Eco-positive design:

Moving beyond ecological restoration

With a background in art, architecture, planning and law, Dr Janis Birkeland from the University of Melbourne is well positioned to understand and address the current obstacles to sustainability. As the originator of net-positive design and development or 'Positive Development' theory, Professor Birkeland believes that cities, buildings and infrastructure, the 'built environment', could become sustainability solutions. However, different systems of urban governance, planning and design are needed if buildings are to measurably "give back more than they take" to nature and society. Her mission has been to define these changes.

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Cities and buildings have greatly improved human life but at a huge cost to the planet around us. We have decimated the very thing that ultimately sustains us – nature itself. According to the World Wildlife Fund, for example, 50% of the earth's biodiversity has been lost in 50 years (WWF, 2018). At its core, Positive Development theory, set out by Dr Birkeland in her 2008 book, posits that the built environment can create a positive relationship between natural and human systems – moving beyond the goal of 'minimum negative impact' to buildings that increase net benefits for both nature and society. The idea that buildings and cities could give back more than they take is now gaining currency, but this has not been matched by the uptake of 'eco-positive' standards, methods and tools that can make this a reality.

CHANGING OUR BUILT ENVIRONMENTS

Dr Birkeland has long advocated changing the way we think about sustainability and ecological design. What is now called 'sustainable development' only aims to improve upon best practice – which is far from ecologically and socially sustainable. Each construction project diminishes the earth's life support systems. Dr Birkeland attributes our failure to aim beyond 'do no harm' to 'closed-system' thinking which limits our perspective to reduction, recycling and restoration. "Despite more positive rhetoric, sustainable urbanism still aims to enhance the good and mitigate the bad—not to increase the life support system" (Birkeland, 2012).

To reverse the devastating effect that our current form of development has had on the planet, future generations and the less fortunate among us, we need to move from decision-based to design-based thinking. The influence of decision theory in urban planning and design has limited us to choosing between poor options with negative, or at best neutral, ramifications. Choosing the lesser of two evils doesn't cancel out the long-term cumulative negative outcomes. Design-based approaches can create more positive options with multiple benefits. Further, existing social and ecological problems are not effectively weighted and addressed: we measure the wrong things in the wrong ways. Positive Development is a revolutionary way of designing the built environment to create truly symbiotic outcomes for the ecology and the community.

NET-POSITIVE BUILDINGS

People are beginning to look more and more at architecture as a way to drive changes toward social, economic and environmental sustainability. However, the methods to assess the impact of these design strategies are flawed – measuring negative and up to zero but not beyond.

Dr Birkeland, with co-authors Birte Christina Renger and David J. Midmore, discuss the positive role buildings could play in carbon sequestration. Buildings are currently a major CO_2 source but the usual approach is to compensate for the emissions from a building's operation, and not the emissions used in resource extraction and construction. They show quantitatively that, with a different approach to design, buildings could sequester more CO_2 than they emit over their full lifecycle (Renger et al., 2015). By designing buildings to support substantial and permanent planting, carbon amortization can be achieved far earlier in the building's lifecycle compared to using only renewable energy systems. They propose a simple tool to assess performance.

Development can be one with the natural landscape.

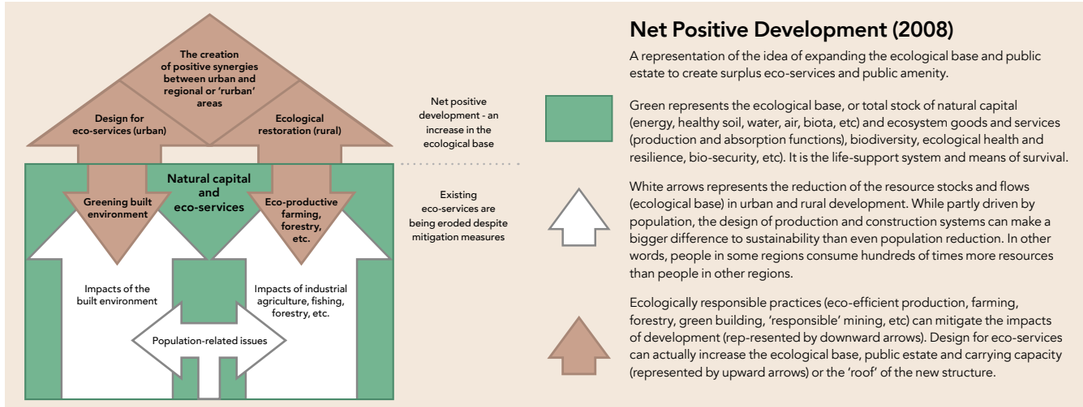
It is crucial that buildings compensate for the ecological damage caused by past development – which they suggest is only possible if ecology becomes an intrinsic part of a building's design and assessment. Dr Birkeland introduced the idea that buildings could be designed to support ecosystem functions and services (Birkeland, 2002). Building-integrated ecosystems can provide for the production of clean air, water, soil and many other public benefits of natural systems, while improving life quality and amenity (Birkeland, 2009). For example, take 'green scaffolding' – structures constructed around, between or inside existing buildings that support carefully-selected micro-habitats, ecosystem services and biodiversity. There is no simple one-size-fits-all approach. Each building is as unique as its setting. However, adaptable design ideas such as green scaffolding can be modified for many different contexts, functions and aesthetics.

Positive Development proposes fixed baselines to measure progress in lieu of current practices.

Dr Birkeland argues that each new construction should address social and economic deficiencies in the surrounding area and make positive environmental and community contributions. However, many sustainability issues are not yet considered in planning analyses, design guidelines or the assessment of the social and economic criteria (which cover everything from community engagement to stakeholder participation, recreational value, health and well-being etc.), and environmental criteria (which include microclimate, heat island effect, air quality etc.). Positive Development outlines new analyses to identify and design for sustainability gaps in the area. Big data analytics will allow more comprehensive planning analyses, but the issues that are now considered and mapped must be expanded. Net-positive sustainability will require a wholesale shift in the way the construction industry, city councils and designers think.

BIODIVERSITY OFFSETTING

'Offsetting' is a term that is becoming more widespread – the idea of using one (positive) action to compensate for another (negative). A common example is where airline companies allow you to pay extra



Net Positive Development (2008)

A representation of the idea of expanding the ecological base and public estate to create surplus eco-services and public amenity.

Green represents the ecological base, or total stock of natural capital (energy, healthy soil, water, air, biota, etc) and ecosystem goods and services (production and absorption functions), biodiversity, ecological health and resilience, bio-security, etc). It is the life-support system and means of survival.

White arrows represents the reduction of the resource stocks and flows (ecological base) in urban and rural development. While partly driven by population, the design of production and construction systems can make a bigger difference to sustainability than even population reduction. In other words, people in some regions consume hundreds of times more resources than people in other regions.

Ecologically responsible practices (eco-efficient production, farming, forestry, green building, 'responsible' mining, etc) can mitigate the impacts of development (rep-resented by downward arrows). Design for eco-services can actually increase the ecological base, public estate and carrying capacity (represented by upward arrows) or the 'roof' of the new structure.

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Positive Development would increase the 'positive' ecological footprint of nature.

Positive Development measures distance from sustainability instead of the distance from current unsustainable conditions and practices.

to offset the carbon footprint of your flight. Biodiversity offsets often include methods to make up for biodiversity losses caused by a development, such as regenerating degraded habitats or permanently reserving land in another location. In a 2016 paper, Dr Birkeland and her co-author Stephen Knight-Lenihan gave an example from the New Zealand Government's biodiversity offsetting legislation. Here, when one ecosystem has to be removed for a development, it is the developer's responsibility to restore another nearby habitat. Doing this might involve implementing improved land management practices and the removal of grazing animals, for example. However, such actions do not increase nature, only remediate it.

Dr Birkeland and Knight-Lenihan suggest that these current offsetting methods do not go far enough: "Phrases such as 'no net loss' of biodiversity in nature or 'net zero' ecological impacts in construction … only move the finish line closer to the starting gate." We should be aiming for a positive influence – not just a zero outcome. The authors highlight that our current attempts at sustainability are not enough to even balance the equation, let alone shore up some degree of resilience within the ecological system.

Even if every urbanised area was to put in place restorative measures such as these, they would not actually compensate for our past and present adverse effects on the natural environment. The 'ecological footprint' (the equivalent land and water area used in development) already exceeds the earth's regenerative capacity. Development should, therefore, compensate for a portion of the cumulative damage of development in general by, for example, increasing ecological space, carrying capacity and biodiversity. The positive development movement is the way forward: creating innovative design frameworks that put the life support system of the planet – its ecology – front and centre in the system.

ECO-POSITIVE GROWTH

There are many building regulations that set minimum health and safety standards, urban policy declarations that set aspirational targets, and building rating schemes that certify a building's performance – all of which Dr Birkeland believes fall well short. Earlier this year, Dr Birkeland published a paper challenging such standards and strategies, using two recent and important policy documents as examples. One states principles for urban development but these would not result in adequate changes to cities to reduce the impacts of natural disasters (fire, floods, cyclones, earthquakes, etc.), provide 'direct' access to basic needs, or address social problems such as economic and racial segregation. The other proposes urban biodiversity credits for development, but these would not increase net ecological carrying capacity or alter the nature of buildings. They assume that 'leaving things better than you find it' is good enough. Instead of measuring the distance from current unsustainable conditions and practices, Positive Development measures the distance to sustainability. It proposes various fixed baselines to measure progress, such as pre-industrial ecological conditions.

Despite the immense challenges, Dr Birkeland contends that eco-positive cities are attainable. Governments can at least ensure a basic standard of living, equal opportunity and long-term environmental security for all their citizens through built environment design standards. Cities offer a vast amount of vertical space that can be used to provide ecosystem services, public spaces and environmental amenities. Retrofitting (renovating) concepts such as green scaffolding, play gardens, retrofit modules and solar cores can contribute to multiple public benefits in urban areas. Urban ecosystem enclaves could also provide a hedge against ecological uncertainty and eventually be used to regenerate the bioregions. Dr Birkeland presents a Positive Development Test as basic criteria for development (Birkeland 2018).

The transformation can begin immediately by the eco-positive retrofitting of cities, because efficiencies in energy and water and reductions in health costs can pay for themselves in a few years and offset the sustainability measures (Birkeland, 2008). As Dr Birkeland says: "Sustainability requires not only disruptive innovations and radical worldviews, but the reformation of design and decision-making frameworks on ethics-based and eco-positive principles. Decision-making systems can make better choices, but only design can create more and better choices." It is time to change the goal posts of urban planning, decision making and design to go beyond aiming for "no harm" to aim for "net good".

Behind the Research

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Research Objectives

Dr Birkeland critiques 'sustainable development' concepts and tools as being about incremental improvements on a failed model of development. She outlines the necessary changes in systems of planning, decision making and design to enable net-positive outcomes.

Detail

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Bio

Before entering academia in Australia, Dr Birkeland was an architect, planner and lawyer in the USA. She chose these fields to gain insights into the barriers to ecological sustainability and social justice. Her PhD was Planning for Sustainability (1993) and books include Design for Sustainability (2002) and Positive Development (2008).

Collaborators

Dr Birkeland is associated with the Thrive Research Centre, University of Melbourne.

Personal Response

You mention the role of governments in ensuring a minimum quality and security of wellbeing. What steps would you like to see put in place at a government level to ensure that positive development becomes the design template for the future?

" Our systems of governance and decision making were designed before there was any real awareness of ecological issues, let alone natural resource limits. They underwrote resource allocation and conflict resolution processes that respected the rights of stakeholders. However, there can be no fairness among present and future generations without sustainability, including environmental equity, security and sound ecological foundations. The book *Positive Development* (2008) proposes a system of eco-governance that can address the ethical issues underlying sustainability. Currently, governmental reform is highly unlikely. However, existing legislation and rules could be tweaked to require development to have positive purposes and public benefits. "