

Regenerative Development

What is it, How does it Support Innovation in the Built Environment and how can it Lead to a Sustainable and Thriving Future

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Abstract: There has been a call from many areas of research and practice for a different approach to sustainable development in the built environment. This has occurred because of the evidence that the social and ecological indicators that underpin our civilisation are being eroded; that is, we are failing at our current approach to sustainability. Led by thinkers in the built environment the call has gone out for approaches that facilitate built environment outcomes that move beyond marginal improvements and shift our focus towards creating vitality and net benefit. That is, projects that begin to heal the damage done in the past and create vital relationships that lead to resilience, as well as adaptive and thriving outcomes. It is argued that regenerative development is a process that can facilitate this type of approach to contributive development. This paper will present the frameworks used to support the application of regenerative development thinking to three projects in Victoria, Australia. While these are long-term projects that will be in development over 15 years, what is presented here is their initial conceptual design processes which aim to increase the potential for regenerative outcomes. The projects were informed by the LENSES framework, the Living Building Challenge, the Regenesi frameworks and Biophilic design principles. Each project has an ecological baseline that was collected as part of the project so as to measure the benefits post construction and occupation.

Keywords: Regenerative development; built environment innovation; eco-city; ecological worldview.

1. Introduction

Regenerative development has been referred to by the Secretary-General of the Commonwealth as the 'Radical new approach to development' that will provide the innovation catalyst to solve our current ecological challenges. Here we will outline what regenerative development is and what it could mean for the built environment. It starts by outlining how regenerative development is different from sustainable development and how it is based on a fundamentally different worldview. This is followed by the description of three case studies and how regenerative development processes have been applied using different frameworks for operationalising it. Where possible a comparison is made between the outcomes achieved and "business as usual" sustainability.

1.1. Why a fundamentally different worldview?

As Einstein is reported to have said, “a new type of thinking is essential if mankind is to survive and move to higher levels” and in 1955, he was part of a group of 15 leading scientists that signed a manifesto stating “We have to learn to think in a new way”. We interpret this as: it is impossible to create sustainable outcomes that improve social and ecological well-being within the same thinking, worldview or framework that created the degradation. We can see evidence of this in our increasingly negative social and ecological impacts. After decades of working towards sustainability, findings from a number of recent international studies, such as the Millennium Assessment Reports (2005) and the 2014 Intergovernmental Panel on Climate Change (IPCC) assessment report, indicate that the situation is getting worse, not better. It has prompted the World Watch Institute (2013), to ask whether sustainability is still possible.

Our current approach to structuring sustainability practice is couched in the language of quantitative, performance-based indicators; reporting on performance in isolated categories; and compliance which is largely driven by individual interest: reputational, financial, or simply 'compliance'. Much has been written about the flaws in this framework and its foundation in the so-called mechanistic worldview (Goldsmith, 1993; Rees, 1999; Capra, 2002; Sterling, 2003; and, Bourne, 2008), as well as the need to shift towards a more relational worldview that will help us develop frameworks suitable for working with living systems (Hes and du Plessis, 2015; and, Murray, 2011).

Many call this more relational worldview (in which the mechanistic is a part) the ecological worldview. As early as the 1960s, its needs were highlighted in built environment practice by Ian McHarg (1969). Since then, numerous authors have explored the characteristics of the emerging ecological worldview and its main narratives (see for example Goldsmith, 1988; Capra, 1987; and, Elgin and Le Drew, 1997). The consensus is that the ecological worldview represents a shift from looking at the behaviour, performance and interests of individual ‘parts’, to consider the well-being of the whole as expressed through interdependent relationships - a web of life of which humans are irreducibly part. The focus is oriented at designing solutions that work at the biophysical level, within inherently nested systems, and across scales including the human mind. The latter is critical because it is argued that the current approach to sustainable development has forgotten the mind and the heart of people (Mang and Haggard, 2016). It has forgotten that we need to create an irresistible narrative that will change behaviour not because we ‘have to’ but because ‘we want to’. Unfortunately, the current irresistible narrative is based on the values of the mechanistic worldview: competition (winning), imperialism (control over) and rationalism (we can explain and understand everything); and a narrative that rewards power, monetary wealth, and status.

Regenerative development is an approach that applies an ecological worldview. In essence, it is a process that aims to achieve an outcome that is a *living environment* as defined by Plaut et al. (2016,p2) as: “*a setting that is thriving, healthy, and resilient because its ecological, social, and economic systems are continually nourished.*” Plaut et al. (2016, p.2) using a regenerative development approach defined it as “*the process of cultivating the capacity and capability in people, communities, and other natural systems to renew, sustain, and thrive*”. Simplified, the authors’ approach to regenerative development is to:

1. Understand the flows through a system that bring it to life, that create a living system. Flows are the various resources, including ‘intangibles’ like culture and social cohesion, that interact with the place,
2. Design place-based solutions that create multiple, mutual benefits between these flows by focusing on the opportunities for creating relationships and

3. Operate within the context of the place to ensure its relevance, resilience, and ability to adapt.

Though in its infancy in application, Regenerative Development is based on the accumulation of millennia of human knowledge and provides us with an opportunity to positively change the often-negative future predicted. Critically, regenerative development is about working within a system to enable the potential of the system to emerge, to co-evolve the aspects of the system so that it can constructively adapt to change and evolve towards increasing states of health and abundance. There are examples of the application of regenerative development ideas internationally but these tend to be reflections on projects and their outcomes (Mang and Reed, 2012) and case studies found on practitioner pages such as Regenesys and the Institute for the Built Environment (IBE) at Colorado State University. While these provide insights into the *outputs* of regenerative development projects, there is a need to better understand the *process* that supports regenerative thinking and contrast it to ‘business as usual’. That is: how do we operationalise these abstract concepts of creating ecological, social, and economic benefit?

2. Introduction to the Three Frameworks and Approaches

2.1 The LENSES Framework

The Living Environments in Natural, Social and Economic Systems (LENSES) Framework aims ‘to facilitate tangible, actionable and contextually based solutions that support and create healthy, natural, social and economic systems’ (Plaut et al., 2010). It provides an overarching process and specific activities that guide teams through identifying and realising the regenerative potential in each place or community. As depicted in Figure 1, the framework is represented by a circular disk with three overlaid lenses, each representing a level of information. The outermost lens (the Foundation Lens) outlines the guiding principles of the project. The intermediate lens (in blue) is the Flow Lens and represents the range of flows across the project. These can be physical or abstract. In the centre of the framework is the Vitality Lens which contains the two spheres of degeneration and regeneration and prompts the team to consider strategies to create opportunities for interaction between flows, create benefit for a flow and to think about that in context of the key guiding principles.

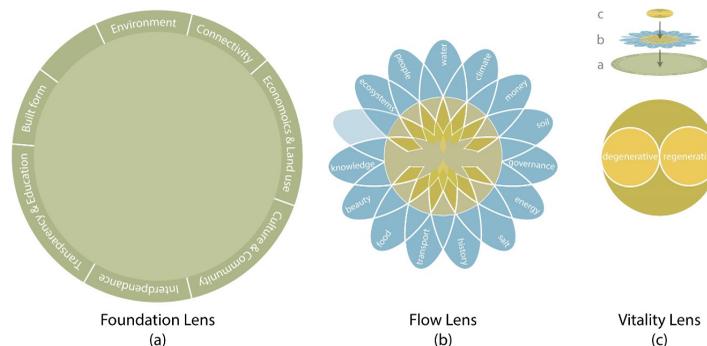


Figure 1. Visual representation of the LENSES framework. (Source: Institute for the Built Environment (IBE) at Colorado State University 2017)

2.2. The *Regenesi*s Frameworks

The *Regenesi*s approach is a process that guides regenerative practitioners as they design for the place, its surrounding community and environment. It draws upon a wide range of disciplines (e.g. permaculture, psychology, ecological architecture) and applies different methodologies to help the practitioners develop three essential capabilities: seeing potential, manifesting this potential in a contributive way and creating a vitalising energy field that will allow the system to continue evolving without losing momentum (Mang & Haggard, 2016). These methodologies serve different purposes and are adaptable to a wide range of scales and roles within a single project.

2.2.1 Three Lines of Work

This tool is used for ongoing reflection and as a reminder to work across three levels: the motivations to do a project, growing the capacity and capability of the community, and improving the value and health of the systems where we design (Mang & Haggard, 2016). Simultaneously, it reminds the designers to work across three nested systems: the project itself, its immediate context (or proximate whole) and a larger context (greater whole). The context can be understood in physical and ecological terms (a site, within a forest, within a bioregion) or social terms (e.g. a governance or leadership system). The proximate and greater wholes are then considered the spheres of influence of the project: the areas, themes, or relationships where this project can contribute and catalyse change towards a healthier system.

2.2.2 The Regenerative Development Tetrad Framework

This tool is used to understand the dynamics working on a project. It was designed to allow us to see the value that is being added to an area because of the project (Figure 2). The tetrad has four dimensions used to understand the system and trigger creative solutions that respond to what the place, ecosystem and communities are trying to become. Figure 2 indicates the four dimensions of the framework using two alternative names: Place-sourced Potential (Ground), Regenerative Capability (Goal), Co-evolving Mutualism (Instruments) and Vocation of Place (Direction).

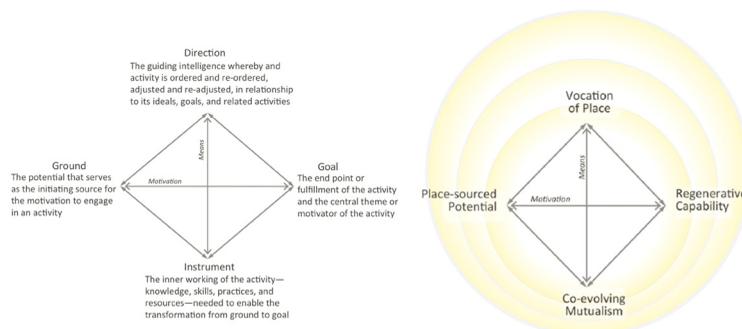


Figure 2: Left: The tetrad framework. Right: The Regenerative Tetrad Framework superimposed on three levels of nested systems (Source: *Regenesi*s 2017)

2.3. The Living Building Challenge Framework and Biophilia

Living Building Challenge is a certification tool for buildings and communities, which aims to result in buildings that 'make the world better'. The aim is to be energy, water and waste positive, contribute positively to ecological services and social capital and to challenge the industry to build as if the building was a flower or tree, the community a forest. It is made up of seven petals (place/site, water, energy, materials, beauty, equity and health) which have 20 imperatives that need to be met, including water positive, energy positive and so forth. The certification is only achieved once the building or community has been operating for 12 months. One of the imperatives is biophilia and requires the design team to have a workshop integrating biophilic concepts in the development. Biophilia is "the urge to affiliate with other forms of life" (Kellert & Wilson 1995, p. 416). Its integration into a building project is called biophilic design. For the project, both Kellert's 70 Biophilic design attributes (Kellert, Heerwagen and Mador, 2008) and Terrapin Green's 14 Biophilic patterns (Browning, Ryan and Clancy, 2014) were used.

2.4. Combining the Approaches

Each project described here focused on the use of one of the approaches, but each approach is complementary. That is, each of the frameworks and approaches can support a project in different ways. The Regenes approach provides a greater conceptual and contributive foundation and will lead to great ability to develop the foundations and flows of LENSES and facilitate a greater level of creativity in the design process. The Living Building Challenge, using biophilic design, supports the detail design and delivery of the design.

3. Case Studies

3.1. Introduction

This paper focuses on three development projects of various scales:

1. Seacombe West, a proposed off-grid eco-resort situated within 80ha of coastal saltmarsh at Gippsland Lakes, Victoria. It will use shallow geothermal opportunities to produce hot water for the resort, intensive greenhouse agriculture and aquaculture.
2. The Paddock, a proposed intentional housing development of 26 homes on a 13,500 m² site. It is located in Castlemaine, a small city located 1.5 hours north-west from Melbourne, Australia where it incorporates a series of private and shared spaces including wicking beds, greenhouses, native greenery, garden sheds, guest rooms, a community centre and washing facilities.
3. BioSciences, an Environmental Sustainable Development (ESD) Blueprint for the new Biosciences Precinct at the University of Melbourne, Parkville Campus. It presents a vision for the university and provides guidance to the project teams working on the design and construction of the new buildings.

The three projects are all real, ongoing and at different stages of design. Each presents a complicated agenda and has consulted diverse stakeholders. This paper specifically reflects on the outcomes of applying regenerative thinking to these three projects, as reflected upon by the authors who actively participated in the project and recorded our observations. As these are long-term projects, the monitoring and reporting of their eventual contribution to the socioecological systems is beyond the scope of this paper. Having said that, it is important to note that an ecological survey of the site and the development

of clear evaluation guidelines was completed for each project to capture the shift before and after development.

3.2. The Three Projects Approach to Understanding the Flows

Responding to the challenges and opportunities present within each project, the approach utilised to apply regenerative development varied with each project applying at least two of the frameworks described in the introduction. For instance, Seacombe West and the Biosciences project applied the LENSES Framework to document the flows for this project and design opportunities for flows to interact and relate. Subsequently, an interactive artefact was made for participants to use as a prompt for their creativity while documenting the guiding principles of the project and the flows which are most relevant for the ongoing viability and vitality of the system. Meanwhile, for The Paddock, the regenerative development approach evolved more organically and was driven by the passion and values of everyone involved in the project. In the latter, the Living Building Challenge was used to guide the design process and enabled the team to identify gaps in their knowledge and reach out to a broader set of consultants who ultimately enhanced the regenerative development approach. Table 1 summarises the specific approach used by each project.

Table 1: Regenerative Development Approaches within each of the three case studies.

Seacombe West Eco-resort	The Paddock	Biosciences
LENSES Framework, Regenesi Frameworks	Living Building Challenge (LBC), Biophilia, and Regenesi frameworks	LENSES Framework
The project began through a series of four workshops utilising the LENSES framework to understand the social and environmental flows of Lake Wellington, Gippsland Lakes, Victoria.	The Living Building Challenge acted as a gateway to engaging with the local community and a broader set of experts who participated in developing an irresistible narrative and strove to contribute beyond the standard scope to enhance the potential of the project.	The LENSES Framework was used as a guide to the creation of the blueprint, benchmarks, and targets for the future Biosciences Precinct within the University of Melbourne.

3.3. The Three Projects Approach to Design Place-based Solutions and Operate within the Context of the Place

The key difference between traditional practices and these three case studies is the fact that the design team took a collaborative approach to understand the physical and intangible flows interacting within a site. This resulted in a unique set of values and commitments for each project. These values became the guiding principles of each project and a source of inspiration and guidance on decision making through the ongoing design and construction process. The guiding principles closely related to those principles present in the original LENSES Framework. In this section, we provide a brief description of the outcomes achieved by each project and how it reflects regenerative development.

3.3.1 The potential for Seacombe West

The process of understanding a place through the flows that bring it to life, or degrade it, meant that the development of the master plan could focus on designing for the potential of beneficial relationships. This

resulted in a master plan which differed significantly from an earlier one done in 2003. The outcome, described in detail in a previous paper (see Hes, Stephan and Moosavi, 2016), showed that instead of the project aiming to be a canal development driven by holiday accommodation for boat owners where ecological restoration and social capacity building played a minor role, it shifted to one driven by the potential to create thriving social and ecological systems. The project now includes the potential to link ecologically responsible tourism, increasing the capacity of the land to adapt and thrive through the salination changes happening and the ability to contribute to the economy through tourism, food production and job creation.

Bringing together community, government, industry, indigenous elders and specialists in soil, geomorphology, water, fish, ecology, agriculture, architecture, construction, engineering, planning, and many others meant being able to co-design the development with an understanding of the flows that bring vitality and viability to the site. The resulting masterplan not only had a vision for the look of the place, but a governance, finance and legal model, detailed architecture, services infrastructure, water formation, and an educational and ecological strategy. Further, the phasing of the masterplan was so that each phase learnt from the lessons of the previous, ensuring continual research and input into the site's evolution. One particularly fascinating challenge came out of the two-day workshop relating to how the project would have an essence of its indigenous roots: how could people by living and visiting the place 'know' they were part of a 70,000-year story?

3.3.1 *The potential for 'The Paddock'*

From the beginning, the project was guided a strong desire to challenge conventional development practices while enhancing social connection and increasing the biodiversity of the area. The landowners engaged a design team with a long-standing relationship with the local community and a history of creating good socio-ecological outcomes. The outcome of their design is not just a set of homes and a nice landscaped productive garden, but it also addresses the need for the ongoing operation of the site to facilitate the project's vision. This required the design team to shift from just the delivery of a physical design to the delivery of systems and strategies for the implementation, management, and evaluation of the site, the homes, and the community. For example:

1. **Food system:** Placed physically at the centre of the development, the food system will provide organic and local food resources to the residents and the surrounding community. The residents will manage part of the garden beds while other sections will be leased to a local producer. There is also a section for bush food highlighting the natural resources of the area. The full food cycle will be incorporated from seedling greenhouses to compost facilities.
2. **Intentional housing system:** in physical terms, the development incorporates a series of shared spaces where the residents and neighbours can come together. However, they considered critical to the ongoing success of the project a need to develop strategies to support the individual and collective wellbeing of their residents and surrounding community. As the design continues to be finalized, the future residents are participating in a series of workshops where they will co-create their governance system, value system and operation strategies for the ongoing management of the site.
3. **Biodiversity design system:** Connecting to the ironbark forest system of the region, the project is maintaining most of the native trees already on the site and incorporating a native landscape strategy where the intention is to enhance the biodiversity system by 50%. Native vegetation

surrounds the homes and permeable paths conserve water. The landscape proposal emulates permaculture principles and understands the project site as part of a broader landscape.

3.3.1 The potential for the Biosciences Precinct, University of Melbourne

The report resulting from this process identified twelve key flows which have been identified as being most relevant to the zone (e.g. Energy, Health and wellbeing, Food) and developed benchmarks for each of the flows as well as specific targets for energy, water, and waste. The benchmarks and targets were intentionally outcome focussed, giving design teams full remit to apply innovative technologies and design solutions to achieve them. Elements of these work now appear on three key university documents: (1) The Sustainability Charter; (2) Our Campus in the 21st-century report; and (3) The Succeeding sustainability report.

Table 2 – Example of targets set for the flows for the precinct (Source: Aurecon)

Flow	Metric	Business as Usual	Best Practice	World Leadership / Regenerative
Energy	Operational Carbon Emissions kgCO _{2-e} / m ² /year	Operational carbon emissions (excluding green power purchased from the grid) less than 230 kgCO _{2-e} /m ² /year.	Operational carbon emissions (excluding green power purchased from the grid) less than 115 kgCO _{2-e} /m ² /year (50% reduction from BAU).	More energy is generated on the site than is used in the lifecycle of the zone (operational and embodied energy).
	Embodied Energy GJ/m ²	Embodied energy of the building less than 10 GJ/m ² .	Embodied energy of the building less than 7.5 GJ/m ² .	

This case study highlights the potential to pragmatically quantify a trajectory toward a more regenerative campus through a 15-year journey. The regenerative development potential of this project stems not only from the benchmarks and processes undergone to map out said trajectory, but through the creation of an application guide and a training session encouraging designers to become regenerative practitioners. This guide can potentially engage all teams bidding for the university project to think regeneratively, identifying the potential of the project and enabling it to be a catalyst shifting towards livings systems or ecological engagement in development in the campus and surrounding city.

Unfortunately, since being written, the document has not been actioned nor the workshops implemented. The outcome of this project is an example of the intentions of future ecologically-based living systems thinking being too big a leap for an embedded mechanistic approach to development. Developing a campus is a complicated multi-actor process, which is already fraught with issues. The introduction of the blueprint did not resonate sufficiently to be taken up.

4. Discussion and Conclusions

Regenerative Development aims to support humans to design and interact with the environment in such a way that it enables both to thrive. These case studies showcase an array of methodologies through which the potential of regenerative development could be achieved. The LENSES framework has the ability to understand the flows through the location of a development and then to look for how to invest impact to achieve mutual benefit can lead to innovative ideas. Beyond that, it can provide a strategy to assess the project's outcome to track the alignment of the project to the place and community values. For 'the Paddock' the Living Building Challenge already creates a specific set of parameters for assessment but does not provide the methodologies to measure those parameters. To enhance the rigour of

evaluation, different design teams also engaged with private consultants to develop evaluation methodologies to measure their success. This included conducting an ecological survey, and a series of workshops with surveys and interviews to track their success.

In each case, the regenerative approach led to the potential of a stronger social and ecological value of the site and developing strategies to support positive interactions within the system. What is more remarkable, is that every project resulted in more than a design master plan: they designed systems. For instance, *the Paddock* has engaged in a process with the future residents to co-create their governance system while the *Biosciences* project resulted in the creation of a process to simultaneously communicate the design brief and up-skill industry practitioners in regenerative thinking and design. Lastly, *Seacombe West* developed a partnership with various universities and collaborated on a research agenda that aims to trial and evaluate regenerative development strategies. Across these three cases, there is an understanding of the project site as a small part of larger interacting systems and that the design can exert an influence in the proximate and greater wholes.

In conclusion, undertaking a regenerative development process engaged the hearts and minds of the participants, community, and consultants. This can be demonstrated by the fact that each project resulted in three key elements: 1) the design team engaged in system design, not physical designs, 2) the process resulted in the development of evaluation methodologies to measure the projects' contribution or influence, and 3) educational strategies were integrated to highlight regenerative development and to communicate processes and outcomes of their design.

These levels of investment by everyone involved in the process requires long-term engagement and highlight the basic differences between the ecological worldview and the mechanistic. An ecological worldview simultaneously works on various 'levels' and places with as much effort in the ongoing expectations of the project as it does in the physical design. By increasing our opportunities to interact with nature, incorporating food security into the design, implementing self-governance strategies, pioneering biodiversity design guidelines, or planning long-term development for a world-leading university, the three case studies above have enormous potential to influence and change the way we develop and grow our cities. However, they also hint at the importance of encouraging continued investment from the people involved in each project. If the momentum is lost, amazing projects can degenerate into business as usual.

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