.org/> and David Holmgren's courses: <http://holmgren.com.au/courses/>

Living Building Challenge

The International Living Futures Institute provides online training that ranges from one hour introductory courses to multi day tailored courses. Many can be organised through accredited training providers as part of the local Collaborative. Website: <http://living-future.org/ilfi/education-events>

In One Planet Living

Using the ecological footprint model to help guide and assess projects, training that is done throughout the world through bioregional offices, contacts can be found through the website: <http://www.bioregional.com/our-services/our-services/one-planet-open-source/>

I want to connect:

With the people in this book

Everyone has been referenced and their work cited, they would welcome contact opportunities to collaborate and implement.

With likeminded people

International Living Futures Institute has collaboratives around the world where people get together and not only discuss LBC, but other ways to work with the built environment to create a living, thriving future – <http://living-future.org/>

A number of the organisation that are mentioned in this book have Facebook and/or LinkedIn profiles, connect with them, collaborate and support them.

Useful tools and guides:

Tactical Urbanism

Guide on how to develop and implement experimental urban design and interventions showing projects from weed bombing, play streets, pop-up retail, pop-up parks and other ways of experimenting in the city. Website: http://issuu.com/streetplanscollaborative/docs/tactical_urbanism_vol_2_final?e=4528751%2F2585800

Codesign studio

Creating great neighbourhoods is about building networks of people and places. Rapid urban revitalisation projects are cheap, fast and fun ways to create physical improvement for spaces, and also build long-lasting social networks. The result is a more sustainable, safe and inclusive environment for everyone. This pack is full of ideas to get you started. Choose from a range of easy-to-source materials, an activity, or mix and match the cards to come up with new outcomes. Some ideas are so simple you could transform your neighbourhood in a weekend. Excerpt from website: http://www.codesignstudio.com.au/wp-content/uploads/files/Flashcards_final_REVIEW.pdf

Living Building Challenge

The tool is online, though membership is required to join the community where it is possible to share, look at the details and documentation. Website: <http://living-future.org/lbc>

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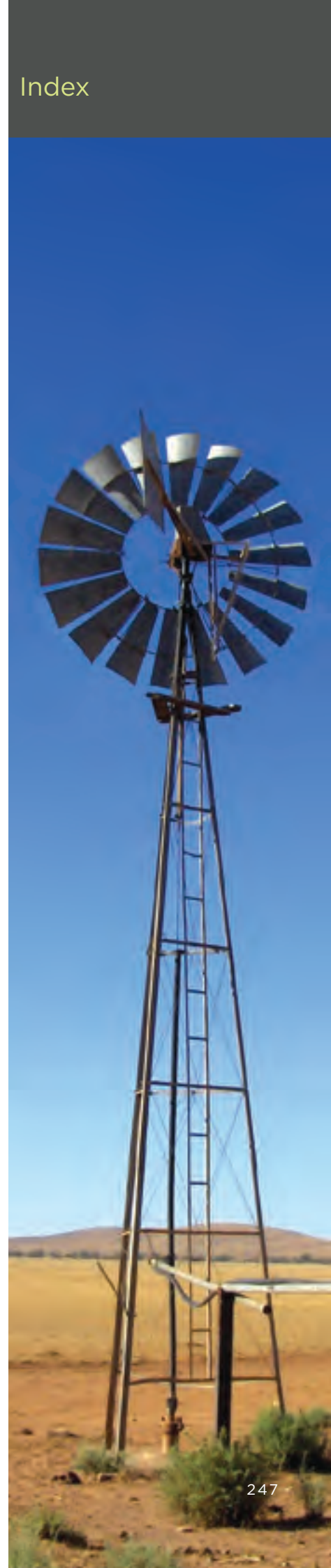
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About the authors

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