

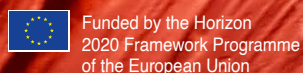
COST Action CA16114 RESTORE: REthinking Sustainability TOwards a Regenerative Economy,
Final Action Dissemination Publication

RESTORD 2030

A Regenerative Guide for
Educators Students and Practitioners

EDITORS

Martin Brown and Carlo Battisti



IMPRESSUM

RESTORE Final Action Dissemination Publication: RESTORD. A Regenerative Guide for Educators, Students and Practitioners.

RESTORE Chair Carlo Battisti (Eurac Research, Italy)
RESTORE Vice-Chair Martin Brown (Fairsnape, United Kingdom)
RESTORE Contributors Ann Vanner (UCLAN, UK)
Alison Watson (COYO, UK)
Blerta Vula (UBT Prinstina, KO)
Carlo Battisti (Eurac Research, I)
Giulia Sonetti, (Università di Torino, I)
Ivan Šulc (University of Zagreb, CR)
Zvi Weinstein (Tel Avi University, IS)
Giulia Peretti (Werner Sobek, Germany)
ISBN 978-3-9505018-0-3 (online)
ISBN 978-3-9505018-1-0 (printed)
urbanity - architecture, art, culture and communication, Vienna, 2021
Copyright RESTORE Action

COST Action CA16114 RESTORE: REthinking Sustainability TOwards a Regenerative Economy

Project Acronym RESTORE
Project Name REthinking Sustainability TOwards a Regenerative Economy
COST Action CA16114
Action Chair Carlo BATTISTI (Eurac Research)
Vice-Action Chair Martin BROWN (Fairsnape)
Scientific Representative Roberto LOLLINI (Eurac Research)
Grant Holder Manager Iliaria ALBERTI (Eurac Research)
STSM Manager Jelena BRAJKOVIĆ (University of Belgrade)
Training School Manager Dorin BEU (Romania Green Building Council)
Communication Manager Daniel Friedrich (Duale Hochschule Baden Württemberg Mosbach)
Grant Holder Institution Eurac Research
Institute for Renewable Energy
Viale Druso 1, Bolzano 39100, Italia
t +39 0471 055 611
Project Duration 2017 – 2021
Website www.eurestore.eu
COST Website www.cost.eu/COST_Actions/ca/CA16114
Graphic design Pluristamp / Eurac Research
Print Esperia Srl
Proofreading/Editing Antony Ross PRICE (Transap)

Citation: Brown, M., Battisti, C. et al. (2021). RESTORD. Regenerative Guide for Educators, Students and Practitioners. COST Action CA16114 RESTORE, printed by Eurac Research (Bolzano, IT).

Editors, authors and the COST office assume no responsibility for the contents of external websites referred to in this publication.

This publication is based upon work from COST Action RESTORE CA16114, supported by COST (European Cooperation in Science and Technology). COST (European Cooperation in Science and Technology) is a pan-European intergovernmental framework. Its mission is to enable break-through scientific and technological developments leading to new concepts and products and thereby contributes to strengthening Europe's research and innovation capacities. It is a space for researchers, engineers, and scholars for the joint development of their own ideas and to take new initiatives across all fields of science and technology, while promoting multi- and interdisciplinary approaches. COST aims to foster better integration of less research-intensive countries in the knowledge hubs of the European Research Area. The COST Association, an International not-for-profit Association under Belgian Law, integrates all management, governance and administrative functions necessary for the operation of the framework. The COST Association currently has 36 Member Countries. www.cost.eu



COST is supported by
the EU Framework
Programme Horizon
2020





REthinking Sustainability TOwards a Regenerative Economy

RESTORD 2030

A Regenerative Guide for Educators
Students and Practitioners

EDITORS

Martin Brown, Carlo Battisti.

CONTRIBUTORS

**Ann Vanner, Alison Watson, Blerta Vula,
Giulia Sonetti, Ivan Šulc,
Jelena Brajković, Zvi Weinstein.**



RESTORD 2030

To disseminate key RESTORE learning through education and awareness interventions based on the (re)imagination of a city (RESTORD) ten years into the future.

A guide for educators, students and practitioners.

TABLE OF CONTENTS

INTRODUCTION	11
PREFACE	13
PART ONE	
1.1 HOW TO USE THIS GUIDE	20
1.2 INTRODUCTION TO RESTORE	22
1.3 (RE)IMAGINING A FUTURE REGENERATIVE CITY - RESTORD	27
1.4 INTRODUCTION TO ECO LITERATURE AND THE BUILT ENVIRONMENT	29
1.5 CLIMATE AND ECOLOGY CRISIS AND THE BUILT ENVIRONMENT	34
1.6 MIND THE REGENERATIVE FUTURE	40
1.7 SIMPLIFYING THE LANGUAGE OF REGENERATIVE SUSTAINABILITY	50
1.8 AN INTRODUCTION TO THE SUSTAINABLE DEVELOPMENT GOALS.	52
1.9 AN INTRODUCTION TO REGENERATIVE SYSTEM THINKING	57
1.10 AN INTRODUCTION TO REGENERATIVE ECONOMICS	61
1.11 EDUCATING THE EDUCATORS	69
1.11.1 EDUCATION IN 2030 RESTORD	74
1.12 SCHOOL COLLABORATIVE ACTIVITY	76
1.13 STORYTELLING	79
PART TWO	
2.1 EDUCATION DOMAIN MATRIX	84
2.2 CLIMATE LITERACY	85
2.3 RESTORD REGENERATIVE GAMES AND EXERCISES	87
2.4 ARCHITECTURAL TECHNOLOGY - PRACTICAL CREATIVITY	90
2.5 FUTURESTORATIVE EDUCATION MODULE	92
PART THREE	
3.1 RESTORD RESOURCES: RESTORE ANIMATIONS	98
3.2 RESTORE RESOURCES: PUBLICATIONS	100
3.3 RESTORE RESOURCES: PAPERS	103
3.4 RESTORE TRAINING SCHOOLS	111
3.5 RESTORD NETWORKS	112
PART FOUR	
4.1 CONTRIBUTORS AND FURTHER SUPPORT	116

A monarch caterpillar with bright yellow-green segments, black stripes, and red spots is clinging to a brown plant stem. The stem is part of a larger plant with several green, unopened flower heads at the top. The background is a clear, bright blue sky.

What is ... is not always just-ice

Amanda Gorman, The Hill We Climb

RESTORE

{verb} to bring back to a state of health, soundness, and vigour.

RESTORD

{noun} a city that is socially just, ecologically robust and culturally rich.

INTRODUCTION

Martin Brown



*It's as if we can see the world we want to live in just over time's horizon;
the question is how do we get there?*

Robin Wall Kimmerer¹.

We are on the cusp of something regeneratively wonderful or something irreversibly disastrous. Use of the word 'regenerative' has seen a welcome resurgence, seemingly applied to everything, from farming to leadership, fashion, culture, economics and the built environment. RESTORE has addressed the two last-mentioned areas- Rethinking Sustainability towards a Regenerative Economy, in the context of the built environment.

It is not that regenerative thinking is new - it has been at the core of ecological thinking for decades, traced back to acclaimed and influential writers on nature and ecology such as Aldo Leopold, Rachel Carson and many others. Importantly, it has likewise been the foundation of many indigenous cultures since time immemorial.

Its current use reflects the urgency we now face as climate change and ecological breakdown become increasingly palpable. It represents a desire and a focused switch in mindset, away from the mechanistic, away from being only less bad, the common and dominant discourse, to one that is living and sees ourselves and the built environment as interactive parts of the beautiful and complex ecosystem web.

¹ Robin Wall Kimmerer, The Serviceberry, Economy of Abundance, Emergence Magazine, 2021, <https://emergencemagazine.org/story/the-serviceberry/>

Along with the increased use of the term 'regenerative' we have a changing narrative. And this is important, as it is narratives that define us and contribute, in turn, to how we define and shape our future. The future is not something that just happens to us, but it is something that we create. As Arundhati Roy² noted in April 2020, we need 'to imagine the future we want and be prepared to fight for it'.

Yet, unless we urgently address the level of ecological and climate literacy, and levels of climate awareness within all areas of education, we will not have the narratives, insights and knowledge to imagine our future, to recognize goodness and what it looks like and to be able to fight for it.

This book, a RESTORE FAD (Final Action Dissemination) serves as:

- 1.0 A regenerative guide for educators, students, and practitioners.
- 2.0 A dissemination 'portal' both reflecting and enhancing on RESTORE work with new reflections on education and awareness interventions.
- 3.0 A primer for the (re)imagination of a city ten years into the future.

WELCOME TO THE CITY OF RESTORD.

2 Arundhati Roy. Financial Times, April 2020, <https://www.ft.com/content/10d8f5e8-74eb-11ea-95fe-fcd274e920ca>

PREFACE

Michelle Holliday



This beautiful article is kindly reprinted as a preface to RESTORD FAD with the permission of Michelle Holliday who appeared as a guest speaker on Zoom Regenerative³ in May 2020. It was first posted on her blog⁴ ‘Love Letter to Those Who Shape our World’.

ARCHITECTS AS ACTIVISTS: A LOVE LETTER TO THOSE WHO SHAPE OUR WORLD

I have this strange occupational hazard in which I fall in love a little with whatever group I am serving, even if the encounter is brief – even, I’m discovering, if the interaction is separated by monitors and keyboards within the constraints of social distancing. This is how I find myself thinking longingly of people who work in “the built environment” – architects, lighting designers, landscape architects, green building consultants, urban planners. Those who shape the spaces in which we live and work and love and play. In my occupationally induced infatuation, **my greatest wish is always that these people – and the world – should see them as I do: essential to this moment, uniquely capable of contributing some vital aspects of a more thrivable world.**

This latest tryst was exceedingly innocuous: an invitation to speak to a built environment group for 15 minutes over Zoom. That’s all. It wasn’t even an exclusive thing: there were two other speakers on the hour-long call. And yet, here I am. Smitten.

Perhaps you’ll understand once you see what I see.

3 Information on Zoom Regenerative, a global forum for learning and sharing, is available at: Zoom Regen | Fairsnape, <https://fairsnape.com/zoom-regen/>

4 Michelle Holliday Blog: <https://michelleholliday.com/architects-as-activists-a-love-letter-to-those-who-shape-our-world/>

The encounter started like so many others. In my standard courting ritual, I shared my belief that all of society's ills can be traced back to the dominant worldview, which tells us that everything in life operates like a machine. Within this story, we are all separate from each other and from nature. We exist to compete and consume. And our sole purpose is productivity and profitability. Output above all, and at any cost.

This mechanistic view has shaped every aspect of our lives, from how we learn to what we eat and how we care for ourselves and each other. And in all of these, the built environment has played an outsized role, too often funnelling us into boxy, lifeless buildings and toxic workplaces, crowded with cubicles and reeking of noxious chemicals. Beyond the four walls of our structures, we are similarly left with depleted, monoculture landscapes and soulless places – what my husband calls the United States of Generica. Winston Churchill famously cautioned that “We shape our buildings and thereafter they shape us.”

Fortunately, as in so many spheres of our lives, there are sprouts of aliveness and hope poking through that barren scene. There are signs that a more life-aligned story is emerging. From the built environment, these are the examples I shared on the Zoom call:

- As early as the 1970s, visionary architect Christopher Alexander pointed out that “the mechanistic view always makes us miss the essential thing.”⁵ Over multiple volumes of work, he has offered guidance for enabling a greater sense and experience of aliveness in our spaces and places. “All space and matter, organic or inorganic, has some degree of life in it,” he advised, “and matter/space is more alive or less alive according to its structure and arrangement.”
- More recently, social ecology professor Stephen Kellert pioneered the field of **biophilic design**, an “architecture of life” that promotes improved health and wellbeing by creating connections between people and nature in the built environment. This connection, he wrote⁶ in 1993, includes “a human craving for aesthetic, intellectual, cognitive, and even spiritual meaning and satisfaction.”
- Launched in 2006, the Living Building Challenge⁷ is an international certification that consists of seven categories: place, water, energy, health + happiness, materials, equity and beauty. “The Challenge is successful,” writes⁸ founder Jason F. McLennan, “because it satisfies our left-brain craving for order and thresholds and our right-brain intuition that the focus needs to be on our relationship and understanding of the whole of life.”
- The field of **regenerative design and development**, that the Regenes Group⁹ has advanced most over the past two decades, views architecture as “the process of building life.” “[Built spaces] either diminish the conditions for life,” asserts Regenes principal Bill Reed, “or [they] create a positive framework for engagement and relationships upon which life builds and regenerates.”

Each of these philosophies and approaches aligns with my own understanding of what is needed and what is emerging in every field and every sector of society. In my work, I refer to it as “thrivability,” the explicit intention and ongoing practice of creating the fertile conditions for life to thrive at every level: for individual people, for organizations as ecosystems, for community, for the biosphere.

Whatever you choose to call it, more and more of us are recognizing that this “intention and practice” is no longer optional, if ever it was. If we don't get clearly focused on enabling life to thrive, then we'll continue to fall catastrophically short of that goal. And there is plenty of evidence of our precarious position in this regard. As I say in my book, *The Age of Thrivability*:¹⁰

5 Alexander, C. (2002). *The Nature of Order, An Essay on the Art of Building and The Nature of the Universe*, Vol. 1, The Phenomenon of Life. The Center for Environmental Structure, Berkeley, California 2002, ISBN:0-9726529-1-4, 476 pp.

6 Stephen Kellert <https://environment.yale.edu/news/article/remembering-stephen-kellert-longtime-professor-of-social-ecology/>

7 Living Building Challenge <https://living-future.org/lbc/>

8 Jason F. McLennan https://arquiculture.files.wordpress.com/2013/11/130502_tt17_spring13-jason.pdf

9 Regenes Group <https://regenesgroup.com>

10 Holliday, M. (2016). *The Age of Thrivability: Vital Perspectives and Practices for a Better World*. Cambium. 2016. ISBN-13:978-0-9952759-0-4

"[T]he hope is that we will be able to move forward more intentionally and quickly to the wiser, more life-honoring perspectives that characterize the emerging era, so that we may solve our most pressing environmental and social problems in time to avert the unthinkable."

With this in mind, my message to those on the Zoom call – and to all who work in the built environment – was that **the explicit purpose of your work must be to craft and cultivate the fertile conditions for life to thrive.**

And certainly, this intention must include sustainable materials, efficient use of resources and inspiring physical design.

But your contribution goes well beyond that. If we shape our buildings and thereafter they shape us, the starting point is how we shape the intention and process of design. And therein lies the most potent point of influence. This is where we start to see that **you are in a special role in all of human civilization.** The architect, the urban planner, the designer all bring people together in community and creative conversation about what is important, what is valuable, what is possible. With each project, you have an opportunity to invite people to reflect on how they engage with each other and their place and their collective potential. You are in a position to help people to see themselves and their story – as it is and as it could be.

Indeed, **you have the power to shape your every project as a practice ground for a more thrivable world.** As a dojo for the skill of discerning what generates more aliveness, more energy, more thrivability. As a time and space dedicated to the practice of stewarding life, leaving everyone involved wiser and more nourished, capable and connected.

What I shared with the built environment Zoom group is that if we are to act as stewards of life, we have to know what that involves. Christopher Alexander¹¹ advised that "we must first learn how to discover patterns which are deep, and capable of generating life." Drawing on the patterns he outlined, along with many other disciplines, I have found that organizations and communities exhibit a core set of characteristics common to all living systems – what I think of as. "Whether it is your body, a rainforest, an organization, or a community, these are the "fertile conditions" that must be cultivated if the living system is to thrive:

1. Divergent Parts: In every living system, there are individual parts, each with an urge for self-expression and contribution.

2. A Pattern of Relationship: The divergent parts are connected and supported in patterns of responsive relationship with each other and with context.

3. A Convergent Whole: The divergent parts come together in relationship to form a convergent whole with new, emergent characteristics and capabilities. In human communities, convergence is enabled and supported by shared purpose and identity – by shared story, most powerful when it is rooted in place.

4. Self-Integration: The entire process is self-organizing, animated and set elegantly into motion by the spark and spirit of life itself.

When these fertile conditions are cultivated in a coherent way, the result is more aliveness – and more capability – within the space and in the community of people connected to it. As Alexander observed: "The more living patterns there are in a place – a room, a building, or a town – the more it comes to life as an entirety, the more it glows, the more it has that self-maintaining fire which is the quality without a name."¹²

11 Alexander C. (1977). *A Pattern Language: Towns, Buildings, Construction.*, Oxford University Press. 1216 pp. ISBN13: 9780195019193

12 https://www.brainyquote.com/quotes/christopher_alexander_417056

So, as you shape the intention and process that lead to design – as you craft your project as practice ground for a more thrivable world – these are the types of questions you might ask as a means of exploring those four fertile conditions:

1. What more could it mean for each of us, individually, to be able to bring the best of ourselves? To feel deeply at home in this place, in this structure, in this work and in our own bodies? And what could support that?
2. What more could it mean for our infrastructure and interactions to support not only information sharing, decision-making, effective action and trust but playfulness, learning and joy? For our patterns of belonging with colleagues, customers and community to be infused with a sense of dedication, earnestness, perhaps even sacredness? And what could support that?
3. What are we called to express and create together, in service of life? What more do we understand at this moment in time about the calling or purpose—the emergent, unifying story—that propels us into transformative action together, as citizens, employees, customers, community members in this place? What is the wisdom that is needed now?
4. What would bring the most life to this process and this project? How can we be inspired, nourished, renewed and even surprised by nature, beauty, art, music, movement and celebration? How can we allow life to flow through us so that we can truly savour this experience of being alive?

If we are to reshape the world, the starting point is reshaping the purpose of our work, expanding it to suit the needs of this moment, each in our own way and within our own context. This subtle form of activism takes courage. But the situation we face demands nothing less. We need all hands on deck – and, even more, all hearts.

MY HEART IS WITH YOU.



PART ONE
A RESTORD Awareness

1.1 HOW TO USE THIS GUIDE

Martin Brown



This book, a guide for educators, students and practitioners, will be of interest to teachers in primary and secondary education, to lecturers and teachers in university education and those involved with delivering sustainability courses, and workshops, including continuous professional development for (planning, design, construction, facilities management) practitioners.

This book aims to inspire users to create new and enhance existing sustainability modules with a regenerative climate and ecological focus. It is pinned on the need for us to understand what good looks like and to imagine a regenerative future, and then to identify the steps that will move us towards that goal.

Downloading the publications from RESTORE¹³ for referencing purposes is strongly recommended.

Part One contains a selection of new thoughtful articles on education and awareness interventions based on, and enhancing the work from RESTORE publications, relating to the need for a new mindset and a narrative for a regenerative future.

Part Two provides insights into what modules are available through RESTORE members and the wider regenerative fraternity.

Part Three provides a reference portal into the myriad publications, presentations, articles, papers, videos and more from the four years of the RESTORE action.

Part Four provides a listing with details of the authors and contributors who can be contacted to facilitate elements of regenerative focused education and to give relevant advice on those themes.

The booklet is also structured to enable users to focus on the levels of education with which they are concerned, mapped against core areas of regenerative sustainability:

¹³ See section 3.2 of this book.

Levels	< >	Regenerative Themes
Primary		Climate Literacy
Secondary		Carbon
Further Education		Ecology
Trade Education		Place
Undergraduate / Masters		Economics
Research		Social
Design Practice		Scale Jumping
Construction		System Thinking
Operation		
Community		

1.2 INTRODUCTION TO RESTORE

Martin Brown and Carlo Battisti



Rethinking Sustainability TOwards a Regenerative Economy

Introduction. Over four years, over 160 members from over 40 countries in 5 working groups, have produced 6 publications, many papers and articles, together with countless presentations.



Fig. 1: Geography of RESTORE Participation Network.

We now ask, what then is the legacy of the action that set out to Rethink Sustainability and that set the agenda for a Regenerative Economy in the Built Environment.

The volume of outputs will undoubtedly inspire and encourage other individuals, and academic and business organizations alike, serving as a road map, from Sustainability to Restorative to Regenerative, seeking to move towards a socially just, ecologically sound and culturally rich future.

As noted in *FutuREstorative*¹⁴ one of the regenerative responsibilities of any organization or project must be to proactively inspire the next generation, the next project, (the next action, paper) to reach higher, and to be bolder and braver.

Yet, we have lost the capability and capacity to think outside of our boxes, we are losing the skill to imagine what a future could look like. And as Rob Hopkins notes in *From What Is to What If*¹⁵ - if we cannot imagine a future, based on what we think good should look like, then we will have great difficulty in getting there. If we knew

14 Brown, M. (2016). *FutuREstorative: Working Towards a New Sustainability*. RIBA Publishing. ISBN-13 9781859466308

15 Hopkins, R. (2019). *From What Is to What If: Unleashing the Power of Imagination to Create the Future We Want*. Chelsea Green Publishing. ISBN-13: 9781603589055.

where 'there' was things might be different or as the old saying goes, if we do not know where we are going then any road will get us there.

RESTORE

Rethinking Sustainability Towards a Regenerative Economy

The RESTORE COST Action set out to affect a paradigm shift towards restorative sustainability for new and existing buildings and space design across Europe. Despite over a decade of built environment sustainability strategies and programs based on climate change targets of capping global warming to 2° C, progress has failed to address key sustainability issues in a meaningful way. With the Paris 2015 Agreement of targeting global warming at 1.5 °C, the sector no longer has the luxury of being incrementally less bad: it requires an urgent shift to net-positive, restorative sustainability thinking.

The built environment is a pivotal part of the climate change problem, heavily contributing to an impact of 40% on energy and water, carbon, and waste. It is also a key in climate change solutions, not only reducing, but also creating net-positive impacts. Research is demonstrating that built environment impacts per annum account for 12% of water, 39% of CO₂, 65% of waste, and 71% of energy consumption and the potential improvements of green building are estimated at 24-50% for energy, 33-39% for CO₂ emissions, 40% for water and 70% for waste.

The RESTORE Action addressed the creation, advocacy, dissemination and implementation of research evidence that can inform restorative sustainability practice within the built environment on health, wellbeing, energy, resource use, biophilia and links to ecosystems on multiple scales.

The aims of the RESTORE Action are as follows:

- To increase knowledge, collaboration and timely knowledge transfer between research centres, universities, education entities, companies, NGOs, and industrial sectors related to the built environment.
- To promote the pre-development of new compulsory design approaches, processes and technologies that can build and improve upon existing best practice.
- To create and to reinforce a European network of skilled professionals (architects, engineers, constructors, urban planners, academics, sustainability practitioners, *etc.*) capable of facing up to the complexity of a broader agenda of environmental strategies.
- To foster continued collaboration beyond the completion of the RESTORE action. The network members are agents for change.
- To work towards the inclusion of Restorative sustainability criteria within education curricula, thus preparing the next generation of building practitioners.

Founded on multidisciplinary research collaborations, RESTORE seeks to stimulate a major academic research focus on Restorative approaches to design.

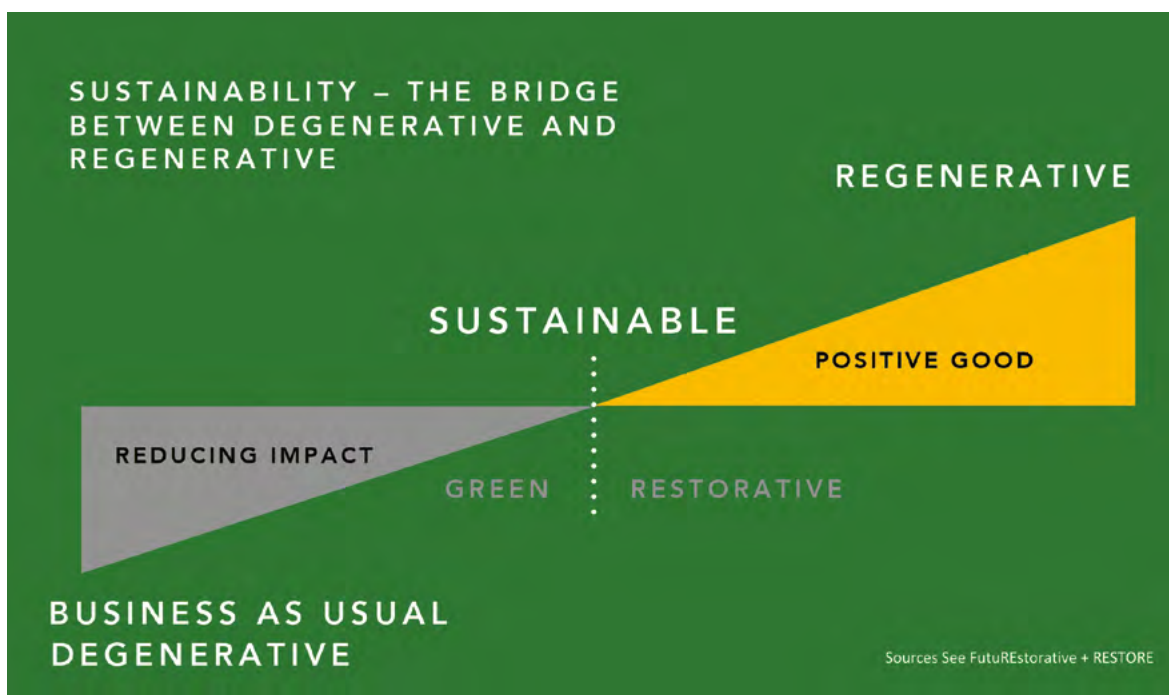


Fig. 2: Sustainability – The Bridge Between Being Degenerative or Regenerative.

“What is ... is not always just-ice”¹⁶

One powerful legacy of RESTORE is the concept of SEVA and that progress towards a regenerative future is dependent on the correct worldview mindset.

Regenerative thinking, the SEVA mindset promoted through RESTORE, is focused on developing capacity and capability for systems evolution. It is not about sustainability that maintains what is or that seeks to restore something to what it once was, by only reducing impacts. Rather, it is about creating systems (places, buildings, communities, organizations) that have the capacity to evolve toward states of health that thrive over time. The first four RESTORE working groups and their publications, papers and outputs have demonstrated that we have the tools, the metrics, the approaches, and the solutions for a symbiotic Human Nature Built Environment relationship (Cost RESTORE, 2020). What we arguably lack in our mindset is the jump in scale that is to be applied. The mindset scale jump to where nature is seen as both a stakeholder and mentor is for some a big scale jump, but one of necessity. The degenerative discourse and path we are on are too dominant. (Brown, 2020).

In the final WG5 Book, a collection of perspective papers, articles, and thoughtful pieces from the WG5 Sub-group looking at the Human-Nature-Built Environment nexus have demonstrated how new regenerative paradigms can be applied, not in competition with or in opposition to the current paradigms, but to be so obvious, so rewarding and effective that the old ways of doing things become redundant. Within the context of buildings and cities, we draw from the definitions of WG1 and, in particular, we scale jump the definition of the regenerative building, as the key concept, that regenerative buildings exist to enable all life to thrive.

¹⁶ Amanda Gorman, The Hill We Climb, President Biden Inauguration, January 2021

Behaviour theory notes that for change and tipping points to occur, we need to reset the conditions to enable the regenerative paradigm to become easy, commonplace and rewarding. To do so, the effective application of the tools, the methodologies, and the approaches are vital within this process that RESTORE has to date set out.

Education

One of the key triggers identified at the outset of RESTORE, primarily in WG1 and echoed throughout its other working groups is the need for education. Education and awareness for all ages within the education system and for this purpose in practice.

Over the four years of RESTORE, we have seen the emergence and declaration of Climate and Ecological Emergencies. Communities, businesses, advocacy groups, local authorities, cities, and countries have made declarations. And contained in all these fine words is a pressing need for greater awareness. It is hardly surprising then to see that Climate Literacy must be established as a key need.

Our RESTORD FAD focuses on both aspects - of increasing our climate awareness through dissemination guides for education and training with the focus on imagining a city ten years into the future: a truly powerful legacy.

People

Over the four years, we have seen action members and those engaged with RESTORE develop and mature sustainability thinking from degenerative business-as-usual sustainability, into a powerful regenerative approach towards the built environment.

This movement has been fostered by the many STSMs that have seen members learn to develop skills around Europe and beyond.

- The wonderful paper and articles produced for leading sustainability journals
- Powerful and inspiring dissemination events around the world
- Commitment through carefully considered and passionate contributions to RESTORE main publications (WG1, 2, 3, 4, 5, RESTORY, RESTORD and Final Book).¹⁷

Aside from the outputs, wonderful friendships, collaborative partnerships, academic and business opportunities have arisen, and flowed throughout the RESTORE Community. The test of the legacy will be to see this community of practice continue and thrive.

Perhaps a lasting legacy is that the collective work of RESTORE will significantly move us towards a built environment that is socially just, ecologically sound and culturally rich.

Scale Jumping

We are on the cusp of a transition to a new paradigm and a new era of regenerative sustainability, driven by a number of factors including the deepening acceptance of contributions from the built environment to our climatic and ecological crisis, both as a problem and as a solution, against a menacing scenery of living for some years with Coronavirus.

The application of complexity theory thinking and distilling the pattern of interventions down to three simple rules provides a simple but vital set of rules for Scale Jumping towards a regenerative built environment.

¹⁷ Cost RESTORE <https://www.eurestore.eu/publications-and-articles/>

RESTORE
Core actions towards a Regenerative Future

DECARBONIZE EVERYTHING within the built environment,

HEAL THE FUTURE repair past damage, enable ecosystems to thrive through a connection with nature and the SEVA mindset,

CLIMATE + ECOLOGY LITERACY improve the awareness and knowledge of climate and ecology throughout all aspects and sectors of the built environment, on a par with language and cost literacy.

Source: WG5¹⁶

1.3 (RE)IMAGINING A FUTURE REGENERATIVE CITY - RESTORD

Martin Brown



Fig. 3: RESTORD 2030 – City of Human Nature and Built Environment Patterns. Source WG5.¹⁶

Context: If we are unable to imagine what good looks like, what future cities we are working to bring about will feel like, the path we tread towards those aims will hardly be clear. Here, a future city, RESTORD 2030, is imagined, in which learning, work and ideas from the RESTORE Action are applied. First written for our online workshop exercises in April 2020, it is included here to spark ideas and fire your imagination of our future city.

RESTORD is a vibrant small to medium sea board city, at the foot of the Central Mountains with a Mid-European climate. It has a population of 102,000.

RESTORD embraced regenerative economic thinking to shape the city and some thought has also been given to the challenges that the 2020 Novel Corona virus Covid-19 and its variants present. The city is now an exemplary proposal for human, nature and built-environment synergy. It is a city that is socially just, ecologically robust and culturally rich.

The approach of the imaginary politicians, planners and city council officials is inspired by the work of the EU Cost Action RESTORE and the publications from its 5 working groups. It embraces regenerative principles and definitions, mandatory regenerative design, construction, the operation of its services and technologies and successfully scale jumped into an exemplary regenerative city. It embraced, and adapted, regenerative programmes such as the Living Building Challenge, Well Build Standard, One Planet Living and Building with Nature.

It has been and remains an inspirational theme for research, student tours, business case studies, conferences and workshops.

RESTORD 2030 is founded on patterns that now govern development and infrastructure. The patterns, referred to as the 'leaves' (of a tree), represent the growth of the city and its health. The leaves are based on system thinking and are fractal, each complementing and supporting the other patterns, never limiting or

over shadowing other each, and left to emerge organically (as in the natural canopies of trees spaced out along a boulevard).

The regenerative economic approaches of RESTORD and its growth emerged from the application and adoption of the Sustainable Development Goals,¹⁸ Preston Model¹⁹ localism and Doughnut Economics²⁰ over the decade up until 2010, never exceeding the 'planetary' capacity ceiling of the city, or falling below its social threshold. However, its application was only possible through regenerative leadership and city-wide regenerative culture.

Seeking to develop closer connectivity with nature, in a move to avoid pre-Covid-19 disconnected health, biodiversity and productivity issues, RESTORD's relationship with nature can be described as SEVA, *doing the right things because it is the right thing to do*, and firmly based on Barry Commoners' 4 Laws of Ecology,²¹ with a biophilic human-nature centric symbiosis driving much of the thought processes behind the city. Education and re-training for all was key in moving RESTORD rapidly out from the Covid-19 shutdown. Climate, Ecology and importantly Eco-Economic literacy was a mandatory curriculum subject for schools, universities and business alike

A Just²² city, RESTORD is proud of its equity, its heritage, stories, memories and 'Sense of Place' that are reflected across the city's buildings, infrastructure and public places through its storytelling programme. RESTORD is a healthy city. Emerging from the Covid-19 pandemic, many streets and highways are re-designed and repurposed for human powered access, on foot and by bicycle, to address both health and air quality. Public places and parks are re-purposed as health and social gathering venues, respecting social distancing, thereby enabling cafés, restaurants and health businesses to thrive after their swift re-opening in 2021.

RESTORD 2030 introduced the concept of 15-minute cities in 2021 and in 2023 the entire city is redesigned as a set of interconnected 15-minute districts, thinking globally and acting locally, where all of life is close at hand for residents, with both green and multi-use spaces.

In 2023, RESTORD is recognized as a National City Park with green interconnected spaces, cultural richness and a thriving social fabric. Around the same time, the process of granting legal rights to natural features is initiated, including the rewilded River Rest that flows through the city, and citizens' rights for natures' pollinators. RESTORD's natural environment is celebrated through a calendar of special days focusing attention on reciprocal relationships between the city's inhabitants with its vibrant ecology.

RESTORD embraces the nexus and the balance between the built environment, health and food production, with all buildings now mandatory urban agriculture producers.

RESTORD's green spaces assume many different forms, from homes covered in wall plants to larger buildings with living walls, miniature connected urban forests replace concrete public and private spaces and urban farms proliferate.

Shaping the growth of RESTORD is the smart grid of interconnected building data, driving and in turn informing its digital twin that combines the data-scape of technical, spatial, ecological and health.

RESTORD's regenerative economic, social and in particular ecologically robust approaches have allowed it to successfully weather the various novel Corona virus pandemics of the 2020s.

THIS THEN IS RESTORD 2030.

18 Sustainable Development Goals <https://sdgs.un.org/goals>

19 Preston Model <https://cles.org.uk/tag/the-preston-model/>

20 Doughnut Economics <https://doughnuteconomics.org>

21 Barry Commoners' 4 Laws of Ecology in 1971 The Closing Circle.

22 JUST <https://living-future.org/just/>

1.4 INTRODUCTION TO ECO LITERATURE AND THE BUILT ENVIRONMENT

Giulia Sonetti and Martin Brown



Context: We can trace the thinking, philosophies and shaping of the desirable futures through literature, enabling us to stand on the shoulders of giants and to reach new heights, in thinking and actions. Here we explore some of the main efforts of educational theories and practice that are necessary to construct a sustainable future. But “whose future?” and through what intellectual and embodied processes can we create useful knowledge on likely, possible and desirable futures?

The mind needs not filling like a jar, but only kindling like wood

(οὐ γὰρ ὡς ἀγγεῖον ὁ νοῦς ἀποπληρώσεως ἀλλ' ὑπεκκαύματος μόνον ὥσπερ ὕλη δεῖται)

Plutarch, “On the right way of listening”, 48C4f.

Within the broader background of the Anthropocene, the geological period during which human activities were the dominant driver in the continued development of Earth’s biosphere, the future of sustainability education is an urgent issue. Complexity, uncertainty, and ‘accelerating change’ define our current ecological moment (Wals & Corcoran 2014).

Not only are we experiencing rapid technological change, now exacerbated by hyper-connectivity, social change, and hyper-migration, in part as a result of global climate change, but we are also witnessing rapid ecological decline. We are essentially in the midst of a global structural dysfunction (Lotz-Sisitka *et al.*, 2016).

Humans are suffering from a lack of location, identity, psychic numbing, and a loss of agency, to say nothing of the effects suffered by the non-human world of plants, animals, and other living beings. One issue for educators and others trying to restore some quiet harmony, sense, and belonging in our existential search on this planet is whether we will obstruct, rather than help their efforts to reflect upon and to re-think the future. Will we reassume the long run, which seems to be spinning out of control? Global learning (Wals, 2007), young people's engagement in sustainable development (Corcoran & Osano, 2009), learning for sustainability in times of accelerating change (Wals & Corcoran, 2012), and intergenerational learning, and intergenerational learning and transformative leadership for sustainable futures (Corcoran & Hollingshead, 2014) have all been discussed by the United Nations Decade of Education for Sustainable Development (2005-2014).

Throughout the last century or so, there have been acclaimed and revered authors and books that have moved our thinking away from our 'tyrannical dominion' over nature (R. Burns) to today's regenerative discourse.

The influence of literature and its authors is significant, from John Muir sleeping wild with Roosevelt leading to the formation of the US National Parks, from the influence of Rachel Carson on the anti-DDT campaign of the 1970s to the start of the environmental movement we know today.

At the heart of most, if not all eco-literature is our relationship with nature, with land, either directly as individual humans or through our industrial and societal development, through energy, transport, communications and the built environment.

Sustainability education could be in essence, what Ingold is arguing for an indigenous evolutionary theory (based on his field work with the Sami), where his anthropology has evolved from recording and recognizing indigenous worldviews to accepting them as a way of learning and being in the world. Indeed, Ingold stressed how current sustainability formulations are focused on the premise that the "entire Planet is a standing reserve," and that we must protect the Earth in the same way that a business protects its income. He drew attention to the implicit corporate or management jargon in these sustainability terms, and how this is also true for conservation organizations.

Teachers may, for example, use multi-racial and multicultural examples to overcome the risk of implicit Westernised viewpoints, highlighting general values and ideas and the contributions of people from various ethnic groups to our common awareness and quality of life. Teachers in education must build a repertoire of culturally diverse examples, as well as the skills and confidence to use them fluidly and consistently in the classroom. The ways in which educators and students communicate, how discipline is promoted, and the types of views and actions that are validated in the classroom all contribute to the transmission of values and attitudes toward sustainability.

Bearing in mind the caveat of different narratives, a list of recommended reading is offered below, encompassing a number of writing genres, from Thoreau's *Walden* in 1852 with a minimalist 'living in the woods' philosophy, to Bill Gates in 2021 on saving the planet through technology. The listing is not exhaustive by any means but represents a good overview and starting point.

On reading these, and others, we need to be asking ourselves,

- what the message was, and has that message been or is it being heard?
- what influenced these writers?
- what was missing, are there flaws in their reasoning?

And, if you were to write an article, a publication or a book - what would your central plot and message be and who would you choose to be your heroes and villains.

*“Teach the student to see the land, understand what he sees
and enjoy what he understands”*

Aldo Leopold. Sand County Almanac. (quote used as the vision for the first RESTORE training school in Lancaster in 2017)

Reading List

Land

Sand County Almanac, Leopold, A., Oxford University Press, US, 1949. ISBN-10 019500 Recognised as a classic publication on land ecology.

Walden, Thoreau, H.D., Princeton University Press, 1852. ISBN-10 0691096120
Classic work on environmental and conservation philosophy.

Landmarks. Macfarlane, R., Hamilton, 2015. ISBN-10 0241967872. Why language and words are important to understanding our relationship with nature and landscapes.

Braiding Sweetgrass. Wall-Kimmerer, R., The Penguin Press. 2013. ISBN-10 1571313567.

Omnivore's Dilemma: A Natural History of Four Meals. Michael Pollan. The Penguin Press 2016. ISBN-10 978159420083.

Nature

Biomimicry: Innovation Inspired by Nature. Benyus, J. & William M., 1998. Paperback ISBN-10 0060533226 Has become a, if not *the* classic reference book for biomimicry.

Biophilia – Wilson, E.O., Harvard University Press, 2009. ISBN-10 0674074424 Part autobiographical and personal, Wilson's introduction to the love and relationship with nature that is known as biophilia.

Feral - Rewilding the Land, the Sea and Human Life. Monbiot, G., Allen Lane, 2013.

ISBN-10 0670067172 Inspiration for restorative and regenerative environmentalism and conservatism.

Wilding: The Return of Nature to a British Farm, Tree, I., Picador, 2018. ISBN-13 978-1509805099.

Education

Last Child in the Woods: Saving our Children from Nature-Deficit Disorder. Louv, R., Algonquin Books, 2005. ISBN-10 1565125223. Why we need biophilia in our and our children's everyday lives.

Young Children and the Environment

Early Education for Sustainability. Cambridge University Press. 2012. ISBN 978052173612. Julie Davis tackles one of the biggest contemporary issues of our times - the changing environment - and demonstrates how early education can contribute to sustainable living. An essential text for students in early childhood education and a practical resource for childcare practitioners and primary school teachers.

Capacity building for transformational leadership and transdisciplinarity. Barth, Matthias; Bruhn, Andrea; Lam, David; Bergmann, Matthias; Lang, Daniel J.

In: GAIA - Ecological Perspectives for Science and Societa. Vol. 29(3):195-197.

The Perception of the Environment.

Essays on Livelihood, Dwelling and Skill. Tim Ingold. Routledge. 2000. ISBN-10 0415617472.

Envisioning futures for environmental and sustainability education. Peter Blaze Corcoran, Joseph P. Weakland and Arjen E.J. Wals (Eds.). Wageningen Academic Publishers. 2017. ISBN: 978-90-8686-303-7.

Community

From What If to What Is. Unleashing the Power of Imagination to Create the Future We Want.

Hopkins, R., Green Books. 2020. ISBN-13 9781603589055. A call to action to reclaim and unleash our collective imagination, told through the stories of individuals and communities around the world who are doing it now, as we speak, and witnessing often rapid and dramatic change for the better.

Soil and Soul, People and Corporate Power. McIntosh, A., Aurimi Press. 2004. ISBN-13 9781854109422. In the face of the torrent of information on environmental catastrophes Alastair McIntosh shows how it is still possible for individuals and communities to take on the might of corporate power and emerge victorious.

(Recent) Non-Fiction

The Overstory. Powers, R. W.W. Norton & Company. 2019. ISBN-13 9780393356687. A sweeping, impassioned work of activism and resistance that is also a stunning evocation of - and paean to - the natural world.

The New Wilderness, Cook. D. Harper. 2020. ISBN-13 9780062333131. explores a mother-daughter relationship in a world ravaged by climate change and overpopulation

The Ministry for the Future. Kim Stanley Robinson. Orbit. 2020. ISBN-13 9780316300131. A near-future novel that is a gripping exploration of climate change, technology, politics, and the human behaviours that drive these forces.

Nature

Biomimicry: Innovation Inspired by Nature, Benyus, J., William Morrow, 1998. Paperback ISBN-10 0060533226

Has become a, if not *the* classic reference book for biomimicry.

Biophilia, Wilson, E. O., Harvard University Press, 2009. ISBN-10 0674074424 Part autobiographical and personal, Wilson's introduction to the love and relationship with nature that is known as biophilia.

Feral - Rewilding the Land, the Sea and Human Life, Monbiot, G., Allen Lane, 2013.

ISBN-10 0670067172 Inspiration for restorative and regenerative environmentalism and conservatism.

Wilding - The return of nature to a British farm. Tree, I., Picador, 2018. ISBN 10-1509805109.

Outdoors

Let my people go Surfing. Chouinard, Y., Patagonia Books, Penguin Books, 2016. ISBN-10 0143037838. Three books in one, biography, sustainability philosophy and business pragmatics of Yvon Chouinard, the founder of Patagonia.

The Living Mountain, A Celebration of the Cairngorms. 4 Vol. Shepherd, N. ISBN-10 0857861832. A lifetime in search of the 'essential nature' of the Cairngorms; classic meditation on the magnificence of mountains, and on our imaginative relationship with the wild world around us.

Business

Confessions of a Radical Industrialist: How My Company and I Transformed Our Purpose, Sparked Innovation, and Grew Profits – By Respecting the Earth. Anderson, R. C. and R. White, McClelland & Stewart, 2009. ISBN-10 0771007531 The guide that shaped and continues to inspire the values and ethos of Interface Inc.

Cradle to Cradle - Remaking the Way We Make Things. Braggart, M., and McDonough, W., North Point Press, 2002.

ISBN-10 0865475873 Ground breaking circular-economy thinking, challenging the way we make and dispose of things.

The Tipping Point: How Little Things Can Make a Big Difference. Gladwell, M., Back Bay Books, 2000. ISBN-10

031634662 Fascinating read on the business perspective of tipping points.

Small is Beautiful: Economics as if People Mattered. E.F. Schumacher. Blond and Briggs. 1973. ISBN-10 0060916303.

Climate

Silent Spring – Carson, R., Mariner Books, 1962. ISBN-10 0618249060 The book that triggered the 1960s environmental protest movement.

This Changes Everything: Capitalism vs. the Climate - Klein, N., Simon & Schuster, 2014. ISBN-10 1451697384 How capitalism and our economic structures are at the root cause of climate change.

Uninhabitable Earth - David Wallace-Wells D

2019. A meditation on the devastation we have brought upon ourselves and an impassioned call to action.

How to Avoid a Climate Disaster, The Solutions We Have and the Breakthroughs We Need. Gates, B. Knopf Publishing Group. 2020. ISBN-13 9780385546133. A wide-ranging, practical - and accessible - plan for how the world can achieve zero greenhouse gas emissions in time to avoid a climate catastrophe

Regenerative

FutuREstorative. Working towards a new sustainability. Martin Brown, M. Riba Publishing. 2016. ISBN-13 978-1859466308.

Regenerative Business. Sandford, C., Nicholas Brealey Publishing. 2017. ISBN-13 9781473669109.

Doughnut Economics. Raworth, K., Random House. 2017. ISBN-10 1847941370.

Designing Regenerative Cultures. Daniel Christian Wahl (plus his blog: <https://medium.com/age-of-awareness/education-for-meaningful-sustainability-and-regeneration-418941dd4c25>). Triarchy Press. 2016. ISBN-13 9781909470774.

Transformational Thoughts. Radical Ideas to Remake the Built Environment. Jason F. McLennan 2012 ISBN-13 9780982690253

Built Environment

Biophilic Design: The Theory, Science and Practice of Bringing Buildings to Life – Kellert, S.R., Heerwagen, J. & M. Mador, John Wiley & Sons, 2008. ISBN-10 0470163348 Nature-inspired architecture.

Design with Climate: BioClimatic Approach to Architectural Regionalism. Olgyay, V., Princeton University Press, 2015.

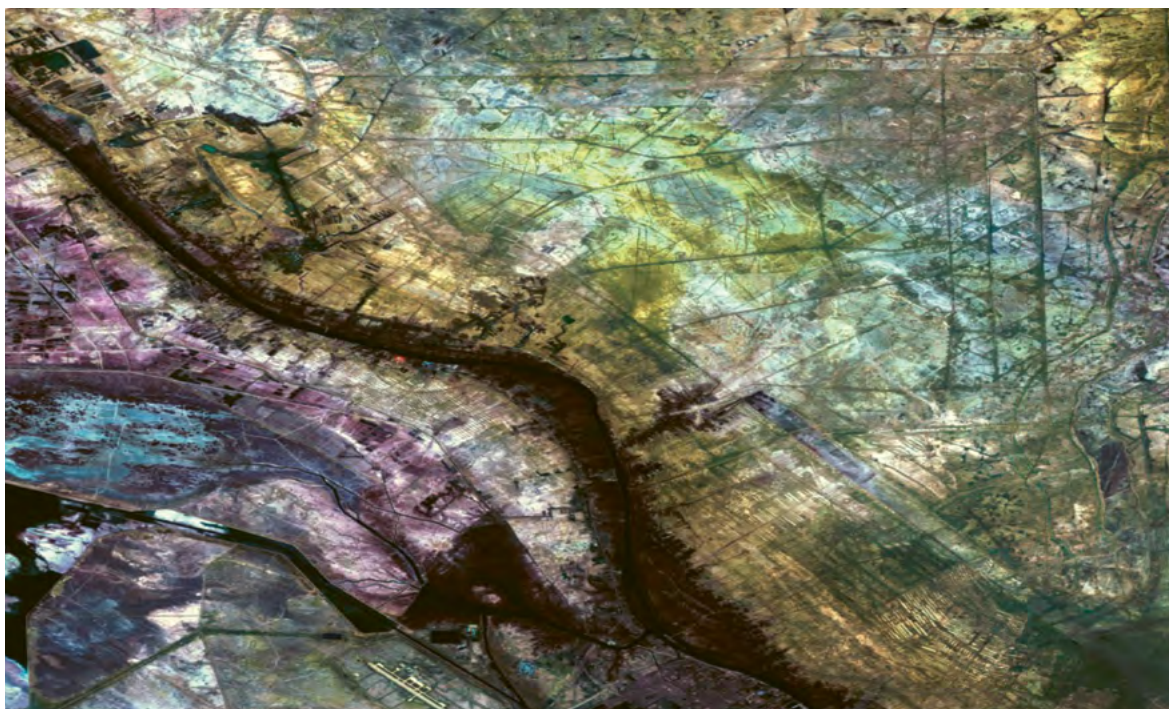
ISBN-10 0691079439.

Reprint of a new and expanded version of a classic 1960s text that inspired and promoted architectural design based on biology and climate.

References used in the main text:

- Corcoran P.B., Weakland, J.P., & Wals A. E. J. (Eds.) *Envisioning futures for environmental and sustainability education*. DOI 10.3920/978-90-8686-846-9_0, Wageningen Academic Publishers 2017.
- Corcoran, P. B. & Hollingshead, B. (Eds.) (2014). *Intergenerational learning and transformative leadership for sustainable futures*. Wageningen, the Netherlands: Wageningen Academic Publishers.
- Corcoran, P. B. & Osano, P. M. (Eds.) (2009). *Young people, education, and sustainable development: Exploring principles, perspectives, and praxis*. Wageningen, the Netherlands: Wageningen Academic Publishers.
- Lotz-Sisitka, H, Wals, A. E. J., Kronlid, D. & McGarry, D. (2015). Transformative, transgressive social learning: rethinking higher education pedagogy in times of systemic global dysfunction. *Current Opinion in Environmental Sustainability*, 16: 73-80.
- United Nations (2015). *Transforming our world: the 2030 agenda for sustainable development*. New York, NY, USA: United Nations. Available at: <http://tinyurl.com/od9mens>.
- Wals, A. E. J. (2012). *Learning our way out of un-sustainability: The role of environmental education*. In: Clayton, S. (Ed.) *Oxford handbook on environmental and conservation psychology*. London, UK: Oxford University Press.
- Wals, A. E. J. (Ed.) (2007). *Social learning towards a sustainable world: Principles, perspectives, and praxis*. Wageningen, the Netherlands: Wageningen Academic Publishers.
- Wals, A. E. J. & Corcoran, P. B. (Eds.) (2012). *Learning for sustainability in times of accelerating change*. Wageningen, the Netherlands: Wageningen Academic Publishers.

1.5 CLIMATE AND ECOLOGY CRISIS AND THE BUILT ENVIRONMENT



Context: Countless countries, local authorities and organizations have made climate and ecological emergency declarations and acknowledgements. Emergencies require urgent action, with clear signposting to the emergency exits, not a continuation of business-as-usual approaches. With each climate report published, we are globally further into the climate and ecological breakdown than we otherwise thought, increasing the urgency for transition to a regenerative future. We are now aware of the global impact that the built environment has on climate change and ecological loss and perhaps we are the first generation to be so. The construction and operation of buildings contributes greatly to the global climate and ecology problem. A Regenerative built environment is concerned with aiming towards better achievements with buildings forming part of the climate change solution. Here, through adapted extracts from RESTORE publications, we explore regenerative thinking within a built environment context and the urgent need to make this transition.

RESTORE ORIGINAL REMIT

The RESTORE COST Action will affect a paradigm shift towards restorative sustainability for new and existing buildings and space design across Europe. Despite over a decade of built environment sustainability strategies and programs based on climate change targets of capping global warming to 2° C, progress has failed to address key sustainability issues in a meaningful way. With the Paris 2015 Agreement that targets global warming at 1.5 °C, the sector no longer has the luxury of being incrementally less bad: it requires an urgent shift to net-positive, restorative sustainability thinking.

The built environment is a pivotal part of the climate change problem, heavily contributing to an impact of 40% on energy and water, carbon and waste. It is also a key in climate change solutions, not only reducing but also creating net positive impacts. Research is demonstrating that built environment impacts *per annum* account for 12% of water, 39% of CO₂, 65% of waste, and 71% of energy consumption and the potential improvements of green building are estimated at 24-50% for energy, 33-39% for CO₂ emissions, 40% for water and 70% for waste.

LIVING BUILDINGS

Adapted extract from WG1 Sustainability: Restorative to Regenerative²³

The built environment accounts for 36% of EU CO₂ emissions and 40% of total EU energy (European Commission, 2018). In recognition of this situation, serious efforts to reduce the negative impacts of emissions are specified in various sustainable building standards (*e.g.*, LEED, BREEAM). However, they are as yet unable to neutralize or even to reverse all the negative effects and cannot therefore become truly restorative or regenerative. The state-of-the-art of new building developments focuses on design, construction and education practices, which are considered sustainable.

There are some design practices and sustainability principles that can to some extent be said to point towards the restorative design approach, however, there are differences in the maturity levels of the diverse subtopics. Current sustainability principles largely focus on energy reduction during the process of on-site building, and pay less attention, among other things, to the negative impacts of construction practices, material production and the built environment's effects on human health and well-being.

Restorative and regenerative buildings generate positive impacts – doing “more good” – to the environment and enhancing the quality of human life.

Regenerative and restorative buildings go beyond sustainable buildings (autonomous or net-zero) levels, by also improving the surrounding environment such as restoring a site's natural hydrology or reintroducing for lost wildlife and plant habitat. These buildings are integrated into the natural environment and are designed to revitalize damaged environments. Regenerative and restorative buildings not only produce all of their own energy and capture and treat all the water that is used within them, but they are also designed and operated to have a net-positive impact on the environment, including the repair of the surrounding ecosystems.

Below, there are some examples of the ways that a building can help restore the environment:

- Being more aware of its physical, social, economic, planning design, long range existing neighbourhoods in relation to the development of the place.
- Utilizing carbon-free technologies.
- Producing more energy than the building consumes and sharing the excess so other buildings can meet their energy demands. The building needs to be connected to the grid, in order to share excess energy from on-site power generation with surrounding buildings.
- Creating opportunities for urban agriculture such as growing food on a green roof, and local animal farming such as raising fish in aquaponics.
- Recharging groundwater systems.
- Creating ecosystems for local species whose niches had been missing, damaged, or destroyed.
- Utilizing local materials and resources, promoting a closed material cycle.
- Recycling waste, especially promoting biological waste usage for environmental nourishment.

Regenerative new buildings can only come into being through a shift in thinking, through the following areas:

- Development and application of new design methods and systems thinking in design.
- Data collection, big data should be more utilized for informing building design.
- Focus of design thinking should be shifted to human and social aspects, *i.e.*, improving human health and the wellbeing of building occupants.
- Perception of a building's relationship with its surroundings.
- Role of a building as an active element of the natural ecosystem and its functional reconnection with nature.
- Development and utilization of new, carbon-free technologies.

²³ Cost RESTORE Publications <https://www.eurestore.eu/publications-and-articles/>

- Future water scarcity mitigation by net positive water management approach.
- Promotion of the circular economy.
- Increasing promotion of equity and educating people.

REGENERATIVE DESIGN

Adapted extract from WG2 DEFINING REGENERATIVE DESIGN²⁴

IPCC²⁵ reports warn us that we have until 2030, to take significant and radical steps to reduce carbon emissions. Projects currently within the briefing, at either the design or the construction stages are those that will start to function within the window available to us - and consequently, these are the designs that need a radical, regenerative makeover, today. It requires the construction of buildings that will not only operate without fossil fuels, but will remain within net carbon positive targets, and buildings that will sequester more carbon and that will produce more renewable energy than is used during their construction, operation and disposal. A phenomenal task.

The built environment no longer has the luxury of just being 'less bad', but it urgently needs to adopt net-positive, regenerative sustainability thinking to do 'more good' incrementally. This thinking involves envisioning homes, workplaces, neighbourhoods and cities that are socially just, culturally rich and ecologically regenerative. Designers have often created cities and buildings that are dependent on a one-way flow of energy, materials and living substances from nature toward human society. Conversely, as widely discussed within Sustainability Restorative to Regenerative,²¹ regenerative design is aimed at enhancing human life and natural ecosystems in a partnered relationship.

FROM SUSTAINABLE TO REGENERATIVE DESIGN

Regenerative Design is an approach that aims to create a new set of relationships that reinforce the state of health of human and natural ecosystems, utilising appropriate construction and technology. This challenge implies an in-depth knowledge of multiple fields, and thus the involvement of several specialists and adequate tools to develop and to frame approaches and solutions. These tools and proper educative guidance are needed to support designers in addressing this complex challenge.

Today's responses to climate change and biodiversity issues are inadequate, in view of the urgency and the scale of the predicted impacts. Current targets tend to aim to reduce the negative impact, or at most aim for 'neutral' operational energy use. It is, however, becoming clear that newly constructed, and renovated buildings need to go beyond reducing environmental impact; they must have positive environmental benefits. A holistic approach is needed that must include carbon, resource use, waste, and water. Regenerative design practice aims to not only mitigate, but also to reverse the causes of climate change and ecosystem degradation.

In the 1970s, US landscape architect John T. Lyle pioneered the term 'regenerative design' in his book entitled 'Regenerative Design for Sustainable Development'²⁶ (the term had already been formulated earlier by Robert Rodale in relation to agriculture). Recently, regenerative design has come to the forefront of sustainability thinking, with scholars such as Bill Reed and Raymond J. Cole exploring its definitions and application. The RESTORE publication 'Sustainability: Restorative to Regenerative', presented an overview of this thinking and established a set of definitions:

²⁴ JUST <https://living-future.org/just/>

²⁵ The Intergovernmental Panel on Climate Change (IPCC) is the United Nations body for assessing the science related to climate change. <https://www.ipcc.ch>

²⁶ Tillman Lyle, J. Regenerative Design for Sustainable Development. Chelsea Green Publishing. 352 pp. ISBN-13 978-0471178439.

- **Sustainability.** Limiting impact. The balance point where we give back as much as we take.
- **Restorative.** Returning social and ecological systems to a healthy state.
- **Regenerative:** Enabling social and ecological systems to maintain a healthy state and to evolve.

The Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES) Global Assessment Report on Biodiversity and Ecosystem Services²⁷, launched in May 2019, revealed that one million species are at risk of extinction over the next decade. With land and built-environment development being one of the main causes, we urgently need to embrace a new relationship with nature and the natural environment.

It shows that humans have been making decisions apart from nature. Conversely, we need a clear understanding of and a willingness to embrace the emerging worldview paradigm, where we as humans make decisions (and undertake design) as 'part of nature' not 'apart from nature'. 'We are developing a worldview which is the understanding of our position on the planet, and has a crucial role in building the awareness for regenerative sustainability, and understanding the true influence of the built environment'.

Regenerative sustainability is framed within the Ego-Eco-SEVA concept:

Ego. From the industrial revolution, as humans, we assumed 'man's tyrannical dominion' over the earth's resources and life forms, founded on a linear take-make-dump mentality. We have moved on from a 'dump' approach to our unwanted products, waste and buildings to a more considered 'dispose of', still as yet a linear mentality that persists within built environment thinking.

Eco. The current and dominant sustainable design and construction discourse was triggered and reinforced by the Brundtland definition (of doing nothing today to compromise tomorrow's generation). This is a promise that we are failing to keep. We have compromised today's generation and, unless meaningful changes to current practices are implemented, we will continue to compromise future generations through, for example, human-made climate change, increasing carbon emissions, poor air quality and the worsening health of those who work, live, learn and play in our buildings.

SEVA. Represents a regenerative worldview in which we embrace living systems of the planet with love and care. SEVA (service) translates into actions we take when tuned into nature, where we see ourselves as a part of, not apart from nature and in which we add more than we subtract from living systems. In practice, this approach means a dedication to healing the future, through repairing the damage that has been caused by our previous designs, which exceed the boundaries of planetary resilience.

FOCUS ON SALUTOGENESIS²⁸

Extract adapted from WG4 Regenerative Interior Environments²⁹

Regenerative design is built on the awareness that humans and the built environment co-exist together both with and within natural systems. As such, Regenerative Design is aimed at reversing the damage that has been done, restoring ecosystems, so that they will thrive and evolve. As regards the design of spaces, regenerative design places occupant wellbeing centre stage. Here, the salutogenic focus is on making wellbeing part of the regenerative paradigm, rather than the reductionist approach of sustainable design that targets the absence of ill health. The term salutogenesis, coined by Aaron Antonovsky³⁰, is roughly equivalent in meaning to 'generation of health'. One key reference within this section is to standards such

27 IPBES Global Assessment Report on Biodiversity and Ecosystem Services <https://www.ipbes.net/global-assessment>.

28 See Handbook on Salutogenesis <https://pubmed.ncbi.nlm.nih.gov/28590610/>

29 JUST <https://living-future.org/just/>

30 Antonovsky, A. (1979) Health, Stress and Coping. San Francisco: Jossey-Bass Publishers. ISBN-13 978-0875894126.

as the Well Build Standard that is aimed at implementing, validating, and measuring features that promote human health and wellness.

It must also be noted that the World Health Organization defines health as *a state of complete physical, mental and social wellbeing* and not just freedom from illness. It helps define the scope within which interior design should focus on human health, whilst providing regenerative co-benefit to planetary health.

'Simple concepts like comfort, joy and aesthetics have had no place in traditional hospitals,' notes Jan Golembiewski³¹ in his article 'Salutogenic design – The neural basis for health promoting environments', 'yet they are the psychological bricks and mortar of all healthy buildings whether or not they are health care buildings.'

In the same way as we now often monitor and display, in real time, the water energy and air-quality performance of a building, the public health sector has perhaps made even more impressive advances, through real-time monitoring of such health issues as asthma and diabetes. It is a logical development to link smart building performance monitoring with smart health monitoring devices. By doing so, we add a new dimension to the building performance gap: the negative or positive impact of a building on the health of its inhabitants.

FutuREstorative asked us to imagine the synergy of smart building performance data, combined with real-time health data and embedded within a Building Information Modelling (BIM) system, which can not only be used for future design, but also for real time, net-positive health interventions.

Extract adapted from WG3 Regenerative Construction and Operations³²

Within construction, almost 100% of its consultancy services and products are outsourced from the client or design team organization to the sectors supply chain. Sustainable procurement is the transition between the sustainable design vision and the materialization of that vision. Within the regenerative sustainability paradigm, it is vital that the construction process of the project along with the facilities management of the project is undertaken in a manner that is not only socially just and ecologically sound, but also regenerative, so as to enable human and ecosystems to thrive.

REGENERATIVE SCALE JUMPING

Extract adapted from WG5 System Thinking Guide to Scale Jumping³³

A thing is right when it tends to preserve the integrity, stability and beauty of the biotic community. It is wrong when it tends otherwise (Leopold A, 1949).

Regenerative thinking, the SEVA mindset promoted through RESTORE, is focused on developing capacity and capability for systems evolution. It is not about sustainability that maintains what is or sustainability that is an attempt to restore something to what it was by only reducing impacts. Rather, it is about creating systems (places, buildings, communities, organizations) that have the capacity to evolve toward states of health that thrive over time. The first four RESTORE working groups and their publications, papers and outputs have demonstrated that we have the tools, the metrics, the approaches and the solutions for a symbiotic Human Nature Built Environment relationship. What we arguably lack in our mindset is the jump in scale that is to be applied. The mindset scale jump to where nature is seen as both a stakeholder and a mentor is for some a big scale jump, but one of necessity. The degenerative discourse and path we are on is too dominant.

31 Jan Golembiewski https://www.researchgate.net/publication/255971085_Salutogenic_design_The_neural_basis_for_health_promoting_environments

32 Cost RESTORE Publications <https://www.eurestore.eu/publications-and-articles/>

33 JUST <https://living-future.org/just/>

CONCLUSION

RESTORE set out to 'review lessons learnt from the emerging sustainability standards that are based on ecological, social, equitable, restorative and regenerative philosophies and advocacy' ... and the question remains as to whether existing regenerative standards (The Natural Step, Living Building Challenge, WELL Build Standard, One Planet Living, Planet Mark, Build with Nature) are fit to take the built environment into a regenerative age. Each of these will have different applications depending on the focus of the project, the client's visions and goals, yet, separately, or combined we have the frameworks, among which the Living Building Challenge is perhaps the most robust, as recently illustrated in the RIBA Sustainability Outcomes Guide. Older standards such as LEED and BREEAM are morphing from environmental standards into regenerative standards, mostly through the alignment, partnering or incorporation of elements from the new set of standards.

Whichever route to regenerative designs is taken towards buildings, what is clear is that higher levels of performance will be demanded of a future built environment, necessitating higher levels of education, awareness, skills and application.

1.6 MIND THE REGENERATIVE FUTURE

WELLBEING AND LOVE FROM AWARENESS OF OUR PLANET



Context: The state of our planet is reflected in the state of our minds and emotions. The state of our minds and emotions is reflected in the state of the Earth. Alongside new science and technologies, the numbers and the spreadsheets, we need a new perspective, a new mind-set. At the outset of RESTORE, the need for a shift in consciousness was explored in WG1 and it introduced Ego, Eco and SEVA thinking into RESTORE, understanding our position on the planet; a worldview that has a crucial role in building awareness of regenerative sustainability. Here, we³⁴ explore aspects of the shifting consciousness.

*We cannot address today's problems
with the same mindset that created them.*

A. Einstein

³⁴ Contributions from Anna Williamson, Anne Parker, Blerta Vula, Lydia Singh,



Fig. 4. Sustainability Restorative to Regenerative³⁵ WG1.

SEVA

In WG1, right at the outset of RESTORE, the crucial role was posited of an awareness of our planetary circumstances, which can be called a weltanschauung or worldview, in building awareness for regenerative sustainability. The role of humanity on Earth should be repositioned away from an ego-centric position to understanding that we are inherently a part of, and fully dependent upon the web of life of our planet. To adopt this role, we also need to become aware of the need for regenerative sustainability. The above EGO-ECO-SEVA visualization encompasses three worldviews. EGO in the visualization (a development of a well-known EGO-ECO meme by Black, 2012³⁶), with man at the top, in a dominant position, ruling over all other life forms. This represents the current dominant worldview of Western culture. The ECO represents a way of positioning ourselves as species together with all other species, within the web of life. This worldview can

35 JUST <https://living-future.org/just/>

36 Black, 2012 originally at glancesideways.com now unavailable -see <https://fairsnape.com/2021/01/11/ego-eco-seva-revisited/>

be found in many indigenous cultures, and it is also firmly supported by research on ecology and evolution of life. SEVA, the third illustration, represents a regenerative worldview in which humanity embraces the living systems of the planet with love and care. SEVA means service, and it translates into actions in which humanity adds more than it subtracts from living systems. In practice this means dedicating to heal the damage that has been caused by our previous action, which has placed the limits of planetary resilience at severe risk (Steffen *et al.*, 2015). The progressive development from EGO to ECO to SEVA starts by moving away from EGO by realizing that we are part of the inherent connectedness and interdependencies of ecological systems and continue to adopt SEVA as a necessary role for regenerative sustainability. This role is needed to create a culture that is not merely sustainable, but flourishes as an interconnected part of living planetary systems. Adopting the role of SEVA enables the ECO way of living on the planet in the long term. The development of changed perceptions, echoes a discussion with DuPlessis (2012)³⁷: regenerative sustainability requires a shift of worldview, from mechanistic to ecological.

RECIPROCITY

Braiding Sweetgrass in many ways (re)defines reciprocity, moving the meaning away from our familiarly reassuring *quid pro quo* relationships towards *the giving of a gift*, the giving of goodwill that enhances human and non-human relationships. These actions are taken without expecting anything in return, but that benefit the person who is giving through improved relationships: synergistic mutualism.

A core reciprocity example from *Braiding Sweetgrass*³⁸ is that of the Three Sisters seeds. “I hold in my hand the genius of indigenous agriculture, the Three Sisters. Together these plants - corn, beans, and squash – feed the people, feed the land, and feed our imaginations, telling us how we might live”. Planted together, the “Three Sisters” optimise sunlight and nutrients, symbiotically supporting each other and bring about a maximum yield.

MINDFULNESS

The practice of mindfulness is placing our minds on pause, an opportunity to halt the buzz, noise, deadlines, demands and stress that surrounds us and to (re)ground ourselves in the here and now. As we may train our bodies for fitness, look after our health through exercise and diet, so we need to allow our minds to practice, being present, being in the moment and enjoying that space.

BEING PRESENT

A short mindfulness session at the start of meetings can assist the focus and the attention of participants on the purpose of the meeting. Being present, leaving behind the baggage and thoughts from elsewhere, from that previous meeting or event. Mindfulness sessions with a focus on nature, taking time to sit and reflect on nature, outdoors or indoors, can make a powerful start for biophilic project workshops

LEARNING TO PAUSE FROM STRESS

FutuREstorative reflected on the power and the need for us to be free to press the pause button in the built environment

37 DuPlessis (2012) see https://repository.up.ac.za/bitstream/handle/2263/32634/DuPlessis_Towards_2012.pdf?sequence=1

38 *Braiding Sweetgrass*. Robin Wall Kimmerer <https://www.robinwallkimmerer.com/books>

OK, I see your amazing new project. Your eco-sustainable, living-materials, planet-friendly building. It beams out at me from the journals – your PR people have done a great job. It shines, it beams, it blows my socks off. Now I'm looking at one of your project managers. And I look again, a little more closely. Now the light is not so bright, now the beam is not so strong. I am looking at fractured thoughts, disturbed sleep, skipped meals. I'm looking at ever-present simmering levels of irritability, of intolerance, of impatience, of short attention spans, of reduced focus, a shadow of pessimism, ongoing anxiety and a mind that never stops.

Is this the best human intelligence? Is this sustainable? Is the building or the project really worth this? Are we so disingenuous that we cannot build amazing projects that also affirm the human spirit and the finest energies of human functioning, the energies of joy and inspiration?

More and more people in the construction industry are turning to mindfulness as a way of grounding themselves in the face of increasing pressures that fire on them from every direction. The jargon about 'the bottom line', meaning profit margins, is millions of miles from the real bottom line, which is human death from the inside. No one has a problem understanding construction death from trips, slips and falls or coffins being delivered to football stadia projects – but who is noting the number of individuals dying from the inside out from the lives of their jobs? *Anne Parker in FutuREstorative.*

SOLASTALGIA³⁹

The grief caused by the inability to derive solace from the present state of our home environment. It is the lived experience of negatively perceived environmental change to one's sense of place and existential well-being. Feelings of powerlessness and loss of hope in the future. Solastalgia is a form of homesickness one experiences, when one is still at 'home' (XR / Albrecht).

TIME OUTDOORS

Research shows that there are different outcomes between groups exposed to natural environments and those exposed to built environments. Research from John Zelenski⁴⁰ and others at Carleton University in Ottawa has explored the link between experiencing the natural world and behaving in a sustainable way. The findings support the fact that decisions made when exposed to nature are more sustainable, more cooperative and more socially responsible compared to those made when exposed only to built-environment surroundings.

- Take meetings outdoors – hold a walking meeting.
- Find sit spots for discussions.
- Start the biophilic and design meetings outside.
- Always ask the question: what would nature do?

³⁹ Albrecht in XR Regenerative Culture 101

⁴⁰ For more on John Zelenski, see <https://uk.sagepub.com/en-gb/eur/author/john-zelenski>

We are attempting to educate, inspire and prepare future generations within classrooms devoid of natural light, views and 'green' elements.

Sustainability workshops and training sessions are held in training rooms in artificial light or in the same hotel conference rooms where strategy was developed.

Construction is managed by project teams working in dirt-grey cabins, interiors of partially completed buildings or basements lacking any natural light or views.

FutuREstorative

EARTH EMOTIONS⁴¹

"In many respects, especially for Indigenous people, the scientifically derived terms "ecology," "ecological," and "ecosystem" also fail to capture the emotional and cultural dimensions of the human relationship to land. They are useful terms in systems science but not so relevant to the expression of human emotions. Human emotions with respect to the Earth, the psychoterratic, deserve to have defining terms that carry no excess baggage.

REGENERATIVE SYMBIOTIC PRACTICE

We are increasingly asking what nature would do to overcome some of our sticky problems and we are incorporating biomimicry within our materials and biophilia within our designs. We are however only just learning how to manage our projects, at design, in construction, in operation, in business through regenerative symbiotic practices. A project management approach that sees us as active agents within a wider eco-system.

FEELING THE RHYTHM

A regenerative built environment is not only in need of numbers and spreadsheets, Gantt charts, contracts and information models. It also needs love, care, compassion and a feeling for the pulse and cadence of living buildings, in how we design, how we bring into being and how we inhabit them. In 2017, the RESTORE training school in Lancaster explored the concept of whether living buildings are somehow sentient, yielding stories from the past, responding and connecting through natural materials, learning and informing the future. In this context, how should we as designers, constructors or inhabitants react?

41 <https://glennaalbrecht.wordpress.com/2020/01/29/earth-emotions-and-ecology/>

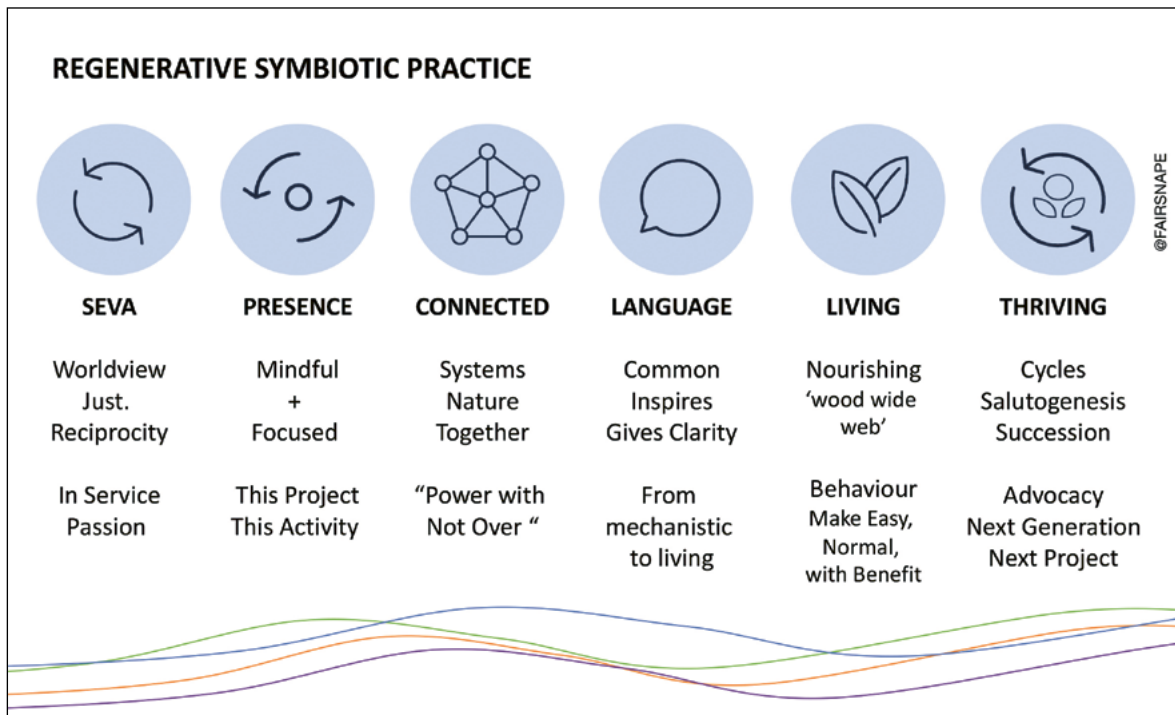


Fig. 5: Regenerative Practice. Source M. Brown (2020).

SELF-ORGANIZING SYSTEMS

Perhaps an emerging approach to project management of regenerative, living projects is through self-organizing systems and teams. A self-organizing team will not wait or rely only on instructions or be handed work from a leader or manager. Instead, SOS teams accomplish their own work along with associated responsibilities and timelines, often within a structure of simple rules that all can understand and follow. One of the most distinctive and wonderful of nature’s spectacular behaviours is the emergence of group order where individuals, as if by magic, synchronize with each other. Such a response is the way a group can, as an entity, interact with its environment. The wonder of birds flocking in murmuration is an example of collective self-organization and emergent behaviour. Simple rules and emergence are key principles of complexity theory.⁴²

“The Self-Organizing System (SOS) defines how we organize, communicate and make decisions about our working culture. It allows us proactively to structure how we organize, allowing us to reflect our values and leave behind ways of working that reproduce injustices and emotional pain in society.”⁴³

42 See section 1.9 System Thinking.

43 See XR approach to Self-Organising Teams

“Like a tree in a forest we will know that we are not alone, but part of a web, a network of life, healing, helping, nurturing each other, as it should always have been...”

Llewellyn Vaughan-Lee. Emergence Magazine.

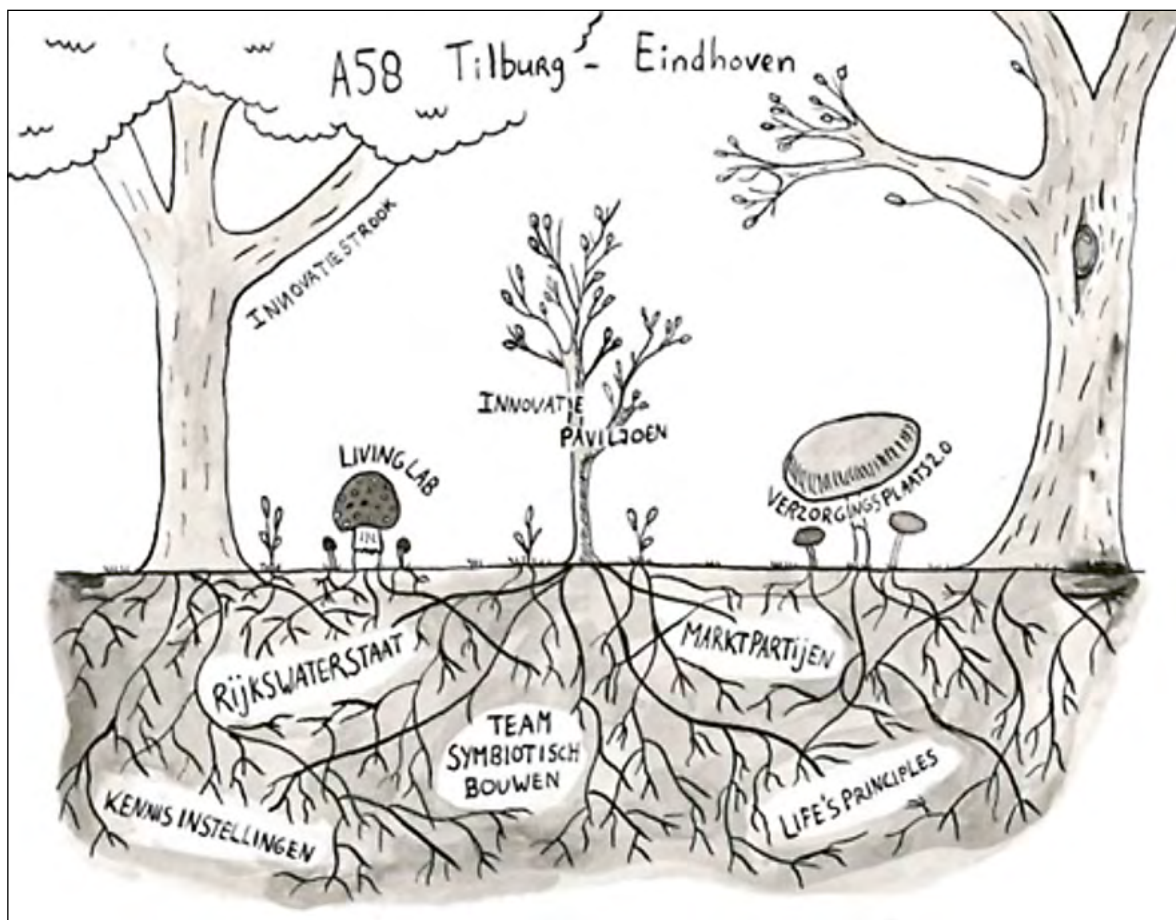


Fig. 6: Symbiotisch Bouwen (Symbiotic Building) Pavilion in the Netherlands will embrace self-organizing approaches, and take lessons from the forests natural nurturing and supporting web. Image: Martine Roseboom

Sustainability is not possible without engaging in the process of Regeneration or Conscious Evolution.

Jason F. McLennan⁴⁴

44 Transformational Thoughts. Regenerating the Whole. From Living Buildings to Building Life. https://arquiculture.files.wordpress.com/2013/11/130502_tt17_spring13-jason.pdf

TRANSCENDENTAL MEDITATION (TM)

“Generation after generation man is born anew. Each generation gives rise to new aspirations in life and brings a new quest for fulfilment. Each man needs sound physical and mental health, greater ability in action, a greater capacity to think clearly, increased efficiency in work, and more loving and rewarding relationships with others. He needs enough vitality and intelligence to satisfy the desires of his mind and bring contentment to his life. We have seen that all this can be gained through the regular practice of Transcendental Meditation” (Maharishi, 1963)⁴⁵

If we are to recover from the frenetic cultures of western civilisation, having lost or forgotten our ancestral heritage and the vessels that held our disquiet and grief, meditation is an invaluable technique. When we meditate, we access the blissful origin of creation, so that we can perform the right action.

Then, “how we structure our communities, how we speak and make decisions, what artefacts we create and who creates them, what we eat, how we dream, who we think we are, how we relate to the mountain of our ancestors, how we bring children into the world, and how all these facets of our lives fit together” Glendinning 1994⁴⁶ become effortless endeavours – buoyed by nature support so that the most mundane tasks, far from causing anxiety, are pleasurable and effortless.

Transcendental Meditation is a silent meditation technique and movement devised and introduced by Maharishi Mahesh Yogi in India in the 1950s. The technique promotes a state of relaxed awareness, stress relief, creativity, and efficiency, in addition to physiological benefits.

The structured meditation technique, practiced twice a day for 20mins, allows practitioners to experience higher states of consciousness and awareness, considered helpful if not essential, for the level of awareness required for a regenerative future.

Transcendental Meditation is practised by many individuals across the built environment sector including organisation owners, clients, designers, constructors and consultants, in addition to the well-known ‘public’ practitioners, writers, musicians and business people.

VASTU ARCHITECTURE

Transcendental Meditation is aligned with the system of ancient Vastu architecture known as Vedic Architecture (Vastu - in harmony with Natural Law) and concerned with the harmonious balancing of human and natural energies.

The state of our minds and emotions is reflected in the state of the Earth and Vastu is a great power in nature and refers to the complete knowledge of how to establish a structure in order for it to always be in harmony with the laws of nature.

Vastu is an ancient Vedic technology, where detailed instructions and guiding principles are applied in accord with natural law, to build what is known as ‘Perfect Vastu’ – that is, a dwelling that in every way conforms with the intelligent structure of the universe. The guiding principles⁴⁷ are as follows:

Orientation – aligned on a north, south, east, west axis, the main entrance of the dwelling faces east – the direction of the rising sun which provides energy, success and vitality for the day.

Alignment – the walls are properly aligned with the cardinal directions – the north and south poles and the equator.

45 Science of being and art of living. 1963.

46 My name is Chellis and I’m in recovery from western civilisation. Glendinning 1994

47 Institute of Vedic Architecture and City Planning, (2019)

Placement of Rooms – each region of the home has a lively aspect to it – so the organs of the body are situated where they are for optimum health, so are the rooms of the home. Should the library be where the kitchen should be, one will always feel hungry and unable to concentrate when working in the library, and *vice-versa*. As with the human body, rooms placed according to Vastu principles nourish the occupants and maximize wealth in all aspects of life.

Healthy construction materials – Building must be free from outgassing chemicals and harmful EMF to ensure good health and happiness of the inhabitants.
In a Vedic City – all roads would be coherently aligned north/south, east/west, with a central square or park at the centre.

REGENVAST⁴⁸

RegenVast is a proposal for a domestic project designed to meet the Living Building Challenge which is the world's most rigorous, progressive and stringent green building programme, with the aim of showcasing regenerative building designs and the importance of these deep green buildings in the creation of a more resilient, sustainable and thriving future for all. (Regen Vast was registered with the International Living Future Institute in Sept. 2016).

This unique home is also designed following Vastu Shastra Principles, an Ancient Hindu Vedic Science of Architecture which aligns the building perfectly with nature and the cosmic energy which pervades the universe and all of creation. It has been scientifically proven that Vastu Homes bring an abundance of Health, Happiness, Peace and Prosperity to dwellers as well as its surrounding areas.

To be sited in the Northern Range, Maracas, St. Joseph, a historical and nature loving community in Trinidad and Tobago.

The RegenVast Smart Living Home will:

- Be completely powered by the sun, thereby only using renewable, clean energy sources.
- Collect all of its water from the rain and treat it (without the use of harsh chemicals such as chlorine) for consumption.
- Treat naturally all grey water via constructed wetland onsite.
- Utilize onsite low water, wastewater treatment systems creating nutrient rich soil as opposed to sewage, thereby providing a closed loop system that benefits all.
- Use natural day lighting and cross-ventilation, hence no need for artificial lights during the day nor air conditioning- reducing overall carbon footprint.
- Contain no toxic materials that are often found in paints, sealants, glues, PVC piping and furniture.
- Be constructed using renewable, sustainable materials with a low carbon footprint.
- Adopt the best of Biophilic designs.
- Grow its own ORGANIC food.
- Be SMART (automated) and use several technologies in managing water collection, energy production, consumption and lots more!

48 RegenVast <https://www.regenvastbuildings.com/projects>



Fig. 7: RegenVast Proposal. Source: Lydia Singh LBC T&T.

SALUTOGENESIS

Rather than only preventing poor health, the focus is on maintaining good health: the regenerative health aspect of the built environment. What if our buildings, our construction projects, our manufacturing processes made people feel better, healthier and happier when leaving than they did upon their arrival. Through salutogenesis and a biophilic mindset, we can create that feel-good buzz within our buildings that we may have experienced on a forest walk.

1.7 SIMPLIFYING THE LANGUAGE OF REGENERATIVE SUSTAINABILITY

Martin Brown



Context: The language of sustainability may inspire, but will continue to be confusing for many, if unfortunately concealed behind a mask. Increased clarity will inspire many more to move towards a regenerative approach, where only reducing impact is deemed not good enough in the pursuit of reciprocity and doing more good. Throughout the RESTORE publications⁴⁹ there are an abundance of definitions, often with explanations that vary depending on the context and the sector of our built environment. Here, readers are encouraged to take RESTORE (and other) definitions and simplify them, to provide clarification that makes sense in your context and in your scope of education. Some examples of simplified definitions are listed as follows:

What would you add? How would you simplify?

⁴⁹ See Section 3.2 Restore References.

1.8 AN INTRODUCTION TO THE SUSTAINABLE DEVELOPMENT GOALS.

Ivan Šulc



Context: In 2015, the UN published its Sustainability Development Goals for 2030. The SDGs define the intention to move away from the 1987 Brundtland⁵⁰ definition of sustainability to “Do nothing today that compromises tomorrow’s generation” to a new purpose that is proactive and net-positive, and one that improves the social, environment and financial wellbeing of people and the planet by 2030. Here, the history, importance and application of the Sustainability Development Goals are explored, with reference to papers from Restore members (Sonetti, G., Brown, M., Naboni, E., & Šulc, I.).

Intense economic development in the global North, exploiting fossil fuels, has led to excessive degradation of the human environment and natural resources. Growing economic wealth in the hands of a few countries and a rather small number of people has led to ever-increasing social inequalities, reflected in unequal availability of food, health care, education, and other social services, prompting calls for a paradigm shift. In 1983, the United Nations established the World Commission on Environment and Development (WCED), to address the world’s environment and find solutions to development problems. In 1987, the Commission published the report *Our Common Future*, also known as the Brundtland Report, after its chair Gro Harlem Brundtland. It introduced the concept of sustainable development to the global public as “development that meets the needs of the present without compromising the ability of future generations to meet their own needs” (WCED, 1987). Its main contribution was the recognition of the interdependence between economic growth, environmental protection and social equity and it brought environmental issues together with economic issues into the focus of the political agenda (Fig. 8).

50 1987 Brundtland *Our Common Future*. <https://sustainabledevelopment.un.org/content/documents/5987our-common-future.pdf>

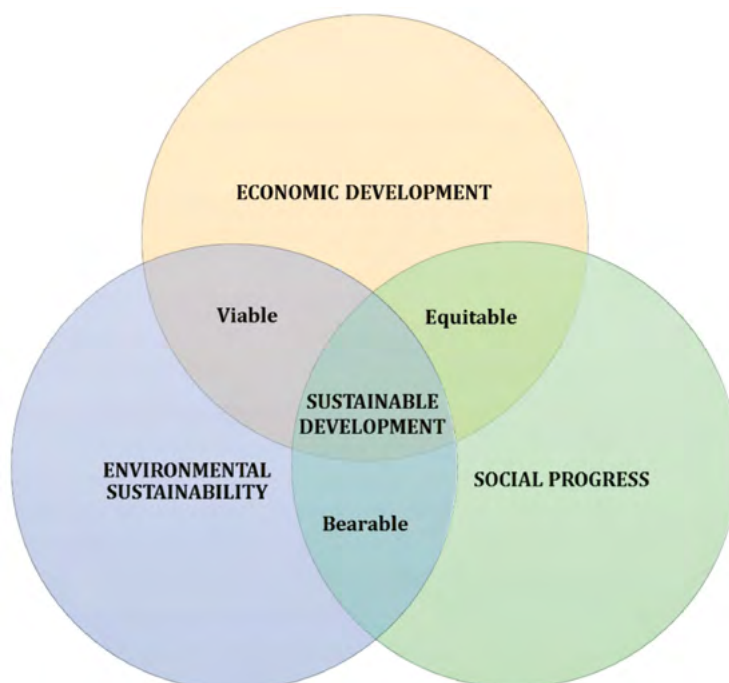


Fig. 8: Pillars of sustainable development.

In 1992, the United Nations organized the Earth Summit in Rio de Janeiro to discuss the agenda for environment and development in the 21st century, which led to adoption of two important documents – Agenda 21 and the Rio Declaration on Environment and Development. Agenda 21 contained a set of actions that governments should implement towards sustainable development, including plans, goals, responsibilities and expenses (Shah, 2008). The Rio Declaration was a short document consisting of 27 principles, most of which concerning economic development and its relation with the environment and introduced the polluter pays principle and the precautionary principle (Shah, 2008).

Eight years later, in 2000, the UN Millennium Summit was held in New York, where all member nations adopted the Millennium Declaration. The Declaration committed nations to a new global partnership to reduce extreme poverty and to meet 8 international development goals (including 21 targets) called the Millennium Development Goals (MDGs) (UNDP, 2021). The MDGs were revolutionary in that they provided a common language to reach global agreement; they were realistic and easy to communicate with a clear mechanism for measurement and monitoring (MDGF, 2021). The goals set for 2015 (compared to 1990) were: (1) eradicate extreme poverty and hunger, (2) achieve universal primary education, (3) promote gender equality and empower women, (4) reduce child mortality, (5) improve maternal health, (6) combating HIV/AIDS, malaria and other diseases, (7) ensuring environmental sustainability, and (8) develop a global partnership for development. The final MDG report noted that the achievements were quite varied – the rate of extreme poverty was almost halved, making the MDGs the largest poverty reduction movement in history (UNDP, 2021). The proportion of undernourished people in developing regions has been halved; primary school enrolment in developing regions has reached 91%, with an increase in the proportion of girls; under-five mortality rates have fallen by more than 50% and maternal mortality by 45%; major progress has been made in the fight against HIV/AIDS, malaria and tuberculosis, etc. (UNDP, 2021).

In 2015, the Millennium Development Goals came to a conclusion, but there was still much to be done. Increased awareness of climate change and rising carbon emissions, projections of a global population

in excess of 8.5 billion by 2030, implying rising demand for resources, and increased risks of insecurity, poverty and deprivation (Sonetti *et al.*, 2018) required a radical shift from the business-as-usual approach to a regenerative approach in all areas of global development. Therefore, in 2015, the UN adopted a new global strategy document Transforming our world: the 2030 Agenda for Sustainable Development, which aims to build on the MDGs and complete what they failed to achieve (UN, 2015). The setting of the SDGs involved governments, international organizations, university institutions, civil society, the private sector, and individuals around the world and represented the most extensive global consultation in history (Sonetti *et al.*, 2018).

The impressive result consists of 17 Sustainable Development Goals (SDGs) and 169 targets to be achieved by 2030 (Fig. 9):

- End poverty in all its forms everywhere.
- End hunger, achieve food security and improved nutrition, and promote sustainable agriculture.
- Ensure healthy lives and promote well-being for all at all ages.
- Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all.
- Achieve gender equality and empowerment for all women and girls.
- Ensure availability and sustainable management of water and sanitation for all.
- Ensure access to affordable, reliable, sustainable and modern energy for all.
- Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all.
- Build resilient infrastructure, promote inclusive and sustainable industrialization, and foster innovation.
- Reduce income inequality within and among countries.
- Make cities and human settlements inclusive, safe, resilient, and sustainable.
- Ensure sustainable consumption and production patterns.
- Take urgent action to combat climate change and its impacts by regulating emissions and promoting developments in renewable energy.
- Conserve and make sustainable use of oceans, seas and marine resources for sustainable development.
- Protect, restore and promote sustainable use of terrestrial ecosystems, promote sustainable forest management, combat desertification, and halt and reverse land degradation and halt biodiversity loss
- Promote peaceful and inclusive societies for sustainable development, provide access to justice for all and build effective, accountable and inclusive institutions at all levels.
- Strengthen the means of implementation and revitalize the global partnership for sustainable development (UN, 2015).



Fig. 9: Sustainable Development Goals Source. UN (2021).

Sustainable Development Goals differ from 8 Millennium Goals in crucial ways – the MDGs focused mainly on social issues in less developed countries and their success was limited to a few areas (Sonetti *et al.*, 2018), while the SDGs cover broad areas of life on Earth, which can be summarized in five basic components (5 Ps):

people – eradicate poverty in all its forms and dimensions.

planet – protect the planet from degradation, manage its natural resources and act on climate change.

prosperity – achieve a prosperous and fulfilling life for all people; reconcile technological progress with nature.

peace – promote peaceful, just and inclusive societies, free from fear and violence.

partnership – build a global partnership to meet the goals, based on global solidarity and focused on the needs of the poorest and most vulnerable (including all countries, stakeholders and people) (UN, 2015).

The 17 SDGs promote social and economic development and incorporate poverty, hunger, health, gender equality, water, sanitation, education, climate change, energy, environment, and social justice (Sonetti *et al.*, 2018). The vision and mission of UN and global partners contained in the SDGs are to:

- end poverty and hunger everywhere.
- combat inequalities within and between countries.
- build peaceful, just and inclusive societies.
- protect human rights.
- promote gender equality and the empowerment of women and girls.
- ensure the lasting protection of the planet and its natural resources.
- create conditions for sustainable, inclusive and sustained economic growth, shared prosperity and decent work for all (UN, 2015).

The SDGs reflect the values of freedom, equality, unity, tolerance, respect for nature and shared responsibility to achieve global peace, equitable development, the spread of human rights and the protection of the environment and natural resources (Sonetti *et al.*, 2018). The document recognizes that all goals and

themes are interconnected systems and that a change in one of them will have an impact on other systems (Šulc *et al.*, 2020).

African countries, least developed countries, small island developing states and landlocked countries that are affected by the global issues addressed in this document have special priority in the Agenda. It also makes special reference to groups of people in vulnerable situations who need to be empowered: children, youth, women, older persons, persons with disabilities, persons living with HIV/AIDS, indigenous peoples, refugees, internally displaced persons and migrants (UN, 2015).

The progress of each goal and target is defined, so that it can easily be measured by one or more specific indicators at different levels. For example, target 8.9. dealing with sustainable tourism (By 2030, devise and implement policies to promote sustainable tourism that creates jobs and promotes local culture and products) uses two indicators: (1) GDP from tourism as a proportion of total GDP and in growth rate; (2) Number of jobs in tourism industries as a proportion of total jobs and growth rate of jobs, by sex (UN DESA, 2021). Different countries may be compared with these variables on an annual basis and their progress tracked from 2015.

The current status of Sustainable Development Goals at a global level can be followed on several on-line platforms, which also include the body of knowledge and specific projects. The site UN Sustainable Development provides basic information on each goal, its importance and global progress, visualized in infographics (available at: <https://www.un.org/sustainabledevelopment/>). Sustainable Development Goals Platform is a central place that collects literature, sources and knowledge on the processes around each goal (available at <https://sdgs.un.org/goals>). Many human activities have brought the SDGs into focus and seek to contribute to their achievement, and some have established dedicated platforms that are used as good practice networks. One such example is Tourism for SDGs, developed by the World Tourism Organization as a collection point for projects that demonstrate how tourism can contribute to the achievement of one or various Sustainable Development Goals (available at <http://tourism4sdgs.org/>).

REFERENCES

- Shah, M. M., (2008). Sustainable Development. In: Jørgensen, S. E. and Fath, B. D.: Encyclopedia of Ecology, Elsevier, pp. 3443-3446.
- Sonetti, G., Brown, M., & Naboni, E. (2018). About the Triggering of UN Sustainable Development Goals and Regenerative Sustainability in Higher Education. *Sustainability* 11, p. 254, DOI: 10.3390/su11010254.
- Šulc, I., Morgado, S., Đorđević, Z., Gašparović, S., Radović, V., & Keranova, D. (2020). Societal Issues and Environmental Citizenship. In: *Conceptualizing Environmental Citizenship for 21st Century Education* (Eds. Hadjichambis, A. *et al.*). Springer, pp. 49-66, DOI: <https://doi.org/10.1007/978-3-030-20249-1>.
- Sustainable Development Goals Fund (SDGF) (2021). Millennium Development Goals. <https://www.sdgfund.org/mdgs-sdgs> (4 March, 2021).
- UN Department of Economic and Social Affairs (DESA) (2021). Sustainable Development. <https://sdgs.un.org/2030agenda> (Accessed: 6 March, 2021).
- UN (2015). Transforming Our World: The 2030 Agenda for Sustainable Development. A/RES/70/1, <https://sdgs.un.org/2030agenda> (Accessed: 6 March, 2021).
- UN (2021). Sustainable Development Goals. <https://www.un.org/sustainabledevelopment/> (Accessed: 6 March, 2021).
- United Nations Development Programme (UNDP) (2021). Millennium Development Goals. https://www.undp.org/content/undp/en/home/sdgvoverview/mdg_goals.html (Accessed: 4 March, 2021).
- UNWTO (2021). Tourism for SDGs. <http://tourism4sdgs.org/> (Accessed: 6 March, 2021).
- World Commission on Environment and Development (WCED) (1987). *Our Common Future*, Oxford University Press, Oxford.

1.9 AN INTRODUCTION TO REGENERATIVE SYSTEM THINKING

Martin Brown with Francesco Gonella.



*“When we try to pick out anything by itself,
we find it hitched to everything else in the Universe.”*

(Muir, 1912⁵¹)

Context: When we address regenerative sustainability within the built environment, when we seek to scale-jump any aspect of the sustainable built environment in isolation, system thinking will enable a full understanding of the reciprocity of symbiotic connections across the built environment. And in turn, it will help us to understand how those connections relate to human and non-human ecosystems. Powerfully, it changes the conversation, enabling the shift in thinking from cause and effect to emergence, from linear to circular and factual growth. Here we explore system thinking within this regenerative scale-jumping context.

EDGE OF CHAOS COMPLEXITY - MARTIN BROWN

Our built environment as a whole functions and behaves in a very different manner than its individual parts. For scale jumping to be at all effective, we must no longer look at individual topics, patterns or petals, but think of systems, and understand how our built environment functions within the context of wider ecosystems.

From experience as a built environment sector practitioner and consultant, I would emphasize the importance of identifying root causes, of tipping points and of points of intervention to make real change. Having long

51 See https://vault.sierraclub.org/john_muir_exhibit/writings/the_yosemite/

subscribed to the Edge of Chaos and Complexity Theory approaches, inspired by Chaos⁵² in the 1990s, I have adopted complexity principles in much of my work. I have found its application extremely powerful in many situations at organizational and project levels, including the creation of new business strategies, designing new process and management systems and implementing sustainability initiatives. Key to this has been exploration and identification of principles such as emergence, simple rules and tipping points.

A GENTLE INTRODUCTION TO SYSTEMS THINKING AND ITS APPLICATION IN THE CONTEXT OF REGENERATIVE CITY PATTERNS - FRANCESCO GONELLA

Einstein’s quote (*problems we face today cannot be solved at the same level of thinking at which they were created*) may be found in countless contexts, yet very rarely it is accompanied by any indication whatsoever of what this “new level of thinking” should actually involve. Systems Thinking (ST) may be regarded as the general name that substantiates this need, that has to do with the ineffectiveness of linear thought at addressing non-linear complex problems. In fact, the conceptual basis of systemic thinking addresses the factual failure of reductionist, bottom-up approaches when describing, understanding and predicting the behaviour of systems characterized by complex interconnections and networks between their elements. The emerging necessity is therefore to shift attention from the study of events -in terms of causes, effects and mutual relationships- to the study of the systems from which they emerge, in terms of patterns, structures and leverage points. This paradigm shift changes the epistemic issues relevant to the scientific inquiry, replacing the traditional cause-effect linear chains with mutual causation structures (feedback loops), and the descriptions of groups of local behaviours with those of self-organizing systemic behaviours. In general, ST describes what happens by investigating what operational configuration of the system as a whole drives the observed events and makes them happen. Fig. 10 below presents an adaptation of the famous “Iceberg of Systems Thinking” metaphor. It shows how the only way to understand the complexity of the observed behaviour of a system is to analyze its configurational patterns, that ultimately depend on its systemic structure.

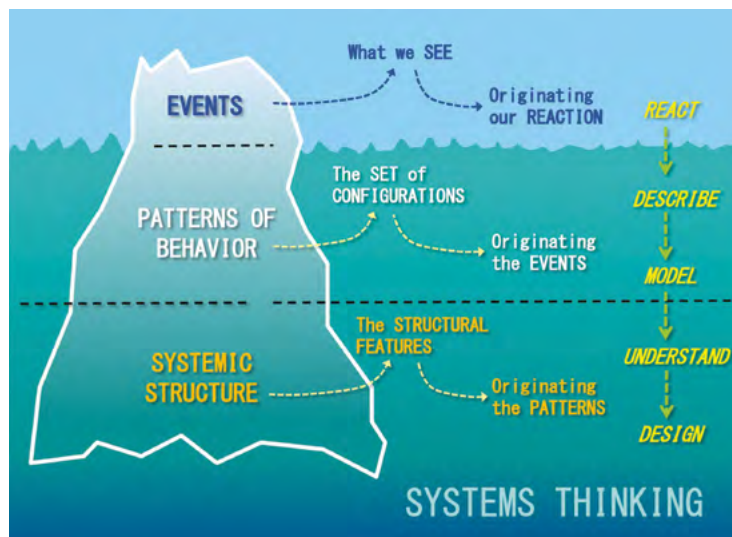


Fig. 10: Systems thinking Iceberg model. Source Francesco Gonella (2020).

Francesco Gonella, Dept. of Molecular Sciences and Nanosystems, Ca’ Foscari University of Venice, Italy. Extract Adapted from the WG5 Booklet

52 Chaos, The Making of a new Science, <https://www.goodreads.com/book/show/64582.Chaos>

RESTORE SCALE JUMPING INTERVENTIONS

System-thinking inventions we can follow to scale jump towards a regenerative built environment. Extract from the WG5 Booklet.

HUMAN	<ul style="list-style-type: none"> • Application of Bio-Leadership principles. • Application of Regenerative Mindsets (SEVA).
DESIGN	<ul style="list-style-type: none"> • Decarbonization through design. • Ecological harmonization of our built environment through biophilic design approaches. • Biophilic design of technologies embedded in the built environment - technologies in support of nature and healthy life. • Ecological, cultural and social applications of a Living Building framework and standard. • Understanding architecture as spatial media - designing space as lived experience and avoiding placelessness.
PLACE AND SPACE	<ul style="list-style-type: none"> • Elevate the sense and importance of place as a special and unique combination of environmental and cultural characteristics of a location.
NATURE	<ul style="list-style-type: none"> • Implement Nature-Based Solutions at large city scale and surroundings. • Improve accessibility to parks and green spaces. • Prioritize “human scale” in designing human-centric rather than car-centric cities.
ENERGY	<ul style="list-style-type: none"> • Promote Positive Energy Districts and facilitate their implementation using tools like energy cafes and living labs. • Consider the human-centric (based on eMergy) approach when assessing different urban solutions. • Integrate materials and technologies in the building envelope to produce energy and increase indoor comfort. • Develop innovative technological solutions at both a micro and a macro scale, improving wellness and reducing the human environmental impact of PEB and PED.
MATERIALS	<ul style="list-style-type: none"> • Use Toxic Material Red Lists and Material Transparency labels outside of sustainability building standards. • Promote bio-based materials, whilst decarbonizing core building materials. • Increase education in climate and carbon literacy across all built environment sectors.
EDUCATION	<ul style="list-style-type: none"> • Elaborate new indicators to ensure that Higher Education can play its leading role in the transformation towards regenerative sustainability and is well accounted for and prioritized in financial planning. • Those exercising leadership functions should adopt servant leadership in the academic world, governed through collaboration rather than in a competitive spirit. • Networking among all of the experienced organizations, teachers, businesses that hold important skills and experience to contribute to capacity building, to encourage involvement, so that people become active healers of the Earth.

EQUITY	<ul style="list-style-type: none"> • Address equity, equality and social justice issues in all aspects of the built environment including rights to natural elements (views, light, air, water) • Ensure representation of nature and natural features (land, rivers) across built-environment processes as a stakeholder with increasing legal status.
ECONOMICS	<ul style="list-style-type: none"> • Promotion, education and application of regenerative economic literacy (such as the doughnut model) across all areas of the built environment. • Embed Social Justice in all economic considerations. • Embed Nature-based accounting in all economic considerations.

VITAL SCALE JUMP INTERVENTIONS

Application of complexity theory thinking and distilling the pattern of interventions down to three simple rules, provides a simple but vital set of rules for Scale Jumping towards a regenerative built environment.

DECARBONIZE EVERYTHING within the built environment.

HEAL THE FUTURE repair past damage, enable eco systems to thrive through a connected-with-nature SEVA mindset.

CLIMATE + ECOLOGY LITERACY improve our awareness and knowledge of climate and ecology throughout all aspects and sectors of the built environment, on a par with language and cost literacy.

1.10 AN INTRODUCTION TO REGENERATIVE ECONOMICS

Ivan Šulc



Context: RESTORE set out to Rethink Sustainability Towards a Regenerative Economy. A regenerative economy can be described as one that makes a transition from a degenerative economy, focused on using, even exhausting, our planets resources and eco-systems, to one that enables ecological systems to return to a healthy state and then to evolve and to thrive continuously. The regenerative economic aspects are explored through the work of the RESTORE working groups.

INTRODUCTION

There is only one planet Earth, but by 2050, 9 billion people will be living here and will be consuming as if there were three Earths (ICC, 2012; European Commission, 2020). Global consumption of such materials as biomass, fossil fuels, metals and minerals is expected to double over the next forty years, meanwhile annual waste generation is expected to increase to as much as 70% by 2050 (European Commission, 2020). At the same time, we live in a time of enormous economic inequalities between people and societies, accelerated environmental degradation, climate change and social inequalities. It is obvious that current economic models, whose ultimate goal is economic growth at any cost (Nugent, 2021), measured in terms of gross domestic product (total and per capita), are not sufficient to achieve a better distribution of wealth, economic equality and well-being, and their prioritization of economic growth has a negative impact on the environment.

Therefore, since the early 2000s, different economic models have been promoted that are designed to achieve social equality and inclusion, to stop environmental degradation and to stimulate environmental regeneration while maintaining economic productivity. Some of these are well known (green, blue and circular economy), while others have emerged more recently (regenerative economy, doughnut economics). In this chapter, these models are briefly presented, as they are all related to and aspire towards building the regenerative economy, and are oriented towards Sustainable Development Goals.

GREEN ECONOMY

The term green economy first appeared in the UK in 1989 in the document *Blueprint for a Green Economy* (Pearce *et al.*, 1989; SDG, 2021b) and was associated with the original concept of sustainable development. However, it gained more attention during the 2008 financial crisis and at the 2012 UN Conference on Sustainable Development (Rio+20) (UN, 2021). The regenerative economy usually includes measures that promote inclusive economic growth while improving environmental protection and social progress (ICC, 2012) and refers to how to make the economy greener, *i.e.*, more environmentally and socially sustainable. It is defined as “an economy in which economic growth and environmental responsibility work together in a mutually reinforcing fashion while supporting progress on social development” (ICC, 2012, 10).

Employment and income growth are generated through public and private investment in green economic activities and infrastructure with resource efficiency as one of the key elements (UNEP, 2021). It is beneficial for society, because lower amounts of resources are needed, volumes of waste, carbon emissions and pollution per unit of product or service are all reduced, biodiversity loss and ecosystem service closures are prevented (UNEP, 2021).

According to the Green Economy Coalition (2021), five basic principles of the green economy are:

1. **wellbeing** – focuses on increasing wealth (not only financial but also human, social, natural and physical capital) that supports wellbeing.
2. **justice** – promotes equitable distribution of opportunities and income within and between generations in a long-term perspective.
3. **planetary boundaries** – protects, restores and invests in nature to provide goods and resources for the economy, but also for its intrinsic values; recognizes the limited availability of natural resources and applies the precautionary principle to avoid environmental degradation and loss of biodiversity.
4. **efficiency and sufficiency** – supports sustainable consumption and production to create prosperity within planetary boundaries, by applying a low-carbon, resource-efficient, diverse and circular economy.
5. **good governance** – evidence-based decision-making; involves the public and is guided by integrated, accountable and resilient institutions (Green Economy Coalition, 2021).

CIRCULAR ECONOMY⁵³

The circular economy is a fairly well-known concept dating back to the 1960s and 1970s. However, it has gained popularity and application since the late 2000s, due to the factors that have previously been analysed. The concept was developed as a contrast to the still dominant linear economy model. In the linear economy, raw materials are extracted from the environment during production and processed into new products that are eventually discarded into the environment (UNIDO, 2021). Raw materials are not infinite and eventually run out, while waste accumulates and drives up the cost of its disposal or pollution (Fig. 11).

⁵³ A circular economy is based on the principles of designing out waste and pollution, keeping products and materials in use, and regenerating natural systems.

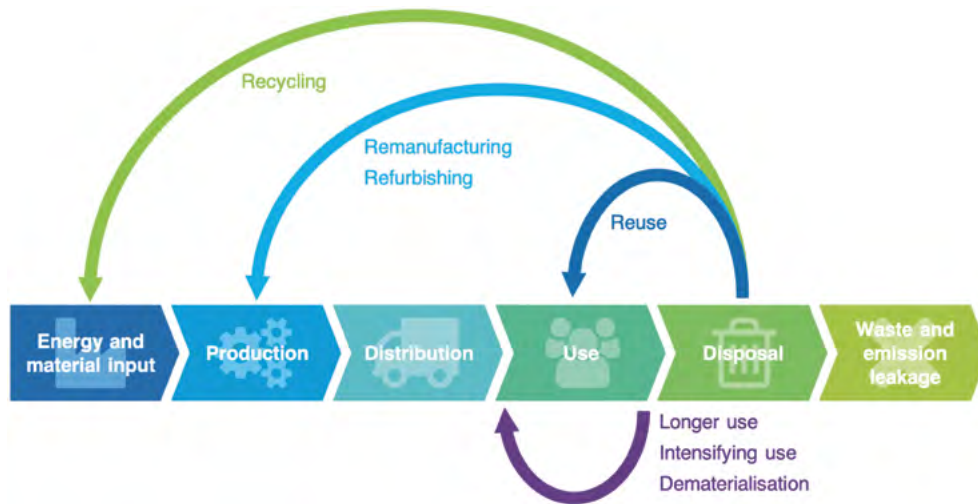


Fig. 11: Circular economy. Source: Geissdoerfer et al. (2020).

The circular economy is seen as a new way of creating value and prosperity, by extending the life of products and moving waste from the end to the beginning of the supply chain. It uses two different cycles – biological and technological. The biological cycle refers to the consumption of food and bio-based materials designed to be returned to the environment through composting and anaerobic digestion processes (e.g., wood products), or transformed into energy. The technological cycle involves the design of products that can be reused and restored as whole products, components, and resources (e.g., buildings, airplanes...) (Ellen MacArthur Foundation, 2021). In other words, in the circular economy, products are manufactured in such a way that they can be disassembled and materials can be broken down by nature or returned to nature, with the goal of not throwing anything away and reducing the need to buy new goods (Sustainability Guide, 2021). Ultimately, resources are used more efficiently by using them more than once, which should lead to less waste (UNIDO, 2021).

While the linear economy is based on the *take-make-use-dispose* principle (Totten, 2021), the circular economy relies on a range of strategies, some of which are well known (e.g., *reuse, reduce, recycle*) and others have only recently emerged (renting rather than owning things) (Kunzig, 2020). On the supply side, the circular economy focuses mainly on production chains in: (1) electronics and ICT, (2) batteries and vehicles, (3) packaging, (4) plastics, (5) textiles, (6) construction and buildings, and (7) food, water and nutrients (European Commission, 2020). On the demand side, the circular economy should provide citizens with high-quality, functional and safe products that are efficient, affordable, last longer and are designed for reuse, repair and high-quality recycling (European Commission, 2020).

BLUE ECONOMY

Green and circular economies have been widely accepted as desirable economic principles and have been used in building new regenerative models. One of them, to be applied to the oceans, coastal and marine areas, is the blue economy, which dates back to the Rio+20 UN Conference on Sustainable Development held in Rio de Janeiro in 2012 (Lesperance, 2012).

It owes its emergence to the fact that oceans cover two-thirds of the Earth's surface and account for over 95% of the biosphere. As the largest source of photosynthesis, they support life on Earth due to oceanic plankton that produce well over 70% of all oxygen, absorbing CO₂, recycling nutrients, and regulating the global climate and temperature; they provide food for humans; coastal and marine areas provide an environment for tourism and recreation; and four-fifths of global trade passes through the oceans (SDG, 2021a).

Unfortunately, oceans suffer from pollution, over-exploited fisheries, acidification from carbon dioxide uptake, biodiversity loss and degradation of coastal environments (SDG, 2021a). Least-developed countries and small island developing states are most affected by these processes. It underlines that the *business-as-usual* principle, which refers to the endless economic exploitation of the oceans and their resources, leading to environmental damage, is nearing its end and requires a paradigmatic shift towards a new approach that recognizes and values all the benefits of the oceans by incorporating environmental and social dimensions (UNEP, 2015).

The blue economy aims to promote economic growth, social inclusion, and the preservation and improvement of livelihoods, while ensuring the environmental sustainability of oceans and coastal areas (World Bank, 2017). Similar to the green economy, it aims to improve human well-being and social equity while reducing environmental risks and ecological scarcities (The Commonwealth, 2021). The blue economy includes various components, some of which are used as economic resources, while others are ecosystem services that support life on Earth and human activities:

1. seafood harvesting (fisheries, aquaculture and related activities).
2. the use of living marine resources for pharmaceutical and chemical products (*e.g.*, health products).
3. the extraction of marine non-living products for use as non-renewable sources (mining, oil and gas, desalinization).
4. the use of renewable and non-exhaustible energy sources (wind, wave and tidal energy).
5. trade and commerce in and around oceans (shipping and shipbuilding, maritime transport, ports and related services, coastal development, tourism and recreation).
6. services provided by marine ecosystems – carbon sequestration, coastal protection, waste management and biodiversity existence (World Bank, 2017).

To be classified as a blue economy, activities must meet three main criteria:

- a) They must provide social and economic benefits for present and future generations.
- b) They must restore, protect and maintain biodiversity, productivity, resilience, core functions and intrinsic values of marine ecosystems.
- c) They must be based on clean technologies, renewable energy and circular material flows (World Bank, 2017).

The blue economy aims to minimize environmental risks and ecological damage from marine activities and to ensure that economic activities are balanced with the long-term capacity of marine ecosystems to keep them healthy and resilient (World Bank, 2017). Therefore, it should be low-carbon, efficient and clean (UN DESA, 2014), based on sharing, circularity, cooperation, solidarity, resilience, opportunity and interdependence (UNEP, 2015) and socially inclusive (SDG, 2021a). In addition, environmentally sustainable ocean-based economic growth, including job creation necessary to reduce poverty, has recently been associated with the notion of blue growth (World Bank, 2017).

REGENERATIVE ECONOMY

Sustainable Development Goals marked the turning point to rethink the transition from current economic models, from a linear to a circular economy, and subsequently to a restorative and finally to a regenerative economy (Brown *et al.*, 2018) (Fig. 12). The regenerative economy is linked to the concepts of restorative and regenerative sustainability. Restorative sustainability involves restoring social and environmental systems to a healthy state, while regenerative sustainability enables social and environmental systems to maintain a healthy state in continuous evolution (Brown *et al.*, 2018).

Originally, the regenerative economy represented an economic system that works towards the regeneration of capital assets (providing goods and services for human well-being), by focusing on the planet and the goods and services it provides (Kibert, 1999). If circular, it nurtures an ever-increasing capacity for life without diminishing capital, meaning that it not only preserves existing resources, but creates new ones while

maintaining a balance between people, planet and economic turnover (Totten, 2021). As with the circular economy, it relies on renewable energy and requires fewer materials (Brown *et al.*, 2018), by reusing and remaking everything or, if nothing else is possible, recycling it back into raw materials or using it as a source of energy (UNIDO, 2021).

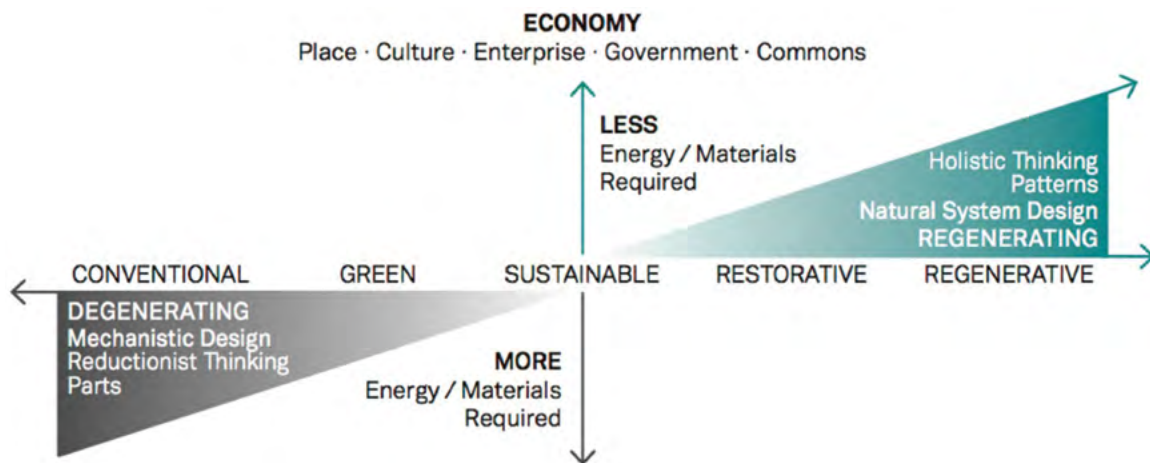


Fig. 12: Stages of development, from conventional to the regenerative economy.

Source: Brown *et al.* (2018) according to Fullerton (2015).

While the green economy is primarily aimed at well-being, the aim of the regenerative economy is to create a stable and healthy system that also includes humanistic and environmental values, beyond sustainability (Brown *et al.*, 2018). The regenerative economy therefore includes the natural environment, the built environment, and the social environment (Totten, 2021) and it gives back more than it takes from the planet (European Commission, 2020). Compared to conventional economic models, the regenerative economy (1) improves rather than degrades environmental health; (2) provides increased community health and well-being by using place-based, inclusive, and participatory design methods, and (3) strives for healthier, more resilient, and more equitable communities (Brown *et al.*, 2018).

The main aspect of the regenerative economy is the understanding of how the whole system works and is linked to other systems, rather than focusing on individual units. A regenerative system involves self-renewing processes that build relations and foster the continuous evolution of socioeconomic and ecological systems (Brown *et al.*, 2018).

DOUGHNUT ECONOMICS

Regenerative economics were applied in the development of a new model of doughnut economics that economist Kate Raworth (UK) presented in 2012, in response to the fact that economic success is measured solely by GDP growth, while finite environmental resources and the consequences of human actions are ignored (Renenergy, 2021). Raworth (2012) emphasized that the development imperative should no longer be economic growth itself, but should guide humanity towards safe and equitable spaces (within the doughnut), to enhance the wellbeing of humankind and to achieve prosperity. Therefore, the measurement of economic development must include social and environmental indicators (*e.g.*, carbon emissions and the proportion of the population that suffers hunger) (Raworth, 2012), which have been incorporated in the model.

Doughnut economics presents a visual model of sustainable development in the form of a doughnut or a lifebelt that combines the concepts of social foundations (inner hole), regenerative economy (doughnut) and the environmental ceiling or planetary boundaries of human activities (outer crust) (Fig. 13). The aim of the model is to ensure that no one lacks the necessities of life (e.g., food, water, housing) and that society will not exceed the limits on supporting environmental systems (e.g., climate, fresh water) and will remain below the environmental ceiling (Raworth, 2012; 2021).

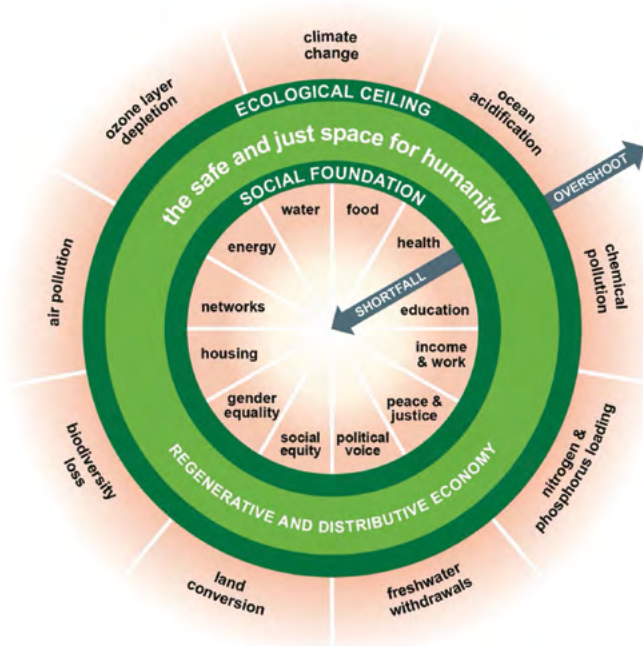


Fig. 13: Doughnut economics. Source: Raworth (2017).

The social foundations of this theory represent a minimum of all human demands to be satisfied (Raworth, 2012). They include twelve dimensions: (1) water; (2) food; (3) health; (4) education; (5) income and work; (6) peace and justice; (7) political voice; (8) social equity; (9) gender equality; (10) housing; (11) networking; and, (12) energy (Raworth, 2017).

Environmental ceiling is represented by the planetary boundaries defined by Rockström *et al.* (2009), which include nine critical Earth system processes with thresholds that, if exceeded, could cause irreversible and potentially abrupt changes across the planet (Raworth, 2012). These global processes are: (1) climate change; (2) ocean acidification; (3) chemical pollution; (4) nitrogen and phosphorous loading; (5) freshwater withdrawal; (6) land conversion; (7) biodiversity loss; (8) air pollution; and, (9) ozone layer depletion (Raworth, 2017). Critical thresholds can vary regionally and are often represented by a gradient of increased risk rather than a single tipping point (e.g., climate change in mountainous and lowland areas). The largest space between the two outer layers (of the doughnut) represents both a safe and a just space for people within environmental and social limits (Raworth, 2021), with regenerative and distributive economy to which all should aspire.

The doughnut economy was adopted in 2020 by the city of Amsterdam, which was the first in the world to adopt it officially as a model for post-Covid recovery and a completely different approach to urban development (Perillo, 2020). Amsterdam’s urban development strategy, based on the doughnut economy, focuses on three main value chains:

1. food and organic waste streams – short food chains that provide a robust sustainable food system; sustainable and healthy food; high quality processing of organic waste.
2. consumer goods – reducing the city's consumption; using existing assets sparingly; making the best use of discarded products.
3. built environment – transitioning to a circular approach in the existing city through collaborative efforts and setting circular criteria (City of Amsterdam, 2020; 2021).

Several cities around the world are currently considering the doughnut economy as a potential model for their future urban and economic development.

REFERENCES

- Brown, M., Haselsteiner, E., Apró, D., Kopeva, D., Luca, E., Pulkkinen, & K.-L., Vula Rizvanolli, B. (Eds.) (2018). Sustainability, Restorative to Regenerative, COST Action CA16114 RESTORE, Working Group One Report: Restorative Sustainability.
- City of Amsterdam (2020). Amsterdam City Doughnut: A tool for transformative action. <https://www.amsterdam.nl/en/policy/sustainability/circular-economy/> (Accessed: 11 March, 2021).
- City of Amsterdam (2021). Policy Circular economy. <https://www.amsterdam.nl/en/policy/sustainability/circular-economy/> (Accessed: 11 March, 2021).
- Ellen MacArthur Foundation (2021). What is a Circular Economy? <https://www.ellenmacarthurfoundation.org/circular-economy/concept> (Accessed: 10 March, 2021).
- European Commission (2020). A new Circular Economy Action Plan: For a cleaner and more competitive Europe. https://eur-lex.europa.eu/resource.html?uri=cellar:9903b325-6388-11ea-b73501aa75ed71a1.0017.02/DOC_1&format=PDF (Accessed: 10 March, 2021).
- Geissdoerfer, M., Pieroni, M. P., Pigosso, D. C., & Soufani, K (2020). Circular business models: A review. *Journal of Cleaner Production*, p.123741.
- Green Economy Coalition (2021). The 5 Principles of Green Economy. <https://www.greeneconomycoalition.org/news-analysis/the-5-principles-of-green-economy> (Accessed: 10 March, 2021).
- International Chamber of Commerce (ICC) (2012). Green Economy Roadmap: A guide for business, policymakers and society. https://iccwbo.org/content/uploads/sites/3/2012/08/Green-Economy-Roadmap-a-guide-for-business_-policy-makers-and-society.pdf (Accessed: 10 March, 2021).
- Kibert, C. J. (Ed.) (1999). *Reshaping the Built Environment: Ecology, Ethics, and Economics*. Island Press, Washington DC.
- Kunzig, R. (2020). Is a world without trash possible? *National Geographic*, <https://www.nationalgeographic.com/magazine/article/how-a-circular-economy-could-save-the-world-feature> (Accessed: 10 March, 2021).
- Lesperance, J. (2016). The Blue Economy: Origin and concept. <https://www.col.org/news/news/blue-economy-origin-and-concept> (Accessed: 11 March, 2021).
- Nugent, C. (2021). Amsterdam Is Embracing a Radical New Economic Theory to Help Save the Environment. Could It Also Replace Capitalism? <https://time.com/5930093/amsterdam-doughnut-economics/> (Accessed: 11 March, 2021).
- Pearce, D., Markandya, A., & Barbier, E. (1989). *Blueprint for a Green Economy*, Routledge.
- Perillo, D., 2020: Amsterdam Doughnut Economics. <https://www.eni.com/en-IT/circular-economy/amsterdam-doughnut-economics.html> (Accessed: 11 March, 2021).
- Raworth, K. (2012). A safe and just space for humanity: Can we live within the doughnut? https://www-cdn.oxfam.org/s3fs-public/file_attachments/dp-a-safe-and-just-space-for-humanity-130212-en_5.pdf (Accessed: 11 March, 2021).
- Raworth, K. (2017). *Doughnut Economics: Seven Ways to Think Like a 21st-Century Economist*. Chelsea Green Publishing.
- Raworth, K. (2021). What on Earth is the Doughnut? <https://www.kateraworth.com/doughnut/> (Accessed: 11 March, 2021).
- Renenergy (2021). The Doughnut Economy, Explained. <https://renenergy.co.uk/insight/what-is-the-doughnut-economy-and-how-does-it-apply-to-climate-change/> (Accessed: 11 March, 2021).
- Rockström, J., Steffen, W., Noone, K., Persson, Å., Chapin, F. S., . . . Foley, J. (2009). Planetary boundaries: exploring the safe operating space for humanity. *Ecology and Society* 14 (2): 32. <http://www.ecologyandsociety.org/vol14/iss2/art32/>.
- Sustainable Development Goals (SDG) (2021a). Blue Economy Concept Paper. <https://sustainabledevelopment.un.org/content/documents/2978BEconcept.pdf> (Accessed: 11 March, 2021).

- Sustainable Development Goals (SDG), (2021b). Green Economy, <https://sustainabledevelopment.un.org/index.php?menu=1446#:~:text=The%20term%20green%20economy%20was,Markandya%20and%20Barbier%2C%201989> (Accessed: 11 March, 2021).
- Sustainability Guide (2021). Circular Economy. <https://sustainabilityguide.eu/sustainability/circular-economy/> (Accessed: 10 March, 2021).
- The Commonwealth (2021). Blue economy, <https://thecommonwealth.org/blue-economy> (Accessed: 10 March, 2021).
- Totten, S. (2021). The Regenerative Economy: Sustaining Society's Future by Design, https://www.southface.org/the-regenerative-economy-sustaining-societys-future-by-design/#_edn1 (Accessed: 11 March, 2021).
- UN DESA (2014). Blue Economy Concept Paper, United Nations, New York.
- UN (2021). Green Economy. <https://sustainabledevelopment.un.org/topics/greeneconomy> (Accessed: 10 March, 2021).
- UNEP (2015). Blue Economy – Sharing Success Stories to Inspire Change. UNEP Regional Seas Report and Studies No. 195, Nairobi.
- UNEP (2021). Green Economy. <https://www.unep.org/regions/asia-and-pacific/regional-initiatives/supporting-resource-efficiency/green-economy> (Accessed: 10 March, 2021).
- UNIDO (2021). Circular Economy. <https://www.unido.org/our-focus-cross-cutting-services/circular-economy> (Accessed: 10 March, 2021)
- World Bank (2017). The Potential of the Blue Economy: Increasing Long-term Benefits of the Sustainable Use of Marine Resources for Small Island Developing States and Coastal Least Developed Countries. <https://openknowledge.worldbank.org/bitstream/handle/10986/26843/115545.pdf?sequence=1&isAllowed=y> (Accessed: 10 March, 2021).

1.11 EDUCATING THE EDUCATORS

Ann Vanner and Giulia Sonetti



Context: The aim of RESTORE is to encourage a paradigm shift in sustainability education, equipping educators with the appropriate knowledge to influence architecture and building environment students at early stages of their professional career and then throughout. The outcomes from RESTORE within the 5 working group publications, the RESTORE final book and numerous papers provide the background to this paradigm shift. Here, we explore why this shift is important, what we can do to educate the educators and what initiatives are currently in place.

“Faced with the indeterminate situation, the enigma, the person can withdraw, feeling inadequate, turn to something easier and more reassuring, indulge in reverie, can withdraw into himself, or he can look reality in the face. Only in this case he begins to reflect.”

J. Dewey, *The sources of a science of education*, 1929 (1951)

In global civilization, each person is called upon to activate individual skills, in order for sustainability “to flourish” through an unprecedented encounter between culture and politics, economics and education. Starting from the context in which the RESTORE project was articulated, which identifies a need for new - unprecedented – sets of skills for sustainability, a sustainability educator should be able to know how to operate in competitive and complex systems and which provide for increasingly participatory approaches, a reflection of a pedagogical nature: given the importance of continuous training, the need emerges to develop skills capable of strengthening the values of human development, integral and authentic, aimed at a fair and healthy investment for the future for the community and the territories. The need for each individual to assume the duty - and to have the right - to exercise their abilities so that sustainability may “flourish” anticipates a further consideration when working in the area of competences. It is also necessary

to examine the issue of “evidence” that is sufficient to testify to individual acquisition of skillsets or competences. It quickly becomes the element through which a system (the educating community, among others) recognizes the abilities of each individual.

Objective documentation or through “evidence to document the possession of certain learnings (skills, abilities, knowledge)” is difficult, but it should not deter us from a holistic approach to the training of trainers. Social and peer pressures will adapt education and training, offering society opportunities for a transition towards economic systems of greater sustainability that cannot be approached through “mechanical” actions alone, the adaptation of competence profiles and the input of new content or techniques that update teaching-learning settings.

Surely all these social learning processes are useful, although it should not be denied that the changes of (local and general) context, coupled with the form of prioritization and social and learning processes within which these learning actions take place, are more complex and challenging.

In the current context - from the local to the world scale - opposing tensions surround innovation and conservation in relation to the means of production and patterns of consumption. These tensions are rooted in different theories and models of society (more or less inclusive, more or less democratic) and the cultures that produce them, consistent with customs, practices, objects, ideas, norms, beliefs and values.

Communities of practices such as RESTORE Cost Action are networks to address this complexity and opacity and to reduce the tensions that are present, relying on some methodological assumptions and analysis that have guided design and action.

Among these, the following are noted as relevant:

1. closer ties between schools, vocational training courses and the other individuals confronting change at a territorial level are the result of “communities of practice” that are learning. These communities lead us towards - cultural and social - repositioning of the actors centred upon new development objectives (for territories, organizations and people).
2. educational research, positing the idea that learning cannot merely be a mechanistic result of teaching, views these changes as social practice, an active process within a territory and therefore within socio-culturally and historically defined participatory frameworks.

Etienne Wenger defined communities of practice in the following way: “groups of people who share a professional or technical interest and who, based on this interest, interact to improve their way of acting”. Social participation is understood as a process of learning and knowledge that modifies individual behaviours and that structures identities, starting from the experiences and meanings that individuals attribute to practices in a given social context. Learning in communities of practice is the result of a negotiation of meaning and objectives between the individual and the community: learning implies acquiring, with respect to a specific practice, knowledge and skills that are socially recognized.

In particular, Wenger defines several dimensions, essential components for a community of practice, which are:

1. the existence of a mutual commitment, on the basis of which the members interact and share the experience that is proper to each one in order to feed collective learning;
2. the creation of a joint venture, through the formation of a shared image of the problems and viable solutions, the negotiation of priorities among the members and the development of a common awareness;
3. the presence of a shared repertoire, represented by sets of knowledge, tools, methods and artefacts through which to convey collective knowledge and to preserve the memory of the community;
4. the formation of bonds that are established between the partners that place the organizational bonds of a hierarchical type in second order.

The community-of-practice construct offers a fundamental contribution through new interpretations for learning processes in organizational and territorial contexts. As in training for trainers, the community of practice is relevant, because its intention is to intervene to develop knowledge and, above all, new forms of relationships, for a different model of sustainable development.

Research actions, a methodological approach that can promote, support and nurture communities of practice, can be added to the Wengerian perspective of the “cultivation” of communities of practice (Lipari & Scaratti, 2014) in which trainers undertake self-promotion.

Confrontation of the problems among the actors whose interactions produce knowledge and change: the former legitimized by the consent of those who produce the knowledge and the latter corroborated by the transformative effects of action in the field.

In trans-disciplinarity, the alignment of change, innovation and learning (the actors, groups and organizations) is achieved through the emphasis that is placed on research in combination with its results when applied to actions within the different organizational and territorial contexts, rather than simply the ‘broad participation’ of people united in a transformative action.

School teachers and trainers on vocational courses are active promoters of change. They are called upon to “innovate” the teaching of new inputs that emerge from a changing world and that require learning to interact in complex, heterogeneous and turbulent situations.

As Mortari underlined: “educating means identifying and organizing educational experiences that are the best possible for students in specific contexts, with respect to the objective of encouraging the full flowering of their potential in each one”.

Education and training are practices guided by a goal, which is continually revised through a constant analysis of situations, identifying and refining strategies and tools for its effective achievement, so as gradually to redefine present and future activities. If reflection is conceived as rooted in experience, the risk is to remain “trapped” within it: there is a need for shared thinking, because “critical thinking is not learned outside a public space where the encounter with the thought of others, which allows the object to be considered from other sides as well, makes it possible to apply critical canons to one’s own point of view”. It is the possibility of sharing different knowledge within a “recognized space”, which prompts the creation of a competent community of practice, in which teachers not only elaborate knowledge from experience, but review theories and ways of working with external realities.

Training and self-training help develop and organize the knowledge of teachers and trainers and other actors within the community of practice. The researcher-teacher learns from experience in a reflective and meta-reflective process and through the search for new knowledge through study, exchange with peers and other individuals, in dedicated training settings that respond to the particular needs of the path that is followed.

This active process takes place within a community of practice where other individuals also learn. It is characterized by the participation and involvement of individuals within a context of action in which they find themselves operating. Training for trainers is, therefore, a social and collective phenomenon, in which the cognitive dynamics are inseparable from the social ones where knowledge is restructured together to take contexts into account, until new ones are configured (Guile 2010). This vision implies a correlation between learning and identity: in fact, learning within a community means learning to be and to act as a member, rather than simply acquiring a set of notions and information. In this way, both the social and the cultural dimensions play a central role in the construction of identity and competence, giving rise to a learning process that transforms individual capabilities for operating within the world, simultaneously modifying identity (repositioning) and behavioural models.

POLAR OPPOSITES

In education, the climate and ecological crises are already here to stay. Throughout the whole journey a learner may follow, from starting primary to completing a masters. Students entering high school in 2021 will graduate from university in 2030. They may graduate as architectural technicians and teachers, or they may become researchers without having a formal, defined grasp of the climate and the ecological crises we are facing. Likewise, their educators may be seeking further knowledge, confidence and structural support to tackle these issues within educative settings.

There are currently two trains of thought – one from the point of view expounded within the UK Ministry of Education that stresses the presence of environmental issues on the school curriculum in the same way as other disciplines such as Geography and Materials Science address their respective learning areas. At the other extreme, the youth-led organization Teach the Future is urgently lobbying to re-purpose the entire education system around the climate emergency and ecological crisis. And it is campaigning because *'our schools, colleges and universities need to become living laboratories for us to learn about the climate crisis and the impacts people are facing'*.

There is a lot of good work happening within individual schools and outreach projects and there are positive initiatives at country and international levels. For example, Italy has made climate change education mandatory in schools. However, further tasks remain to be completed.

We need to change 'what' the individuals are taught, 'how' they are taught and 'where' they are taught. Education and the educator play critical roles within the dynamic transformation that is needed.

We need to teach for the future and not for the past.

The rapid developments over the last 100 years have shown us that almost every aspect of the lives of coming generations will differ radically from our own.

And dramatic changes are also needed in our approach to schools and education.

However, we are still teaching and preparing the next generation for workplaces and roles that may no longer be relevant. Students sit in rows, are discouraged from using technology and are all expected to walk through the 'gateway' of exams at the end of their education. Many of the learning environments date back to the Victorian era, are inflexible, uninspiring and in some cases detract from the learning potential of students unable to learn with sufficient speed and to match their capabilities with their goals.

HOW CAN WE SUPPORT TEACHERS AND EDUCATORS?

We should support the educators and challenge 'how' and 'what' we teach. Working collectively will help us to do so – an individual has insufficient reach: we cannot rely on governments, but if we work together as a community then we are able to bring about change.

These communities might be within schools or colleges, within groups of educational establishments or within the wider community that these institutes serve.

Studies have shown that many educators have a limited understanding of climate and ecological issues and little confidence in teaching these subjects

We should support teachers to become facilitators of learning, rather than lecturing, so that they no longer need a deep understanding of the given topic, but they should know how to learn about it. They should be part of the learning journey.

We should support the ongoing learning of educators, to ensure that their knowledge bases are updated, so that the skills of their trainees can upskill a sector, through the definition of a framework that retains a degree of competence in a rapidly changing world and that acknowledges the various levels of knowledge

and skills already used in practice. Among others, the UN Sustainability goals and the work of the Restore group underpin this balance between knowledge and skills.

We should also challenge 'where' we teach. School buildings should use renewable energy, support locally grown food, focus on waste issues; steps that will encourage discussion on climate change and ecological crisis.

We should incorporate learning on the climate and ecological issues into all aspects of school life and involve the whole community in the formation of learning environments where students are educated while living and breathing these issues.

The aspiration is to provide education for the learners and the educators that will empower them in all three aspects of sustainability: economic, environmental and social.

CONCLUSION

Children are becoming more aware of the climate crisis. We need to embed the teaching of climate change within the curriculum and build a common language for climate action.

Students need support to learn about the climate and ecological crises and the opportunities to consider climate solutions. This will increase our resilience in society as well as our competitiveness in a green economy.

We have a collective responsibility to instil an awareness of climate change in students, but to do this we need to support educators now, so that they can start teaching them this year and next year, so that that the child entering high school today will graduate in a few years' time with the knowledge and understanding they need to perceive how they can live their life in the future that we are now constructing.

REFERENCES

- Bornatici, S. (2017). Circular economy, green jobs and educational planning: investment for the future. MeTis Mondì Educativi.
- Mortari, L. (2009). Research and reflect. Carocci, Rome, p. 11.
- Guile, D. (2010) The Learning Challenge of the Knowledge Economy. Rotterdam, Sense.
- Rychen, D. S. & Hersh Salganik L., (2007). Acting key competencies. Scenarios and strategies for conscious wellbeing. FrancoAngeli, Milan.
- Wenger, E. (2007). Cultivating Communities of Practice. Perspectives and experiences of knowledge management. Guerini e Associati, Milan.
- Wenger, E. (2006). Community of Practice. Learning, meaning and identity. Raffaello Cortina, Turin.

1.11.1 EDUCATION IN 2030 RESTORD

Zvi Weinstein



Context: A personal reflection on the importance of Education to bring about the RESTORD city, linking work from the RESTORE Working Groups towards a future regenerative curriculum.

Education can be the most important and significant pillar of life. Without human-based education, our world might otherwise have appeared cruel, savage, humiliated, disrupted and destroyed. People in our contemporary world, including the young generation are growing up in a world of overwhelming environmental challenges resulting from the declining state of the global environmental crisis.

Any prediction of an unknown future situation is complex, all the more so if it is to predict the image of education systems and their performance ten years on from the day, especially considering the global crises and issues that the World now faces: climate change, the COVID-19 pandemic, waves of immigration from poor to developed countries, technological innovations that change planning, thinking, concepts, paradigms, values, human behaviour and interactions and global economics. These issues might be solved with the help of building models and scenarios whether possible or impossible events, even if we analyse the present or past situations that we have witnessed.

The questions that are raised concern the pace at which education systems will change through integrated, productive and sustainable stages to achieve a comprehensive way of life that balances nature, humankind and the planet. These three elements have to be at the core of educational curricula from now on.

Webster Dictionary and Wikipedia define Education as follows:

Education is the process of facilitating or the acquisition of knowledge. Skills, values. Benefits and habits. Educational methods include teaching, training, storytelling, discussion, direct research. It can take place in formal or informal settings and any experience that has a formative effect on the way one thinks, feels or act. In RESTORE WG1, Education was defined as the essential element of moving from sustainability to regenerative. Education has to be an integral and vital part of all sustainability strategies. A definition that reflects

the thinking of Aldo Leopold (1940): “*Teach the student to see the road, to understand what he sees, and enjoy what he understands*”. Therefore, we have to relate to Education as the key component through which abilities and capabilities can be designed, as the priority factor leading the city of RESTORE 2030 towards new directions for the future of nature and planet ecosystems.

The RESTORE motive “aims at a paradigm shift towards restorative sustainability for new and existing buildings, promoting **thinking** and multidisciplinary **knowledge**, leading to solutions that celebrate the richness of **design creativity** while enriching **user experience**, health and wellbeing inside and outside buildings in harmony with urban ecosystems, **reconnecting users** to nature” (Brown *et al*, 2017). The emboldened words encapsulate the symbols of human mind skills to use co-design, co-creativity, co-productivity and co-participation to achieve the integration and comprehensiveness of nature-people-planet relationships. For RESTORE 2030 we have to pave the way for an educational and enlightened future city where the answers to the issues we face can be found within the interactions between nature-people-planet that can become a tool to overcome global crises.

On the basis of the RESTORE agenda, curriculum programs will be such as to encourage student’s self-motivation, interest, skills, self-awareness and self-consciousness towards innovative approaches for an integral planet, repairing the failures of previous generations whose circumstances led to the global crises of our contemporary era. Education will still be a long-drawn-out process with the flexibility to comply with new and unexpected issues produced over time.

The key is to mobilize resources and incentives, using the power of nature and human skills for further innovations to solve global problems. Curricula should focus on professions that include a variety of subjects: environment education, nature studies, chemistry, biology, physics, mathematics, economy, energy, water, agriculture, geography, greening areas, waste, circular economy, sensible consumption, besides other important basic values, culture, human rights, equity, and art.

Education should stem from the vision of holistic and living system

thinking. It means that education is involved in changing the behaviour of society and all ecosystems engaged in our human-nature-planet relationships.

A large partnership or stakeholder consortium is needed to create curricular impact together with academia, private and public sectors, teachers, students, research institutes, international organizations and experts working in fields relating to the environment and climate change, the natural world and the built environment.

1.12 SCHOOL COLLABORATIVE ACTIVITY

Blerta Vula and Alison Watson



Context: Educating children of school age on sustainability, regenerative issues and the natural world is key to *futureproofing the next generation*. Here we explore what is possible and how sustainability education and awareness can be undertaken through challenges, competitions and collaboration

A HOME FOR EVERYONE: RESTORD 2030

Education and awareness among all generations is the key transforming indicator that would substantially impact people everyday choices and the way they treat the planet. Many researchers believe that the concept of sustainability shall become a living culture in order to be successful. It shall be embedded in the way every person makes their daily decisions and understand that each of this decision matter. Accordingly, they encourage that the sustainability principles should be involved in the official curriculums starting from the primary school or even kindergartens so children would be raised with the sense of admiration for the nature and would praise its benefits.

While discussing of integrating the concept of sustainability into the everyday learning process, many teachers express their willingness to be involved, but they either lack the confidence, knowledge or sources to do so. In this case, professionals shall be included to provide their experience on disseminating the materials such as “Place-based Education: Practice and Impacts” from Gregory Smith⁵⁴ (2013) which provides excellent examples on how children can dissolve the theory of waste management or recycling into real day-to-day actions.

54 <https://www.routledgehandbooks.com/doi/10.4324/9780203813331.ch22>

The main challenge is to facilitate the well-known triangle of education – teacher/child/parent and simplify the examples which can be further explored and incorporated into the learning schedules. Simplified illustration using pictures, drawings, maps, models, experiments, games, quizzes and challenges, would enhance children comprehension and encourage their engagement. Moreover, bringing together national and international school experiences would boost children’s potential to shift the sustainability idea into a higher level.

Facilitating its professionals' network RESTORD 2030 is assisting a joint collaboration between MILENIUMI 3 School in Pristina (Kosovo) and a King EGBERT School in Sheffield (UK).

KING EGBERT SCHOOL

King Egbert School (KES) is a co-educational secondary school with academy status (age range 11–18) in the village of Dore in the south-west of Sheffield, South Yorkshire, England. The headteacher (from January 2017) is Paul Haigh. The school is named in honour of King Egbert of Wessex, who became recognised as overlord of England at Dore in 829.

The school's values are

- Academic excellence for all;
- Showing respect at all times;
- Having high aspirations and personal goals that go beyond our time in school;

King Egbert School Curriculum is diverse which enhance inclusiveness and innovation.

- Sequential curriculum is academically rigorous. It is built around the principles of knowledge retention and teachers work together to develop strategies to ensure that learning is embedded in the long-term memory and cognitive overload is avoided.
- They teach the cultural capital and wider knowledge that will enable disadvantaged students to close gaps, achieve the best grades and succeed in life.
- They believe in choices. At KES the curriculum model is inclusive for all, ensuring every student enjoys and achieves equally. It develops academic, social and cultural capital and also meets the specific needs and aspirations of individuals.
- Students learn in a school environment that is exciting and inspiring, leading to opportunity, success, personal growth and further study.

MILENIUMI 3 SCHOOL

Mileniumi 3 is a non-public primary and secondary school founded in 2004 in Pristina, Kosovo. The vision of the school is to maximise and enhance the uninterrupted development of each student in accordance with their mental and physical abilities and in accordance with the requirements of the Knowledge Society. The mission of the school is to be a model by offering programs with high standards, which create conditions for students to have self-confidence and to be creative builders of the future. The school community focuses self-being of the child to sow the desire to learn, to take risks and responsibilities, as well as to contribute to the transformation of oneself and society.

Taking advantages of good English speakers of Mileniumi 3 School children, the initial collaboration between schools will consist of mutual online meetings, short presentations between the children from both schools on how they understand sustainability, how they live and then how they would imagine the best living conditions for them, their parents and grandparents.

They will be asked to explain how they make their everyday choices:

- At home: recycling, food, energy;
- At school: recycling, energy use, travel to;
- Leisure: access to outdoor space;

Further competition, games and quizzes may take place which will further be used as examples for other school's involvement.

CHALLENGE

Level: Secondary school

Requirement: Design a home for residents of RESTORD CITY.

BACKGROUND

RESTORD is a small, vibrant city of 102,000 people that prides itself on being socially just, ecologically robust and culturally rich. It's politicians, planners and officials have embraced regenerative design principles, where community and nature go hand in hand.

Children and young people have played a central part in RESTORD's transition to a fit city. Too young to drive, their focus has been on making streets and highways suitable for human powered access, on foot and by wheelchair or bicycle. Public places and parks are wonderful places to gather safely, meet family and friends, keep fit and explore the natural surroundings.

The City Mayor has now asked local schools to help once more, by designing a Home for Everyone. Somewhere that any RESTORD resident can live.

THE REQUIREMENT

Class Of Your Own⁵⁵ will take the successful 'Home for Everyone' Challenge and align to RESTORE outcomes for a pan European young audience. Working together, they will take on a variety of design, engineering and construction professional roles, working together in teams to create the ideal inclusive house - a house that, no matter who you are, or what your individual needs are, provides a home that is fit for purpose throughout your, and its, lifetime.

Students will consider the range of people who live in your community. From the very young and very old, those who are fit and those who are not, those who are disabled, those who are not and a whole range of people who face different challenges in their everyday lives.

The challenge is to design a zero-carbon house that is safe, comfortable, accessible and secure, that truly supports health and wellbeing; a house that is truly a home.

Suitable for children and young people age 10 – 16, schools can use the programme as a project delivered within the timetable as part of the STEM curriculum⁵⁶ or as an inter-school RESTORE challenge, supported by the member community.

55 <https://www.classofyourown.com>

56 <https://www.stem.org.uk/resources/collection/3166/national-curriculum>

1.13 STORYTELLING

Giulia Sonetti



Context: As Terry Tempest Williams⁵⁷ notes “Storytelling is the oldest form of education”. If we are to address and halt the climate and ecological breakdown, then the key element in the awareness, education and literacy is the age-old art of telling stories. From around the fire pit to the modern lecture hall, from the forest glade to the business conference room, we all have stories to tell. In what follows, the background and the importance of storytelling in the RESTORE context is explained.

How storytelling supports building a common vision

Narrative and storytelling have always been associated with the folklore of peoples, rather than with a measurable scientific phenomenon. This approach has so far been linked to some areas of social life, and linguists and anthropologists rather than scientists have studied it in search of reoccurring models.

Storytelling was born to communicate across heterogeneous genders, ages and cultures, with the aim of capturing the attention of the public, regardless of backgrounds (Denning, 2004), and it might therefore be worth looking at it through the “lens” of sociology. Simply this characteristic alone, which is knowing how to connect all audiences at all levels, makes it the perfect means of establishing an agreement with all stakeholders (internal and external), to improve team satisfaction and raise awareness of organizational and design quality (Louisot, 2006; Donaldson, 2006).

There is empirical evidence to support the thesis that narration is capable of producing real and effective results on the target audience (Denning, 2007) and that each entity (be it a single individual or an organization) has a story to tell (Boje, 2006).

Since the mechanisms underpinning stories are similar around the world and are therefore recognizable and familiar ways of transferring and understanding information, stories have the potential to contribute

⁵⁷ See <https://study.com/academy/lesson/terry-tempest-williams-biography-books.html>

to a non-threatening and comfortable exchange of perspectives, especially for learning purposes (Star & Griesemer, 1989).

Humans are also physiologically adapted to the use of stories: when reading and writing a novel, we remember and recall information better and feel more engaged in action than when reading or writing a text or any other treatise (Bruner, 1991; Bhalla, 2013; Janda & Topouzi, 2013, Rotmann *et al.*, 2015). Personal, sectoral, and disciplinary viewpoints and forms of thinking that are taken for granted are sometimes no longer 'at the front of the mind' anymore, but have become tacit frames of mind that can be supported by storytelling (Brown & Gray, 1995).

Other collaborative processes, particularly those focused on finding consensus and defining "solutions" too early, such as the processes that architects in a design studio or engineers in large construction companies may follow, will not always provide opportunities to unlearn one's own position and understand the value of other voices and perspectives. When considering the built-environment design process, the voices of the actual users of the buildings or natural species involved in the drawings is often unheard. Storytelling is therefore a multi-stakeholder engagement technique that can create an environment where participants appreciate that all information is situated and context-dependent (Jasanoff *et al.*, 1995) It can result in participants' discussion around beliefs, requirements, constraints, demands, incentives, and dangers, (Jasanoff *et al.*, 1995) and so on as part of a collective strategy focused on finding out what underpins a particular point of view (Hanleybrown *et al.*, 2012; Mourik *et al.*, 2015; Rotmann, 2017). However, this benefit of storytelling as a method for learning and unlearning, also known as sense-making, has received little attention thus far (Diedrich *et al.*, 2011).

The awareness that prejudice is completely appropriate in stories and that it is a good entry point to knowing another person's viewpoint is an important part of unlearning (Mourik *et al.*, 2015). The fact that every storyteller has a particular social status and access to specific information leads to bias (Alvesson & Sköldb-berg, 2008).

The development of empathy is also another important aspect of this technique. Empathy is important for double-loop learning, because it creates a level playing field and fair perspectives (Star & Griesemer, 1989). According to Boase (2008), when we listen to stories, we do so as individuals, rather than as members of a professional environment, or an industrial or a social class. When talking about collaborative storytelling, Boase (2008, p.8) argued that "[in] working together to create a mutually acknowledged / accepted truth, the storytellers increase their understanding of each other. This fact makes narrative transactions a useful tool for encouraging social reflection and producing mutual understanding and potentially, social cohesion."

Stories can be interpreted as a boundary object that establishes common contexts and, as a result, bridges disciplinary aspects as well as sectoral, and social divides (Lindberg & Czarniawska, 2006; Polman & Hope, 2014).

Eventually, another important aspect of storytelling is inclusivity. When dealing with highly complex problems, such as urban-based challenges, everybody should have a say in the decision-making process. Stories are something that almost everyone is likely to have grown up with, and as such, they are a potentially simple and yet powerful means of information exchange, as opposed to other mediums, such as (scientific) papers.

As a result, stories may animate individual listeners who will simply let the background scenery and the voices enter their minds as they participate in telling the stories to themselves; listeners who may not otherwise feel qualified or capable (Miller *et al.*, 2015).

We're all capable of telling a story.

REFERENCES

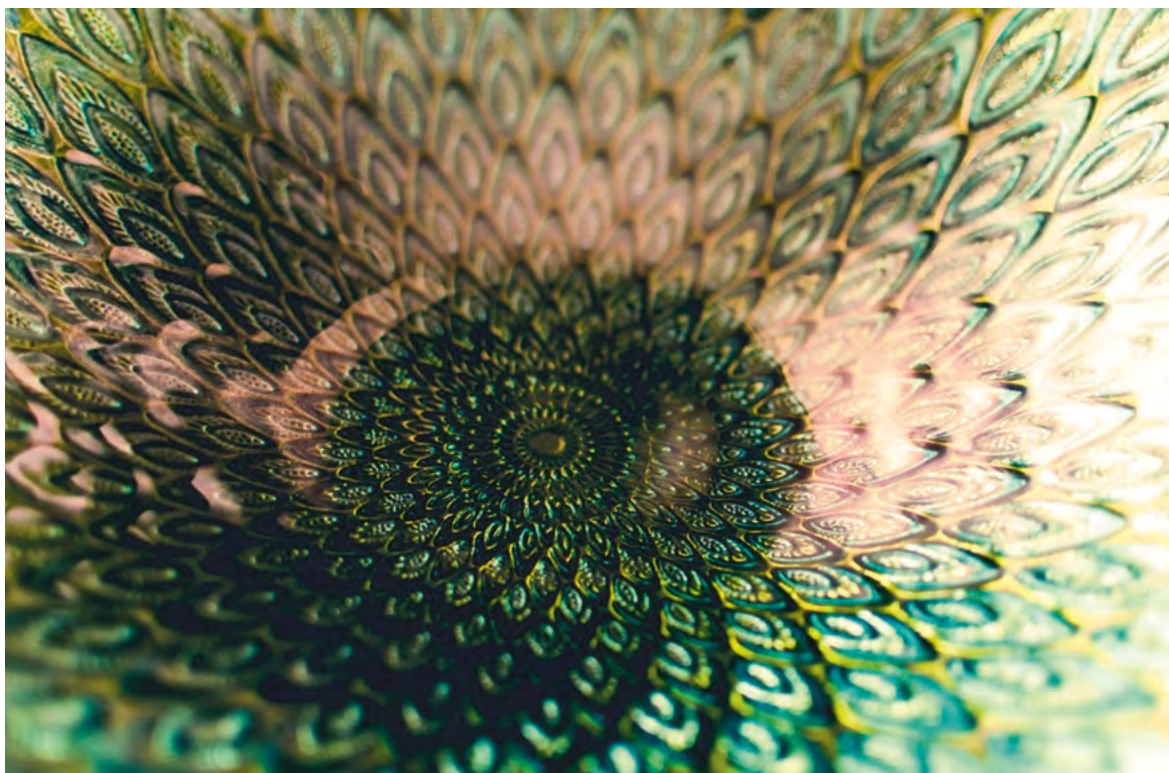
- Alterio, M. and McDrury, J., 2003. *Learning Through Storytelling in Higher Education*. London: Kogan Page.
- Alvesson, M. and Sköldbberg, K., 2008. *Reflexive Methodology*. London: Sage.
- Arrobbio, O., & Sonetti, G., 2021. Cinderella lost? Barriers to the integration of energy Social Sciences and Humanities outside academia. *Energy Research & Social Science*, 73, 101929.
- Argyris, C. and Schön, D., 1978. *Organizational learning: A theory of action perspective*. Reading, MA: Addison Wesley.
- Bhalla, J., 2013. It Is in Our Nature to Need Stories. *Scientific American Guest Blog*. [online] Available at <https://blogs.scientificamerican.com/guest-blog/it-is-in-our-nature-to-need-stories/>
- Boase, C., 2008. *Digital Storytelling: For Reflection and Engagement. A Study of the Uses and Potential of Digital Storytelling*. University of Gloucestershire: Centre for Active Learning & Department of Education.
- Bracken, L. and Oughton, E., 2006. What do you mean? The importance of language in developing interdisciplinary research. *Transactions of the Institute of British Geographers*, 31(3), pp. 371-382.
- Bruner, J., 1991. The narrative construction of reality. *Critical Inquiry*, 18(1), pp. 1-21.
- Carbonell, J., Sanchez-Esguevillas, A. and Carro, B., 2017. From data analysis to storytelling in scenario building. A semiotic approach to purpose-dependent writing of stories. *Futures*, 88, pp. 15-29.
- Dahlstrom, M., 2014. Using narratives and storytelling to communicate science with non-expert audiences. *Proceedings of the National Academy of Sciences of the United States of America*, 111(4), pp. 13614- 13620.
- Goodchild, B., O'Flaherty, F. and Ambrose, A., 2014. Inside the eco-home: using video to understand the implications of innovative housing. *Housing, Theory and Society*, 31(3), pp. 334-352.
- Irwin, A. and Wynne, B., eds., 1996. *Misunderstanding Science? The public reconstruction of science and technology*. Cambridge: Cambridge University Press.
- Jasanoff, S., Markle, G., Petersen, J. and Pinch, T., 1995. *Boundaries of Science*. *Handbook of Science and Technology Studies*. London: Sage.
- Lang, D., Wiek, A., Bergmann, M., Stauffacher, M., Martens, P., Moll, P., Swilling, M. and Thomas, C., 2012. Transdisciplinary research in sustainability science: practice, principles, and challenges. *Sustainability science*, 7(1), pp.25-43.
- Mourik, R., Robison, R., and Breukers, S., 2017. *Storytelling - SHAPE ENERGY facilitation guidelines for interdisciplinary and multi-stakeholder processes*. Cambridge: SHAPE ENERGY.
- Mourik, R, Sonetti, G., Robison, R.A.V., 2021. The same old story – or not? How storytelling can support inclusive local energy policy, *Energy Research & Social Science*, 73, 101940.
- Schneidewind, U., Singer Brodowski, M., Augenstein, K. and Stelzer, F., 2016, *Pledge for a Transformative Science: A Conceptual Framework*. Wuppertal Paper 191, Wuppertal Institute for Climate, Environment and Energy.
- Selin, C., Kimbell, L., Ramirez, R. and Bhatti, Y., 2015. Scenarios and design: Scoping the dialogue space. *Futures*, 77, pp. 4-17.
- Sovacool, B., 2014. What Are We Doing Here? Analyzing Fifteen Years of Energy Scholarship and Proposing a Social Science Research Agenda. *Energy Research & Social Science*, 1, pp. 1-29.
- Throgmorton, J., 1992. Planning as persuasive storytelling about the future: Negotiating an electric power rate settlement in Illinois. *Journal of Planning Education and Research*, 12(1), pp. 17-31.
- WAPTAC, 2010. *Weatherization works! Storytelling Manual*. Weatherization Assistance Programme Technical Assistance Center.
- Weinshenk, S., 2014. *Your Brain On Stories*. The Team W Blog. [online] Available at <http://www.blog.theteamw.com/2014/11/04/your-brain-on-stories/>





PART TWO
Literacy and Education

2.1 EDUCATION DOMAIN MATRIX



Deciding upon the necessary and the desired atmosphere, ecological awareness and environmental understanding within education and in educational praxis is an area that requires urgent development.

The following ‘domain and topic’ matrix (Fig. 14) has been much discussed within RESTORE FAD working group sessions.

It is included here so that the reference materials signposted within this guide may be cross-referenced, which will assist the creation, development and enhancement of existing awareness and education modules.

SCOPE	WG	EDUCATION DOMAIN								
		Primary	Secondary	Further + Trade Edu	Degree + Masters	Research	Design Practice	Construction and Material	Building Operation	Community
Climate Literacy	1	Grounding awareness and knowledge	Sound awareness & knowledge to enable integration with other curricula topics	Advance awareness & knowledge to enable application in specialisms	Advance knowledge & awareness to enable integration with degree subject matter	Expert awareness & knowledge to further body of knowledge of research and knowledge	Detailed awareness & knowledge to enable application in design role	Detailed awareness & knowledge to enable application in construction & material production	Detailed awareness & knowledge to enable application with building management role	Detailed awareness & knowledge to enable application with community based initiatives
Carbon	1, 2, 3, 4, 5,									
Ecology	1, 2, 5									
Place	1, 2, 3, 5									
Regenerative Economics	1, 2, 3, 4, 5									
Social Transition	1, 5									
System Thinking	5									

Fig. 14: Education Domain ‘Needs’ and Regenerative Scopes.

2.2 CLIMATE LITERACY

Martin Brown and Scott McAulay⁵⁸, AAS



Context: Climate literacy is vital in understanding and taking action on the climate and the ecological emergency we face. Here Martin Brown and Scott McAulay explore what is possible with examples of readily available climate literacy approaches.

Introduction to ECO-LITERACY (from WG1)

Eco-literacy is defined as the ability to understand the natural systems that make life on earth possible (Norris, S. P., 2012). To be eco-literate means to understand the principles behind the organization of ecological communities (*i.e.*, ecosystems) and to apply those principles to the creation of sustainable human communities (Sealey, F., 2011).

The term was coined by American educator David W. Orr and physicist Fritjof Capra in the 1990s, thereby bringing a new value to education; the “well-being of the earth” (Surhone, L., 2011). An ecologically literate society is a sustainable society which will not destroy the natural environment on which its population depends (De Leo, J., 2010).

Climate Literacy furthers our understanding, how we have arrived at the current climate and ecological emergency, our impact as individuals, and the roles within the built environment and of the built environment itself, along with the actions we can and must take to pull back from a climate and ecological breakdown. Climate Literacy is the contextual, pragmatic understanding of the implications of climate breakdown upon any given activity, its own contributions towards those implications, and recognition of where it has the potential to positively respond. Climate Literacy paves the way for regenerative design by familiarizing

⁵⁸ Scott McAulay <https://www.linkedin.com/in/scott-mcaulay-2025/>

designers with today's changing context - one of a climate emergency. It equips them with knowledge with which designers can appropriately, proactively and regeneratively respond.

Notably, this sort of literacy requires a paradigm shift in both education and practice: historically, it has not been fundamental in education, today there is no guarantee that it will be a core component of built-environment training, nor is it something universally possessed by practitioners. The knowledge gap in climate literacy poses both a challenge to transitioning to more regenerative models of construction and economics and creates an opportunity to redefine conventions as the necessary upskilling takes place.

Anthropocene Architecture School

The **Anthropocene Architecture School (AAS)**⁵⁹ is an agile educational platform that creates spaces to proactively engage with climate change around the built environment: cultivating climate literacy in architectural education and the wider construction industry. The **AAS** was formed at the beginning of 2019 and launched in July during Scotland's Architecture Fringe.

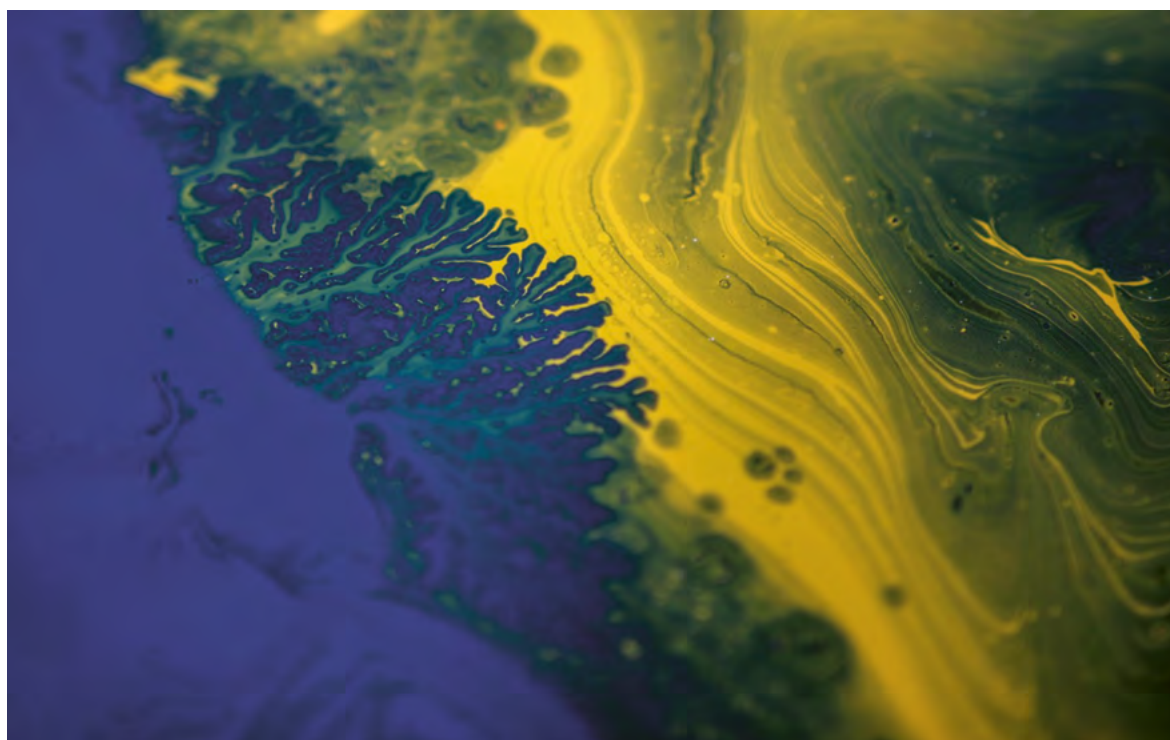
What began as a protest against the architectural climate of inaction following the 2018 IPCC Report, organically evolved into an educational project and has since engaged with over 3500 people. Notably, despite its roots in activism not academia, **AAS** has been invited to provide lectures and workshops at 15 universities to date – within and beyond the U.K., including teaching staff for example at the Mackintosh School of Architecture at Glasgow's School of Art.

Building upon talks on the Climate Emergency, a Climate Literacy and the Built Environment workshop was developed and delivered at Glasgow School of Art. This workshop contextualized the climate emergency in detail, explored narratives around climate change and created spaces to engage with personal responses. It then placed the built environment in that context of climate crisis – noting both its impacts and its potential, and then explored solutions and strategies to decarbonize it - with aims and ambitions to promote regenerative design.

AAS frames and articulates climate literacy in terms of a positive responses to the climate emergency that appears to have arrived at a critical moment. These workshops have been requested across the built-environment sector, in education, at institutes and in practice. It is becoming clear that the appetite within student cohorts is equal to the growing awareness within built environment disciplines that fluency in climate literacy to address our Climate Crisis is essential to work in construction.

59 <https://www.facebook.com/Anthropocene.A.S/>

2.3 RESTORD REGENERATIVE GAMES AND EXERCISES



RESTORE related exercises that can act as icebreakers, development games, and learning exercises for your education, training, awareness and development.

For facilitation, guidance and support see Sections 3 and 4.

Table 1: RESTORD Exercises

Exercise	Description	Reference Material	Facilitation Support	Education Levels
What does Good Look Like?	Ask questions to stimulate debate on what good looks like and how we can turn it into a reality, as individuals, organizations and projects	RESTORE Publications FutuRestorative ILFI materials	Carlo Battisti Martin Brown	Schools University Sessions Events and Workshops In House Training and Development
Make it personal	Based on Ego-Eco-SEVA thinking, promoting debate on how we should, how we can think differently from just Eco thinking. Through relating the Ego Eco SEVA approach to the hockey-stick graph of temperature patterns, prompt debate on personal timelines, why have things increased in my lifetime, what can we do within our timelines	RESTORE WG 1, 2, 5	Martin Brown	Schools University Sessions Events and Workshops In House Training and Development

Exercise	Description	Reference Material	Facilitation Support	Education Levels
Mindfulness	Introduce mindfulness interventions within workshops, meetings, lectures, giving all the opportunity to pause, remove mind baggage, become grounded, present and focused on the subject of the session.	WG1	Martin Brown	Schools University Sessions Events and Workshops In-House Training Development
The Good, the Bad and the Ugly	An exercise to prompt debate and discussion on what is good, bad and ugly within an organization, project, home, training venue. Use a framework such as the Living Building Challenge	Fairsnape Living Building Challenge	Carlo Battisti Martin Brown Alison Watson	Schools University Sessions Events and Workshops In-House Training Development Project evaluation
RESTORD 2030	An exercise to prompt discussion on What would we like future cities to look and feel like 2030. Use visuals only to imagine future cities. Use one-word or one sentence for clarity. Use the exercise for building and project evaluation.	RESTORD 2030	Jelena Brajković Martin Brown	Schools University Sessions Events and Workshops In-House Training and Development Project evaluation
Nature at the table	An exercise to explore how nature could be represented in a business or project. What would nature say if it had citizenship rights.	Where nature is given citizenship rights: Curridabat, Costa Rica. The Magpie River, CA, New Zealand	Martin Brown Alison Watson	Schools University Sessions Events and Workshops In House Training Development Project evaluation
Connecting with Nature	An exercise to experience connectivity with nature. Take your meeting, workshop, classroom outside to find a sit spot, where it feels right, and then through self, one-to-one or group sharing, express experience through sensing, emotions, delight, connections* and reciprocity**. **Connectivity, reflect on how we are connected *Reciprocity – what could I do as a gift that would benefit me, not now, but indirectly eventually		Martin Brown Alison Watson	Schools University Sessions Events and Workshops In-House Training Development Project evaluation
SDGs	The main goal is to analyse through multidisciplinary collaboration and using an edutainment approach how the (organization, community, network, project) is aligned or may be better aligned with the 17 Sustainable Development Goals, so that its contribution to their achievement is effective.		Carlo Battisti Cristina Larcher	Schools University Sessions Events and Workshops In House Training Development Project evaluation

Exercise	Description	Reference Material	Facilitation Support	Education Levels
Lost Word Card Game	Game play based on Jackie Morris and Robert Macfarlane's best-selling book, Lost Words, encouraging reflection and discussion on our connectivity with the natural environment and loss of biodiversity.	Available from https://folkbytheoak.ticketsrv.co.uk/tickets/12	Martin Brown	Schools University Sessions Events and Workshops In-House Training Development Project evaluation
The RESTORD 2030 Card Game	In development. Coming in 2021		Martin Brown	Schools University Sessions Events and Workshops In House Training and Development Project evaluation

2.4 ARCHITECTURAL TECHNOLOGY - PRACTICAL CREATIVITY

Ann Vanner



Context: Learning through doing. Provides an overview and insight into ways of addressing regenerative design in Architectural Technology Education at UCLan, UK.

THE PRACTICE OF ARCHITECTURAL TECHNOLOGY

What is architectural technology? In very simple terms it is the creative act of making building, from conception design to the physical manifestation of the scheme, into and during construction and more importantly beyond – to maintenance, use and deconstruction.

Our focus is on detailing the building and the design process involved in creating these details/junctions. As Architectural Technologists we understand the importance of the build-up of the materials that make buildings. The building fabric is our main area of interest and concern. We are responsible for detailing these junctions, where different materials meet – to control moisture, minimize heat loss and ensure air tightness.

With greater awareness of the climate and ecological matters and the environmental impact buildings have on our health and wellbeing of the individual and the planet, we need to encourage a more ecological, regenerative and just approach to architectural details.

Details are undervalued – and the creative and innovative solutions often employed are hidden, invisible to the user of the building once complete.

We need to teach the next generation to detail creatively and responsibly.

THE EDUCATION OF ARCHITECTURAL TECHNOLOGY

Learning should be as engaging as possible, hands on teaching, not hour after hour of lectures in dark theatres. Students can retain much more information and they are highly motivated to learn more, even after the formal timetabled slots have finished.

Teaching architectural technology at UCLan, we rely on pedagogic research and follow the theories of 'hard fun' and 'serious play', which have grown into our own tagline of 'Practical Creativity- Learning Through Doing'.

While we are a studio-based course, we are very outward facing and have tried to use several tactics to break down the physical confines of the four walls of the studio.

ATS ON TOUR

Taking the teaching off campus and teaching in unusual and inspiring places for example Cuerden Valley Visitor Centre and Brockholes Nature Reserve.

Learning from the everyday to ensure the everyday is well built

A series of *sketching walks* exploring the surrounding area and noticing what does and does not work for each person and trying to devise solutions to resolve poorly detailed buildings

TWITTER CRITTER

Using social media to engage with practitioners and professionals who are unable to attend the studio. Work is digitally reviewed and engagement between student and industry is encouraged.

LOCAL PROBLEMS/ GLOBAL SOLUTIONS – GLOBAL PROBLEMS/LOCAL SOLUTIONS

Using the UN Sustainability Goals to explore all aspects of the design process of details and both their local and global impact, from extractions to deconstruction.

BANNING WORDS

Over the last two years, we have banned the word 'sustainability' in the studio and in work. It means that students have to explain their ideas and thoughts more clearly and show what they mean in diagrams or in drawings. This approach has questioned both written and spoken words and has highlighted the need for students to clarify the terms and words they use, so that the precision of their explanations improves.

ENGAGING IN LIVE CROSS DISCIPLINE DESIGN PROJECTS

The use of live projects on the course has always been of importance. The students value the experience, the opportunities and the insight it gives them – working with a real client, to defined briefs, within a professional context. We have used the Living Building Challenge Petals as a research framework, linking and understanding accreditation schemes and the realities of implementing them within a project and explaining them to a client.

The design of the detail is a process that links both the technical means of construction and its interior and exterior appearance. The work of the Architectural Technologist is key to effective design, execution and delivery of inclusive communities. It is important that what the students learn during their studies is aligned with industry needs, with a focus on ensuring that graduates understand how to apply theory in a useful, and meaningful way within the industry.

We need to teach the next generation to detail creatively and responsibly and we feel that when they have the space to learn in innovative and inspiring ways, it will ensure that they are ready to face both climate and ecological crises and provide the solutions that we all need.

2.5 FUTURESTORATIVE EDUCATION MODULE



Context: The following illustrates the education module developed in conjunction with FutuREstorative⁶⁰, used in UK schools and adapted as the framework for the COST RESTORE Training School in Lancaster, UK, in 2017.

FUTURESTORATIVE STUDENT MODULE PROGRAMME

Version 5 (NOVEMBER 2017)

Module (Chapter)	Area of Study	Taught (Lecture/Presentation) 10 Hours Total	Interactive (Student Project Based) 10 Hours Total	Short Introduction Exercises
Culture and Challenges				
1 (1)	Understanding of the tradition, history and culture along with the challenges that the built environment faces in making the transition to a restorative, sustainable sector.			
Concepts				
2 (2)	Exploring and understanding the key concepts for a restorative sustainability. Exploring the teachings and insights of thought leaders, books and publications.			
New Thinking				
3A (3)	Exploring and understanding the potential net-positive impact of the built environment on human and ecological health.			
3B (4)	Exploring and understanding the impact and influence of Nature, Earth, Light and Air on health and wellbeing			
3C (5)	Exploring and understanding the impact and influence of Energy, Water, Materials, Waste and Carbon			
Standards				
4 (6)	Exploring and understanding the philosophies, ecological background and rise in interest and application of new, restorative sustainability standards			
Digital				
5 (7)	Exploring and understanding the impact and influence of the digital age on restorative sustainability potential.			

FutuREstorative is available through RIBA: <http://www.ribabookshops.com/item/futurestorative-working-towards-a-new-sustainability/85971/>

MARTIN BROWN

@FAIRSSNAPE

FUTURESTORATIVE

2017

Fig. 15: FutureRestorative Student Module Programme.

60 https://www.ribabooks.com/futurestorative-working-towards-a-new-sustainability_9781859466308

CASE STUDY 1

We present two case studies that illustrate the topics covered in this book, at a technical level but also at an educational level. Both case studies have inspired many educational groups.

Klan Kosova TV and Arena Center

LOCATION: Pristina, Kosovo
 CLIENT / OWNER: Devolli Corporation
 ARCHITECT: Astrit Nixha - anarch
 THEME/TYPOGRAPHY: Renovation, Reuse, Reduce, Recycle
 COMPLETION YEAR: 2016

Driven by 'TripleR' mindset of Circular Economy-Reduce, Reuse, Recycle, 'Klan Kosova TV Studios and Arena Center' building is one of the first examples of transformation of industrial buildings, from a shock absorbers factory built in the '80s, into state-of-the-art TV Studios and event center. This building screams and whispers, moralises and absorbs, all at the same time. It represents an invariable resistance to the new order while seeking the puzzling future. Elements of the existing factory and raw waste from different parts of the country are used contributing in building's environmental impact by creating architectural expression. The spaces and the surfaces jump at you, as if they are craving to let you know about themselves, about their history, about where they come from and what they represent. They shout out, touch me...!!! The tactile nature of the installation elevates ones' experience, and one is miraculously dragged into this continuous performance, of the walls, of the floors, of the ceiling, of the details. The surprise sense is continuous and leads you to all constructing parts of the theatre, that come together.

The level of detail is mesmerising, and these details synergistically form a whole that continuously performs and entertains prior to the "real" theatrical performance.

The material palette is all organic. Woods, bushes, ropes, bricks, are all sourced locally. Either reclaimed from the former industrial building, or foraged on the fields not far from the Theatre itself. One cannot help but think of the parallels to the Michelin Star culinary chefs that so masterfully play with your senses to ensure a multisensory experience, with utilising products foraged not far from where their lab/restaurants perform miraculous multisensory experiences.

This is architecture and interior delicious feast, masterfully prepared and served to all the lucky visitors that will always get at least two performances for the price of one. The meaning of theatre is redefined here, there is always a performance before performance.

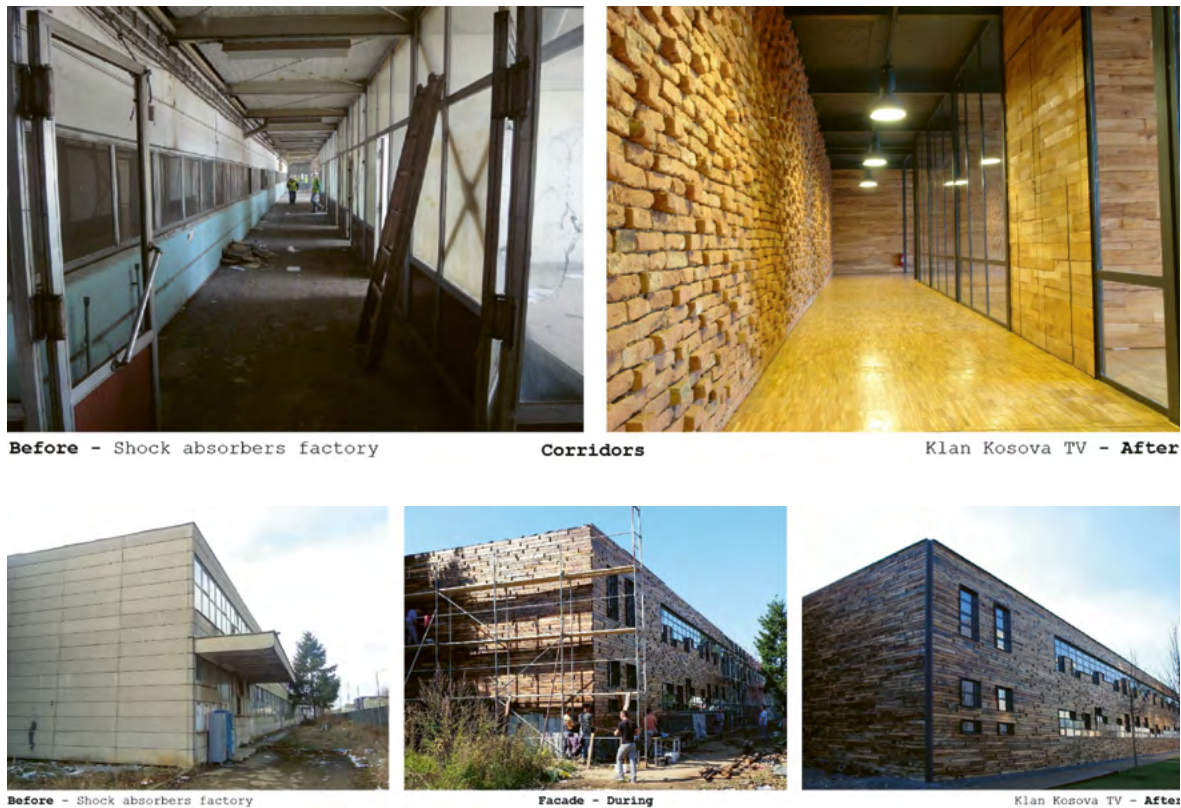


Fig. 16 Klan Kosova TV and Arena Center Before and After. Artan Hoxha,

Video: <https://www.youtube.com/watch?v=iUDhwnRjbPY&t=7s>

CASE STUDY 2

Cuerden Valley Park Visitor Center

LOCATION: Preston, UK.
 CLIENT / OWNER: Cuerden Valley Park Visitor Trust
 ARCHITECT: Barbara Jones, Straw Works
 SUSTAINABILITY: Martin Brown, Fairsnape
 THEME/TYPOGRAPHY: New Build, Living Building, Natural Materials
 COMPLETION YEAR: 2016

Built largely by volunteers of the Cuerden Valley Park Trust with training courses run by the School of Natural Building for carpentry, car tyre foundations, straw bale walls, lime rendering and cedar shingling.

The roof is covered in cedar shingles – with the rear section mono pitch and the front section forming a curved roof. Where the two join, clerestory windows provide natural daylighting into the corridor below. A curved glazed screen forms the front elevation, with a raised decking area overlooking the fantastic views of the parkland.

It was the first Living Building Challenge registered building in the UK. The Living Building Challenge is the built environment's most rigorous performance standard. It calls for the creation of building projects at all scales that operate as cleanly, as beautifully and as efficiently as nature's architecture.

Now in operation it is a thriving café and visitor centre that has contributed to the increase in people visiting the Park, and in doing so increased awareness of our connectivity with nature and the benefits of regenerative nature-based buildings. It is used by many social, outdoor and education groups, in addition to being a vibrant café meeting venue.



Fig. 17 Cuerden Valley Park Visitor Center. Image Martin Brown

Video: https://www.youtube.com/watch?v=xNi31Qdq-MM&feature=emb_imp_woyt





PART THREE
RESTORD Resources

3.1 RESTORD RESOURCES: RESTORE ANIMATIONS



REthinking Sustainability TOwards a Regenerative Economy

RESTORE animations. 90 second animated overview of RESTORE working groups state of the art and vision.

The animation videos can be viewed here: <http://bit.ly/RestoreAni>

ANIMATION	RESTORE WG	Description	Category	Educational Levels
What is the RESTORE Action?	0	Sustainable buildings are critical to a future that is socially just, ecologically restorative, culturally rich, and economically viable. The built environment sector needs to adopt net-positive, regenerative sustainability thinking. The RESTORE project advocates, mentors, and influences for this vision through working groups, training schools, events, and Short Term Scientific Missions.	Climate, Carbon, Place, Ecology, Energy, Economics, Social, System Thinking	Primary, Secondary, UG/Master, Research
Sustainability, Restorative to Regenerative.	1	RESTORE WG1 is progressing a paradigm shift in built environment thinking, from sustainability to restorative sustainability and on to regenerative sustainability. Buildings can become part of the climate regeneration solution, by switching to restorative and regenerative approaches.	Climate, Carbon, Place, Ecology, Energy, Economics, Social, System Thinking	Primary, Secondary, UG/Master, Research Practice
Regenerative Design in Digital Practice	2	RESTORE WG2 focuses on restorative design practice. Designing urban environments and improving existing buildings requires a regenerative paradigm shift. The key is creating cities that are part of nature. Buildings need to be open to the outside, linking nature and humans.	Climate, Carbon, Ecology, Energy, Well-being	Primary, Secondary, UG/Master, Research Practice
Regenerative Construction and Operation	3	RESTORE WG3 focuses on restorative building and operations. Buildings can be constructed, operated, and maintained in a regenerative manner. RESTORE identified three areas of major transformation for construction and real estate industries during the main stages of the life cycle of a building: positive net environmental impact construction strategies, urban facilities management, regenerative drivers of historic buildings and existing building stock.	Carbon, Economics, Energy, Economics, Social, Well-being	Primary, Secondary, UG/Master, Research Practice

ANIMATION	RESTORE WG	Description	Category	Educational Levels
Regenerative technologies for the indoor environment	4	RESTORE WG4 focused on defining what a regenerative indoor environment is; which technology solutions are needed to enable the best indoor environment quality, whilst producing the lowest environmental and social impact; and methods to assess that environment. A regenerative environment is one where humans live harmoniously with the natural environment, thereby promoting occupant wellbeing and health.	Carbon, Climate, Ecology, Economy, Social, Well-being	Primary, Secondary, UG/Master, Research Practice
Scale Jumping	5	RESTORE WG5 focused on interactions between Humans, Nature and the Built Environment, applying systems thinking to go beyond individual aspects in regenerative design to highlight bidirectional influences and interconnections. Scale jumping regenerative strategies can be designed using digital tools, platforms, metrics and practices.	Carbon, Climate, Ecology, Economy, Social, Well-being	Primary, Secondary, UG/Master, Research Practice

3.2 RESTORE RESOURCES: PUBLICATIONS



REthinking Sustainability TOwards a Regenerative Economy

The key RESTORE publications (essential reading) are listed below. Collated and referenced by Ivan Šulc.

Table 2: Key RESTORE Publications.

PUBLICATION	RESTORE WG	Description	Category	Educational Levels
Brown, M., Haselsteiner, E., Apró, D., Kopeva, D., Luca, E., Pulkkinen, K., & Vula Rizvanolli, B. (Eds.) (2018). Sustainability, Restorative to Regenerative. COST Action CA16114 RESTORE, Working Group One Report. COST RESTORE, EURAC Research. https://www.eurestore.eu/wp-content/uploads/2018/05/RESTORE_booklet_print_END.pdf .	1	The publication presents a summary of the work of WG1, its attempt to progress with a paradigm shift in built-environment thinking, from sustainability to restorative sustainability and on to regenerative sustainability.	Climate, Carbon, Place, Ecology, Energy, Economics, Social, System Thinking	Primary, Secondary, UG/Master, Research Practice
Naboni, E., & Havinga, L. C. (Eds.) (2019). Regenerative Design in Digital Practice: A Handbook for the Built Environment. Bolzano: EURAC. https://www.researchgate.net/publication/336121907_Regenerative_Design_In_Digital_Practice_A_Handbook_for_the_Built_Environment#fullTextFileContent .	2	The publication explores how the regenerative concept is now being applied to the regenerative design of cities and buildings. A series of digital design approaches are exemplified via a series of examples drawn from leading international practitioners and researchers.	Climate, Carbon, Ecology, Energy, Economics, Social, Well-being	Secondary, UG/Master, Research Practice
Peretti, G., Druhmman, C. K., Bleiziffer, J., Brown, M., Campama Pizarro, R., del Río Merino, M., Gremmelspacher, J., Kontovourkis, O., Nenonen, S., Purs, I., Villoria Sáez, P., & Vula Rizvanolli, B. (Eds.) (2019). Regenerative Construction and Operation. COST Action CA16114 RESTORE, Working Group Three Report. COST RESTORE, EURAC Research. https://www.eurestore.eu/wp-content/uploads/2019/07/RESTORE-WG3-Booklet.pdf	3	The publication helps bridge the gap between design and construction, following a Life Cycle Approach consisting of practical approaches for procurement, construction, operation and future life.	Carbon, Economics, Energy, Economics, Social, Well-being	Secondary, UG/Master, Research Practice

PUBLICATION	RESTORE WG	Description	Category	Educational Levels
Lollini, R., & Pasut, W. (2020). Regenerative technologies for the indoor environment: Inspirational guidelines for practitioners. COST Action CA16114 RESTORE, Working Group Four Report. COST RESTORE, EURAC Research. https://www.eurestore.eu/wp-content/uploads/2020/06/WG4_Final-Book_Regenerative-technologies-for-the-indoor-environment.pdf .	4	The publication presents activities undertaken with the aim of defining the aspects that determine a regenerative indoor environment, so that all the technologies and their characteristics that provide this regenerativeness may be defined. Practitioners can approach aware design of indoor regenerative environments with examples of solution-sets within the building domain and case studies.	Carbon, Climate, Ecology, Economy, Social, Well-being	Primary, Secondary, UG/Master, Research, Practice
Reith, A., & Brajković, J. (2021). Scale Jumping: Regenerative Systems Thinking within the Built Environment. COST Action CA16114 RESTORE, Working Group Five: Scale Jumping. Available at: https://www.eurestore.eu/publications-and-articles/	5	A guidebook for regenerative implementation: Interactions, tools, platforms, metrics, practice.	Climate, Carbon, Place, Ecology, Energy, Economics, Scale Jumping, Social, System Thinking	Primary, Secondary, UG/Master, Research, Practice
Andreucci, M. B., Marvuglia, A., Baltov, M., & Hansen, P. (Eds.) (2021). Rethinking Sustainability Towards a Regenerative Economy . Springer. https://www.springer.com/gp/book/9783030718183#otherversion=9783030718190 . (to be published soon)	1, 2, 3, 4, 5	The book highlights how sustainability in buildings, facilities and urban governance is crucial for a future that is socially just, ecologically restorative, and economically viable, both for Europe and for the whole planet. In light of the search for fair solutions to the climate crisis, the authors outline the urgency for the built environment sector to implement adaptation and mitigation strategies, as well as a just transition.	Climate, Carbon, Place, Ecology, Energy, Economics, Scale Jumping, Social, System Thinking	Secondary, UG/Master, Research Practice
COST Restore (2021). Atlas of Solutions . https://www.eurestore.eu/tools/ .	4	The Atlas of Solutions represents an online interactive map representing case studies collected within the work of the WG4. These case studies incorporate technologies aimed at improving the quality of the indoor environment.	Carbon, Climate, Ecology, Economy, Social, Well-being	Primary, Secondary, UG/Master, Research Practice

PUBLICATION	RESTORE WG	Description	Category	Educational Levels
Battisti, C., Brown, M. <i>et al.</i> (2021). RESTORY. Managing a COST Action as a Project. COST Action CA16114 RESTORE. Available at: https://www.eurestore.eu/publications-and-articles/	1, 2, 3, 4, 5	This publication has a double aim: to summarize the main results from the COST Action CA16114 Rethinking Sustainability Towards a Regenerative Economy (RESTORE, 2017-2021); and to provide some insights into project management that we as the team involved have put in place to ensure correct and successful development of the Action.	Project Management, Innovation Management, Research, Climate, Carbon, Ecology, Economics, Social, System Thinking	Primary, Secondary, UG/Master, Research Practice
Brown, M. Battisti, C. <i>et al.</i> (2021). RESTORD. Regenerative Guide for Educators, Students and Practitioners. COST Action CA16114 RESTORE, Available at: https://www.eurestore.eu/publications-and-articles/	1, 2, 3, 4, 5	A Regenerative Guide for Educators, Students and Practitioners	Carbon, Climate, Ecology, Economy, Social, Well-being	Primary, Secondary, UG/Master, Research Practice

3.3 RESTORE RESOURCES: PAPERS



Rethinking Sustainability TOwards a Regenerative Economy

Listed below are the key RESTORE papers. Recommended Reading Collated and referenced by Ivan Šulc.

Table 3: RESTORE Papers.

PUBLICATION	RESTORE WG	Description	Publication Category*	Educational Levels
Dițoiu, N. C., Agachi, M., & Balan, M. (2020). Newness Touches Conventional History: The Research of the Photovoltaic Technology on a Wooden Church Heritage Building. <i>IOP Conference Series: Materials Science and Engineering</i> 960, 022055, doi:10.1088/1757-899X/960/2/022055	1, 4, 5	A case study of the restoration of a Transylvanian wooden church from Cojocna, Cluj county, Romania.	Climate, Carbon, Place, Energy	UG/Master, Research
Evola, G., Vincenzo, C., Magri, C., Margani, G., Marletta, L., & Naboni, E. (2020). A Novel Comprehensive Workflow for Modelling Outdoor Thermal Comfort and Energy Demand in Urban Canyons: Results and Critical Issues. <i>Energy and Buildings</i> 216, 109946. https://doi.org/10.1016/j.enbuild.2020.109946 .	2, 5	A novel simulation workflow developed in the Grasshopper environment, where Ladybug Tools are used to model the interrelations between urban microclimate, building energy performance and outdoor thermal comfort, with reference to an urban canyon in Calabria, Italy.	Climate, Energy, Well-being, Economics, Place	Secondary, UG/Master, Research
Friedrich, D. (2019). Effectiveness of peer review as cooperative web-based learning method applied out-of-class in a role-playing game: A case study by quasi-experimental approach. <i>Smart Learning Environments</i> 6, https://doi.org/10.1186/s40561-019-0102-5 .	1, 5	In contrast to most studies here, this article reports the results of a CPR conducted outside the classroom and assisted by a web-supported role-playing game representing a publisher where a common online class journal is used as an incentive and motivational element. The effectiveness of CPR was examined by means of a quasi-experimental study.	Education	UG/Master, Research

PUBLICATION	RESTORE WG	Description	Publication Category*	Educational Levels
Friedrich, D. (2019). Normative market regulation by means of early standardization: A descriptive policy analysis for the biobased industry. <i>Journal of Cleaner Production</i> 232, 1282-1296.	1, 3, 5	An analysis of the economic impact of early standardization for biobased materials with potential to internalize the costs of environmental damage from crude oil consumption.	Ecology, Energy, Technology, Economics	UG/Master, Research
Friedrich, D. (2020). Attitude of building experts towards novel biobased wood-polymer façades under various properties: a choice-based experiment and impact analysis. <i>Journal of Building Engineering</i> 35, 102079, https://doi.org/10.1016/j.jobe.2020.102079	3, 4	An investigation of willingness-to-pay in the construction industry for Wood-Polymer Composites (WPC) façades equipped with different utility bundles. For this purpose, an auction-like, choice-based survey was conducted among 212 building experts.	Climate, Carbon, Energy, Technology	UG/Master, Research
Friedrich, D. (2020). Effectiveness of Class Peer-Review under varied multiple review designs: A teaching method with home-schooling format. <i>The Journal of Competency-Based Education</i> . https://doi.org/10.1002/cbe2.1227 .	1, 5	The Class Peer-Review (CPR) method offers the opportunity for students to evaluate each other and share knowledge during their private learning time. This study reports on a CPR that was conducted out-of-class with 39 students in Business Management.	Education	UG/Master, Research
Friedrich, D. (2020). How regulatory measures towards biobased packaging influence the strategic behaviour of the retail industry: A micro-empirical study. <i>Journal of Cleaner Production</i> 260, 121128, https://doi.org/10.1016/j.jclepro.2020.121128 .	2, 4	A study dealing with regulatory measures to mitigate the waste problem from an economic point of view. The paper discusses the results of a choice-based experiment with 253 industrial decision-makers from the German food science retail segment.	Ecology, Economics, Social	UG/Master, Research
Friedrich, D. (2021). Thermoplastic moulding of Wood-Polymer Composites (WPC): a review on physical and mechanical behaviour under hot-pressing technique. <i>Composite Structures</i> 262, 113649. https://doi.org/10.1016/j.compstruct.2021.113649	3, 4	A comprehensive review of current research literature on mechanical and physical Wood-Polymer Composites (WPC) material criteria.	Climate, Carbon, Energy, Technology	UG/Master, Research

PUBLICATION	RESTORE WG	Description	Publication Category*	Educational Levels
Gremmelspacher, J. M., Sivolova, J., Naboni, E., & Nik, V. M. (2020). Future Climate Resilience Through Informed Decision Making in Retrofitting Projects. In Gervasi O. <i>et al.</i> (Eds): <i>Computational Science and Its Applications – ICCSA 2020</i> , Springer, Cham, 352-364 https://doi.org/10.1007/978-3-030-58808-3_26	1, 3, 4	High energy use for space conditioning in residential buildings is a significant economic factor for owners and tenants, but also contributes to resource depletion and carbon emissions due to energy generation. To investigate how future climate resilience can be implemented in the design process of retrofitting measures, this study concentrates on real case studies that have been retrofitted during the past decade.	Carbon, Energy, Climate	Secondary, UG/Master, Research
Härmănescu, M., Coccolo, S., Naboni, E., & Hansen, P. (2018). Rethinking Sustainability Towards a Regenerative Economy within an Adaptive Neighbourhood Design. In: Ng, E., Fong, S., & Ren, C. (Eds.): <i>PLEA 2018: Smart and Healthy Within the Two-Degree Limit Proceedings of the 34th International Conference on Passive and Low Energy Architecture 2</i> , 591-597.	2, 5	A series of urban methods and design case studies that engage in newer, continuous and healthy relationships with the unique 'place' of intervention in the light of climate adaptation. The results point to a change on the path of "to perceive" "to adapt" and "to develop" the urban environment and to define recommendations for science-based interdisciplinary design processes.	Place, Carbon, Climate	Secondary, UG/Master, Research
Ibáñez, C. S. (2019) Circular design in everyday urbanism: Towards regenerative and restorative dynamic spaces in cities. <i>Wellbeing in daily built environments</i> 11. DOI: https://doi.org/10.13135/2384-8677/3390 .	2, 5	A reflection on the environmental effect of ecological design and circular economy on individual wellbeing at an urban scale, the so-called circular city. It deployed urban and ecological design principles to transform neglected spaces into healthy places through integrated grassroot experiments and models that empower local communities in innovative learning environments.	Place, Climate, Ecology, Economics, Well-being	Secondary, UG/Master, Research
Kalinowska-Wichrowska, K., & Suescum-Morales, D. (2020). The Experimental Study of the Utilization of Recycling Aggregate from the Demolition of Elements of a Reinforced Concrete Hall. <i>Sustainability</i> 12, 5182.	3, 4	A case study as to whether the thermal and mechanical recycling of concrete is suitable for concrete debris from the demolition of structural elements of a 30-year-old industrial hall.	Carbon, Climate, Economics	UG/Master, Research

PUBLICATION	RESTORE WG	Description	Publication Category*	Educational Levels
Kamrowska-Załuska, D., & Obracht-Prondzyska, H. (2018). The Use of Big Data in Regenerative Planning. <i>Sustainability</i> 10, 3668, https://doi.org/10.3390/su10103668 .	2, 4, 5	A study of the role of Big Data retrieved from sensor systems, social media, GPS, institutional data, and customer and transaction records. The study includes an enquiry into Big Data and its relations with the ecosystem and human activities, in supporting the development of regenerative human settlements.	Place, Social, Economics, Scale jumping, System thinking	Secondary, UG/Master, Research
Luca, E., Šulc, I., Haselsteiner, E., Kopeva, D., & Brown, M. (2017). The reuse of industrial heritage as an approach to restorative sustainability and conservation. Comparison between industrial heritage development in the South-eastern Europe and Austria. <i>Journal A+P</i> 19, 124-161, DOI: 10.13140/RG.2.2.29581.69600.	1	Analysis of the actual condition of former industrial sites in South-eastern Europe that gives a clear vision of the principles and strategies that should be used to redress the urban decay of this typology of heritage.	Place, Economy	Secondary, UG/Master, Research
Mauree, D., Naboni, E., Coccolo, S., Perera, A. T. D., Nik, V. M., & Scartezini, J.-L. (2019). A review of assessment methods for the urban environment and its energy sustainability to guarantee climate adaptation of future cities. <i>Renewable and Sustainable Energy Reviews</i> 112, 733-746, https://doi.org/10.1016/j.rser.2019.06.005 .	2, 5	The paper reviews assessment methods for the urban environment, critically analyses papers working on urban climate and energy demand, outdoor thermal comfort and the urban energy systems and demonstrates the links between the processes.	Climate, Energy, Well-being, Economics, Place	Secondary, UG/Master, Research
Morishita-Steffen, N., Alberola, R., Mougeot, B., Vignali, E., Wikström, C., . . . Andreucci, M. B. (2021). Smarter Together: Progressing Smart Data Platforms in Lyon, Munich, and Vienna. <i>Energies</i> 14 (4), 1075, https://doi.org/10.3390/en14041075 .	4, 5	Within the framework of the <i>Smarter Together</i> project, the cities of Lyon (France), Munich (Germany), and Vienna (Austria) have integrated this tool into their city's metabolism and use it at different scales. Nevertheless, the principle remains the same: the collection (or even dissemination) of internal and external data to the administration will enable the communities, companies, not-for-profit organizations, and civic administrations to "measure" the city and identify areas for improvement in the territory.	Place, Economics, Social, Scale jumping, System thinking	Secondary, UG/Master, Research

PUBLICATION	RESTORE WG	Description	Publication Category*	Educational Levels
Naboni E., Milella, A., Vadalà, R., & Fiorito, F. (2020). On the localised climate change mitigation potential of building facades. <i>Energy and Buildings</i> 224, 110284.	2, 3, 5	An assessment of thermal mitigation and its potential façades properties such as window-to-wall ratios and finishing attributes, such as reflectivity and emissivity. The study, starting from the definition and calibration of a Ladybug Tool simulation workflow for the assessment of outdoor comfort conditions, simulates urban canyons located in three climate types (temperate warm, temperate cold, and tropical arid), parametrizes façade types, along with canyon aspect ratios and ground thermal properties.	Climate, Well-being, Scale jumping	Secondary, UG/Master, Research
Naboni, E., Meloni, M., & Mackey, C., Kaempf, J. (2019). The Simulation of Mean Radiant Temperature in Outdoor Conditions: A Review of Architectural Tools Calculation Assumptions. In <i>Proceedings of Building Simulation 2019: 16th Conference of IBPSA</i> (ISBN: 978-1-7750520-1-2) and volume 16 of the <i>Proceedings of the International Building Performance Simulation Association</i> , International Building Performance Association (IBPSA).	2, 5	Due to population growth and recent urbanization trends, outdoor human comfort is becoming an essential parameter to assess the quality of the urban microclimate. Over the past few years, several tools have been developed to model outdoor human comfort. Each implies different physical assumptions for the calculation of the Mean radiant temperature (MRT), one of the most critical parameters influencing outdoor thermal comfort. The paper contains an evaluation of the use of different assumptions and equations to calculate MRT with the following programmes: CitySim Pro, ENVI-met, RayMan, Grasshopper plug-ins Ladybug Tools and Autodesk CFD.	Climate, Well-being, Scale jumping	UG/Master, Research
Naboni, N., Natanian, J., Brizzi, G., Florio, P., Chokhachian, A., Galanos, T., & Rastogi, P. (2019). A digital workflow to quantify regenerative urban design in the context of a changing climate. <i>Renewable and Sustainable Energy Reviews</i> 113, 109255, https://doi.org/10.1016/j.rser.2019.109255 .	2, 5	A prototype workflow is proposed to evaluate regenerative performance using existing evaluation tools in a single digital workflow, applied in a case study of Malaga.	Climate, Energy, Well-being, Economics, Place	Secondary, UG/Master, Research

PUBLICATION	RESTORE WG	Description	Publication Category*	Educational Levels
Petrovski, A., Pauwels, E., & González, A. G. (2021). Implementing Regenerative Design Principles: A Refurbishment Case Study of the First Regenerative Building in Spain, <i>Sustainability</i> 13 (4), 2411, https://doi.org/10.3390/su13042411 .	2, 5	The research is organized according to the seven categories (petals) of the Living Building Challenge standard, and all 20 imperatives of the LBC are discussed. Additionally, the aspects of costs and project management are investigated.	Place, Economics, Climate, Energy, Carbon	Secondary, UG/Master, Research
Rodonò, G., Naboni, E., Sapienza, V., Cucchi, F., & Macrelli, G. (2020). Simulation Workflow for Parametric Optimization of Outdoor Comfort-Based Origami Shelter, <i>Journal of Architectural Engineering</i> 26, doi: https://doi.org/10.1061/(ASCE)AE.1943-5568.0000410	2, 5	A kinetic component, such as an origami surface, is adaptable to the various climatic conditions throughout a day and can be folded up when not needed. Despite its potential, the application is limited by the lack of outdoor comfort-based methodology and simulation workflows to control its operations. This study is a contribution to the field of simulation of adaptive components that fulfil the maximum degree of outdoor comfort.	Climate, Energy, Well-being, Economics, Place	UG/Master, Research
Sonetti, G., Brown, M., Naboni, E. (2019). About the Triggering of UN Sustainable Development Goals and Regenerative Sustainability in Higher Education. <i>Sustainability</i> 11 (1), 254; https://doi.org/10.3390/su11010254 .	1, 5	The paper outlines the context in which universities may decide to collaborate with and to make their contribution to sustainability values, attitudes, and behaviour within future regenerative societies related to Sustainable Development Goals.	Carbon, Climate, Place, Ecology, Economy, Social, Scale-jumping, System Thinking	UG/Master, Research

PUBLICATION	RESTORE WG	Description	Publication Category*	Educational Levels
<p>Sonetti, G., Naboni, E., & Brown M. (2018). Exploring the Potentials of ICT Tools for Human-Centric Regenerative Design. <i>Sustainability</i> 10 (4), 1217, https://doi.org/10.3390/su10041217.</p>	2, 4	<p>The ICT architecture has been tested to observe human behaviour and to collect relevant data within a room at the Politecnico di Torino (IT) where the inhabitants were strategically aware of their behaviours. Analysis included technologies related to the domain of AI (such as Natural Language Analysis, Computer Vision, Machine Learning and Deep Learning) that have been used in social network analysis in connection with the word 'comfort', and the resulting definitions resonated strongly with the realm of regenerative design. The findings were used to research the role of users that could serve as advantages to design (both spaces and related smart systems) according to actual user needs.</p>	Social, System thinking	Secondary, UG/Master, Research
<p>Torresin, S., Aletta, F., Babich, F., Bourdeau, E., Harvie-Clark, J., Kang, J., & Lavia, L. (2020). Acoustics for Supportive and Healthy Buildings: Emerging Themes on Indoor Soundscape Research. <i>Sustainability</i> 2020, 12 (15), 6054, https://doi.org/10.3390/su12156054</p>	2, 3	<p>Indoor soundscape research has recently emerged as an approach that brings a perceptual perspective on building and room acoustics, in order to shape built environments that "sound good" according to building occupants' preference and needs. This paper establishes an initial discussion over some of the open questions in this field of research that is still at an embryonic stage.</p>	Social, Well-being	Secondary, UG/Master, Research

PUBLICATION	RESTORE WG	Description	Publication Category*	Educational Levels
<p>Trombin, R. (2020). <i>Working with fractals: A resource for practitioners of biophilic design</i>, Terrapin Bright Green, New York. http://www.terrapinbrightgreen.com/wp-content/uploads/2020/12/Working-with-Fractals-by-Rita-Trombin_2021-01-29_TBG-COST-RESTORE.pdf</p>	2	<p>Research and design opportunities supporting the visual experience of fractals for the indoor environment. The aims are: (1) to appreciate the value of fractal patterns and incorporate them within their projects; (2) to illustrate how nature-based fractal patterns can lead to significant positive health benefits; (3) to encourage product and material selection featuring fractal patterns to optimize associated health benefits.</p>	Well-being, System thinking	UG/Master, Research
<p>Andreucci, M.B.; Loder, A.; Brown, M.; and Brajković, J. Exploring Challenges and Opportunities of Biophilic Urban Design: Evidence from Research and Experimentation. <i>Sustainability</i> 2021, 13,</p>	1, 2, 4, 5,	<p>Exploring challenges and opportunities of biophilic urban design: Evidence from research and experimentation</p>	Climate, Carbon, Place, Ecology, Economics, Social, Scale Jumping, System Thinking.	UG/Master, Research

3.4 RESTORE TRAINING SCHOOLS



Rethinking Sustainability TOwards a Regenerative Economy

Context: RESTORE has planned and hosted 5 powerful training schools. Here we set out the salient information on the training schools and links to further information. Each contained unique training and development material relating to the RESTORE remit of enabling a paradigm shift towards a regenerative built environment. Full details of the Training Schools can be found at the www.EuRestore.eu website.

Table 4: RESTORE Training Schools.

Training School	Theme	Description
WP1 Training School Lancaster (UK), 2017	Rethinking Sustainability	Explored concepts of sustainability through seminars, workshops, site visits and exercises. The focus was firmly on Restorative Sustainability, Biophilia, and Sustainability Education. Over four days trainees gained a deep understanding of Restorative and Regenerative Sustainability and the key topics from RESTORE working groups. https://www.eurestore.eu/training-school-2017-lancaster-uk/
WP2 Training School Malaga (Spain), 2018	Regenerative Design	Through use of digital parametric modelling, the TS challenged improvement of outdoor microclimate qualities and indoor wellbeing, operating a transformation that responded to the criterion of the Circular Economy, an opportunity for enhancing life in all its manifestations. The accent was on shifting the focus from a solely based human-centred design process to a nature-centred one, where “people and buildings can commit to a healthy relationship with the environment where they are placed”. https://www.eurestore.eu/training-school-malaga-2018/
WP3 Training School Bolzano (Italy), 2019	Regenerative Construction and Operation	How to realize a regenerative building and operate it in a sustainable and regenerative way? This challenging question was the exiting theme of the third Training School of RESTORE. In all 4 intensive days, and we can proudly say that the TS in Bolzano was a great success! Hosted by Eurac Research at NOI Techpark in Bolzano, we concluded a highly interesting and stimulating week where we moved closer to methods, processes and examples for turning the concepts of regenerative build environment into reality. https://www.eurestore.eu/training-school-2019-bolzano-italy/
WP4 Training School Venice (Italy), 2019	Regenerative Interior Environment	4-day Training School “Rethinking technologies for regenerative indoor environment” a learning-by-doing approach with local case studies, solution-sets evaluation, measurements of indoor environment parameters and administration surveys to understand prospective users. https://www.eurestore.eu/training-school-2019-venice-italy/
WP5 Training School Vienna (Austria), 2020	Scale Jumping	Urban renewal of an existing neighbourhood, an implementation of social cultural relations, an inclusion of circular considerations and a reflection of biophilic approaches. Jump 2030 ‘The Good Urban Life’ https://www.eurestore.eu/training-school-2020-vienna-austria/

3.5 RESTORD NETWORKS



REthinking Sustainability TOwards a Regenerative Economy

RESTORE related networks that can provide inspiration and support for your activities relating to education, training, awareness and development.

Table 5: RESTORD Networks.

NETWORK	RESTORE WG	Description	Category	Educational Levels
Living Future Europe	1, 2, 3, 4, 5	<p>Living Future Europe (LFE) is a non-profit association with a mission to make the world work for 100% of humanity, in the shortest possible time, through spontaneous cooperation without ecological offense or disadvantage to anyone, catalysing the transformation toward communities that are socially just, culturally rich, and ecologically restorative.</p> <p>Following a RESTORE Management Committee's decision, LFE took delivery at the end of April 2021 of some RESTORE assets, in order to keep the RESTORE Legacy alive, including RESTORE's name, logo, website, social media, email address and contacts list. http://www.living-future.eu/</p>	Carbon, Climate, Place, Ecology, Economy, Social, Scale-jumping, System Thinking	Post-secondary Education and Built Environment Practice
Zoom Regenerative	1, 2, 3, 4, 5	<p>"Like a tree in a forest we will know that we are not alone, but part of a web, a network of life, healing, helping, nurturing each other – as it should always have been.</p> <p>Zoom Regenerative is based fortnightly global family of regenerative practitioners and advocates, sharing, exploring and discussing regenerative solutions and practices. Pollinator tutorial and training sessions available. https://bit.ly/ZoomRegen</p>	Carbon, Climate, Place, Ecology, Economy, Social, Scale-jumping, System Thinking	Post-secondary Education and Built Environment Practice

NETWORK	RESTORE WG	Description	Category	Educational Levels
TrUST Transdisciplinarity for Urban Sustainability Transition	1, 2, 3, 4, 5	TrUST - Transdisciplinarity for Urban Sustainability Transition - is a research project that aims at better understanding how to achieve more efficient and effective inter/trans-disciplinary research and education for urban sustainability transitions. https://www.trustcollaboration.com	Carbon, Climate, Place, Ecology, Economy, Social, Scale-jumping, System Thinking	Post-secondary Education and Built Environment Practice
COST Action CA16229 European Network for Environmental Citizenship (ENEC)	1, 2, 3, 4, 5	European Network for Environmental Citizenship (ENEC) is a COST Action that aims to improve understanding and assessment of environmental citizenship in European societies and participating countries. It focuses on raising awareness of environmental issues and personal and collective responsibility towards the environment through individual and collective actions. It is aimed in particular at pupils and students within formal and non-formal primary and secondary education.	Climate, Carbon, Place, Ecology, System Thinking	Post-secondary Education and Built Environment Practice



PART FOUR
RESTORD 2030 People

4.1 CONTRIBUTORS AND FURTHER SUPPORT



Contributors to this RESTORD book who can provide further advice, support or facilitation for your education, training, awareness and development activities.

Table 6: RESTORD Contributors.

NAME	PROFILE	CATEGORY	EDUCATIONAL LEVELS
<p>Martin Brown</p>	<p>“Supporting, counselling and provoking clients, designers, contractors, academic and industry groups on their regenerative journeys, discoveries and approaches”</p> <p>Martin Brown is an innovative sustainability ‘provocateur’, advocate, and business improvement consultant with his Fairsnape practice, based in the Forest of Bowland, Lancashire, United Kingdom.</p> <p>He is Vice Chair of RESTORE and Vice President of Living Future Europe, a Living Building Challenge Ambassador, and a firm believer that sustainability needs to be regenerative and salutogenic, not just doing less bad, but doing more good.</p> <p>A project manager and strategic consultant with over 45 years of experience in the built environment, Martin is a respected expert and advocate for regenerative sustainability innovation, with an interest in all that will help bring about a healthier future for us and for the planet.</p> <p>https://www.linkedin.com/in/martinbrownfairsnape/</p>	<p>Carbon, Climate, Place, Ecology, Economy, Social, Scale-jumping, System Thinking</p>	<p>Primary, Secondary, UG/Master, Research, Practice.</p>

NAME	PROFILE	CATEGORY	EDUCATIONAL LEVELS
Ivan Šulc	<p>Ivan Šulc works as postdoctoral researcher (assistant professor) at the University of Zagreb, Faculty of Science, Department of Geography. He obtained his Master and PhD degrees at the same institution. He participated in international mobility and scientific training at the University of Milan, Italy. His current research focuses on the intersection of tourism and GIS, particularly tourism area life cycles, impacts of tourism, tourism in protected natural areas, (over)tourism at UNESCO World Heritage Sites, and tourism and heritage. Most of his research is related to areas in Croatia, especially South Dalmatia and the Zagreb Urban Agglomeration. His recent work also deals with the link between tourism and environmental citizenship and the impact of the COVID-19 pandemic on tourism. He has also published the handbook "Digital Cartography for high school students". His teaching responsibilities have included several courses at undergraduate and graduate level related to tourism and GIS (Special Interest Tourism, Tourism Geography, Geographic Information Science, Cartographic Basis of GIS and Geography of East Asia). He is also the secretary of the international scientific journal Croatian Geographical Bulletin and the team leader at the International Geography Olympiad. Ivan Šulc, PhD, University of Zagreb, Faculty of Science, Department of Geography, Marulićev trg 19/II, 10000 Zagreb, Croatia, email: isulc@geog.pmf.hr</p>	Economics, Social, Place, Scale jumping	
Giulia Sonetti	<p>Giulia Sonetti (female) PhD, MSc, MArch+BArch, is assistant professor at Politecnico di Torino, Sustainability Specialist at Green Team(Turin), Transdisciplinary Researcher at CEN-SE(Center for Environmental and Sustainability Research(Lisbon),and fellow at the Postdoc Academy for Transformational Leadership(Robert Bosch Stiftung foundation, Berlin). While being organiser, speaker and facilitator of several shared-science and multi-stakeholder workshops around Europe, she designed and implemented many national, EU FP7 / H2020 research projects about inter/trans-disciplinary approaches, university campus sustainability management strategies, organizational change, and transformative education methods. Currently, she is the manager and principal investigator at the research project "TrUST –Transdisciplinarity for Urban Sustainability Transition"</p>	Carbon, Climate, Place, Ecology, Economy, Social, Scale-jumping, System Thinking	Primary, Secondary, UG/Master, Research.

NAME	PROFILE	CATEGORY	EDUCATIONAL LEVELS
<p>Alison Watson MBE</p>	<p>Founder and Chief Executive at Class Of Your Own Limited. Awarded a Doctor of Engineering honorary degree from the great Heriot-Watt University, with whom Class Of Your Own has worked for a number of years and elected Honorary Fellow of the Chartered Institution of Civil Engineering Surveyors in the Institution's 50th Anniversary year.</p> <p>Nominated to the Board of Construction Scotland Innovation Centre in 2018 and awarded an MBE for services to education in HM The Queen's 2018 New Year Honours.</p> <p>I established Built Environment education consultancy and social enterprise 'Class Of Your Own' in 2009, and my dedicated team has helped young people and their teachers to recognise and aspire to the wide range of TECHNICAL and PROFESSIONAL careers available to them in the Architecture, Engineering and Construction industries.</p> <p>Our expertise in developing educational programmes centred around school building and community projects provides educators and their students with positive, contextualised experiences.</p> <p>As an industry professional and social entrepreneur, I am passionately committed to ensuring that the built environment is seen as an exciting, challenging and technologically stimulating place to learn and work.</p> <p>Years of R&D have culminated in Design Engineer Construct! ('DEC') - an exciting, accredited STEAM focused curriculum offering young people a suite of engaging project based awards and formal qualifications at Level 1, 2 and 3. In Autumn 2020, we launch the corresponding DEC 'Future Infrastructure' curriculum.</p> <p>DEC programmes are changing the way the industry is perceived for the better, not only in the eyes of students, but also for teachers and parents.</p> <p>Class Of Your Own actively works with leading industry and education partners to provide recognised progression routes into work experience, skilled apprenticeships, further and higher education.</p> <p>Our programmes are endorsed and supported by a growing number of highly respected specialists, and delivered in some of the most forward thinking schools in the U.K. and around the world.</p>	<p>Carbon, Climate, Place, Ecology, Economy, Social, Scale-jumping, System Thinking</p>	<p>Primary, Secondary, UG/ Master, Practice.</p>

NAME	PROFILE	CATEGORY	EDUCATIONAL LEVELS
<p>Ann Vanner</p>	<p>Ann Vanner is a Senior Lecturer in Architecture and Architectural Technology. As a qualified Chartered Architect and Architectural Technologist and educator, she works with a range of people, groups and organisations to develop innovative, inspirational and engaging live projects and hands-on exercises for students of all ages. This fosters the idea of learning through doing, inspirational pragmatism and Practical Creativity. This has led to a number of cross discipline projects and case studies.</p> <p>Her research and practice interests lie in retrofitting and building adaptation and the conservation and reuse of existing buildings alongside an interest in social enterprise and cooperatives exploring how these might provide alternative approaches to the commissioning and use of buildings.</p> <p>She has explored the use of technology within teaching and learning, specifically Architectural Technology and how this might facilitate learning beyond the walls of the studio</p> <p>Before lecturing, she worked as an Architect and Architectural Technologist both in the UK and abroad, working on a huge variety of projects ranging from small domestic extensions in the Lake District to the redevelopment of a 42 hectare former steelwork site in the former East German city of Riesa. She has always freelanced and has worked with a range of designers/ academics and professionals on a number of project including looking at the space left over, following the Fall of the Berlin Wall, exploring the work of Lawrence Halprin on the West Coast of America and studying the concept of cohousing groups in both Germany and the UK. Other more recent projects include questioning how best to reuse empty buildings in Preston and exhibiting work around the importance of construction detailing and its wider impact.</p>	<p>Carbon, Climate, Place, Ecology, Economy, Social, Scale-jumping, System Thinking</p>	<p>Primary, Secondary, UG/Master, Research, Practice.</p>
<p>Blerta Vula</p>	<p>Blerta Vula Rizvanolli, is an architect and researcher who works at Department of Architecture in the University for Business and Technology in Pristina, Kosovo and as a CEO at Anarch Company.</p> <p>She also works as a consultant for World Bank and EU projects with a special attention in Construction and Energy Management. She holds a Master of Science Degree in Architecture and Project Management and a MBA from University of Sheffield. She is certified by International Project Management Association.</p> <p>Blerta was an active contributor of WG1 and WG2 of Cost RESTORE as well as presenter at the Final Conference and READY Events. She is an author and co-author of several publications on Regenerative and Restorative Sustainability, Circular Economy, Complex Adaptive Leadership Approach, Innovative Information Systems in Construction Industry, Buildings Performance, etc.</p>	<p>Architecture, Research, Project Management, General Management, Consultancy, Architectural design and practice, Regenerative Sustainability, Energy Efficiency, Renewable Energy, Sustainability</p>	<p>Primary, Secondary, UG/Master, Research, Practice.</p>

NAME	PROFILE	CATEGORY	EDUCATIONAL LEVELS
<p>Jelena B. Brajković</p>	<p>Brajković Jelena Managing Director at the University of Belgrade Housing Foundation & Research Associate at the Faculty of Architecture University of Belgrade.</p> <p>With a PhD in New Media Architecture and Environments, she has researched the expanded boundaries of architecture at the intersection of art, design, nature, science & technology. A research associate and teaching assistant for students of architecture on various modules and at various levels.</p> <p>She helps with the functional development of projects - management/research/design positions at different types of employments and projects – academic, scientific, building, cultural and design – EU Cost Scientific Framework, EU IPA International Cultural Framework, Ministry of Education, Science and Technological Development of the Republic of Serbia, University of Belgrade, Institute of Architecture and Urban & Spatial Planning of Serbia...</p> <p>At EU Cost Action RESTORE (Rethinking Sustainability Towards a Regenerative Economy), she has exercised the roles of STSM Coordinator, ITC Conference Grant Manager, Open Access Publication Grants Manager and Vice-Leader of WG5 – Scale Jumping: Regenerative Systems Thinking within the Built Environment.</p> <p>She has rich experience in Exhibition Design and Architecture. As a designer with a new media background, she helps authors through every step of conceptualizing the exhibition: vision, concept and branding, information design, narrative architecture, spatial layout and design of experience, coordination and production, further promotion and dissemination.</p>	<p>Place, Ecology, Economy, Social, Scale-jumping, System Thinking.</p>	<p>Primary, Secondary, UG/Master, Research, Practice.</p>
<p>Carlo Battisti</p>	<p>Carlo Battisti. Degree in Civil Engineering from the Politécnico of Milan, twenty years of experience in construction companies. Master of Management and Organizational Development at MIP. Certified Project Manager IPMA. LEED, Living Future, WELL Accredited Professional. USGBC®, WELL Faculty™.</p> <p>Since 2009, he has been working as a sustainable innovation manager in the building industry, consulting regional development agencies (IDM South Tyrol, the Energy and Environment District of Trentino), companies, manufacturers, R&D projects, and green buildings.</p> <p>He is Chair of RESTORE.</p> <p>Since 2018 he has been European Executive Director for the International Living Future Institute and is now the President of Living Future Europe.</p>	<p>Carbon, Climate, Place, Ecology, Economy, Social, Scale-jumping, System Thinking</p>	<p>Primary, Secondary, UG/Master, Research, Practice.</p>

NAME	PROFILE	CATEGORY	EDUCATIONAL LEVELS
Zvi Weinstein	<p>Dr Zvi Weinstein is an urban planner specializing in urban regeneration among disadvantaged neighbourhoods. He is teaching at the Tel Aviv university the Urban Design Lab; Co-Founder of the Israel Smart City Institute. Member at several EU-COST Actions – Citizen Science, Cyber Parks, Environmental Citizen Science and RESTORE; Founder of Youth Build Organization in Israel. His field of interests includes Aspect of social and human behaviour; Citizen participation; How to humanize technology; Citizen science roles in smart cities, poverty, green building.</p> <p>He holds several academic degrees in Urban Regeneration (PhD.); Public Policy (MA); Law (MA); Geography (MA); Town and Regional Planning (MSc.); He published several pieces of research and books on a topic related to sustainability and urbanism; Participating in international committees on Sustainability and a member in the PIVOT organization. He is the initiator of two enterprises: Contributing computers to families with children who do not have a computer and live in the periphery; Vocational schools for developing skills and abilities aimed at young people living in a disadvantaged neighbourhood. He is the CO-Founder of the Israeli Smart Cities Institute.</p>	Climate, Place Ecology, Economy, Social, Scale-jumping, System Thinking	

We are also grateful for the follow contributions from

Michelle Holliday (Preface)
<https://www.linkedin.com/in/michelleholliday/>

Anne Parker (Mindfulness extract from FutuREstorative)
<https://www.linkedin.com/in/anneparkerlandd/>

Anna Williamson (TM and Vastu Architecture)
<https://www.linkedin.com/in/anneparkerlandd/>

Scott McAulay (Climate Literacy)
<https://www.linkedin.com/in/scott-mcaulay-2025/>

Francesco Gonella. Dept. of Molecular Sciences and Nanosystems, Ca' Foscari University of Venice, Italy

Lydia Singh (RegenVast)
<https://www.linkedin.com/in/lydia-s-10a842112/>

LIST OF FIGURES

Fig. 1	Geography of RESTORE Participation Network	22
Fig. 2	Sustainability – The Bridge Between Being Degenerative or Regenerative.	24
Fig. 3	RESTORD 2030 – City of Human Nature and Built Environment Patterns. Source WG5.16	27
Fig. 4	Sustainability Restorative to Regenerative WG1.	41
Fig. 5	Regenerative Practice. Source M. Brown (2020).	45
Fig. 6	Symbiotisch Bouwen (Symbiotic Building) Pavilion in the Netherlands will embrace self-organizing approaches, and take lessons from the forests natural nurturing and supporting web. Image: Martine Roseboom	46
Fig. 7	RegenVast Proposal. Source: Lydia Singh LBC T&T.	49
Fig. 8	Pillars of sustainable development.	53
Fig. 9	Sustainable Development Goals Source. UN (2021).	55
Fig. 10	Systems thinking Iceberg model. Source Francesco Gonella (2020).	58
Fig. 11	Circular economy. Source: Geissdoerfer et al. (2020).	63
Fig. 12	Stages of development, from conventional to the regenerative economy. Source: Brown et al. (2018) according to Fullerton (2015).	65
Fig. 13	Doughnut economics. Source: Raworth (2017).	66
Fig. 14	Education Domain 'Needs' and Regenerative Scopes.	84
Fig. 15	FutureRestorative Student Module Programme.	92
Fig. 16	Klan Kosova TV and Arena Center Before and After. Artan Hoxha,	94
Fig. 17	Cuerden Valley Park Visitor Center. Image Martin Brown	95

LIST OF TABLES

Table 1	RESTORD Exercises.	87
Table 2	Key RESTORE Publications.	100
Table 3	RESTORE Papers.	103
Table 4	RESTORE Training Schools.	111
Table 5	RESTORD Networks.	112
Table 6	RESTORD Contributors.	116

A NOTE ON GRAPHICS

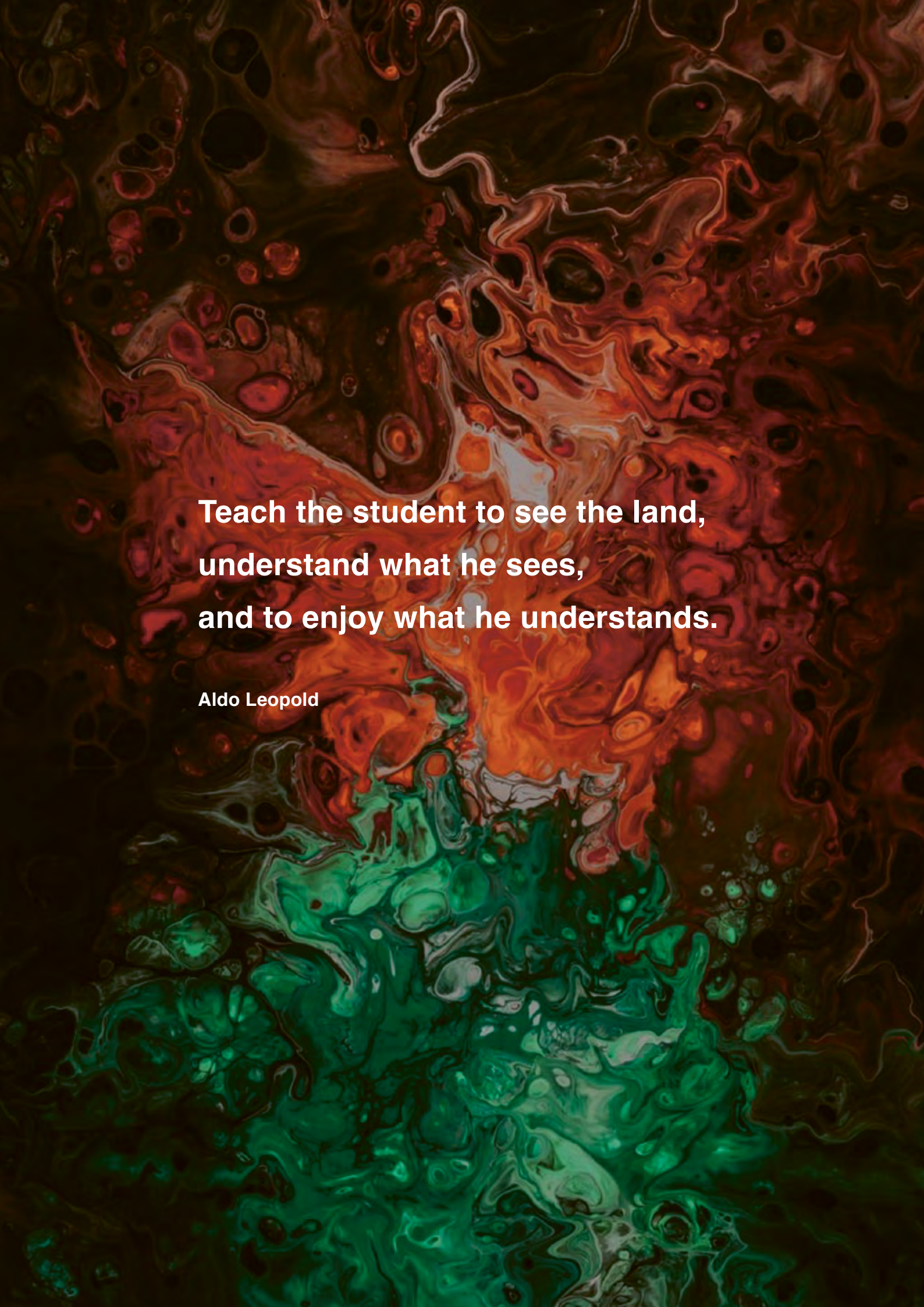
The Graphics chosen for this publication, of natures patterns & fractals and the Monarch butterfly, represent the themes of emergence, growth and transformation.

LIST OF PICTURES USED FOR SECTION HEADINGS

Page 6 - Unsplash/Wolfgang Hasselmann; p. 8 - Unsplash/Erik Karits; p. 18 - Unsplash/Salman Hossain Saif; p. 82 - Unsplash/Martin Sanchez; p. 96 - Unsplash/Patlivia Nuswantito; p. 114 - Unsplash/Ricardo Gomez Angel; p. 123 - Unsplash/Pawel Czerwiński

LIST OF PICTURES USED FOR CHAPTER HEADINGS

Page 11 - Unsplash/Yannick Pulver; p. 13 - Unsplash/Chi Girls; p. 20 - Unsplash/Qingbao Meng; p. 27 - Unsplash/Paul Talbot; p. 29 - Unsplash/Xiaolong Wong; p. 34 - Unsplash/USGS; p. 40 - Unsplash/Sharon Pittaway; p. 50 - Unsplash/a befendo; p. 52 - Unsplash/Ivan Bandura; p. 57 - Unsplash/Aurora Oak; p. 61 - Unsplash/Mason Unrau; p. 69 - Unsplash/Sven Gauditz; p. 74 - Unsplash/Adam Dachis; p. 76 - Unsplash/Lachlan Gowen; p. 79 - Fairsnape/Martin Brown; p. 84 - Unsplash/Ira Mint; p. 85 - Unsplash/Christian Lambert; p. 87 - Unsplash/Adrien Converse; p. 90 - Unsplash/Orlova Maria; p. 92 - Unsplash/Joshua J. Cotten; p. 116 - Unsplash/Francesco Gallarotti



**Teach the student to see the land,
understand what he sees,
and to enjoy what he understands.**

Aldo Leopold

The most important aspect of regenerative business today is to inspire future generations, future projects and future ideas to reach higher, to be bolder and to be far, far, more disruptive.
Martin Brown

RESTORD 2030 is a guide for educators, students and practitioners. It will be of interest to teachers in primary and secondary education, lecturers and teachers in university education and those involved with delivering sustainability courses and workshops, including continuous professional development.

RESTORD 2030 aims to inspire users to create new and enhance existing sustainability modules with a regenerative climate and ecological solution focus. It is pinned on the need for us to understand what good looks like and (re)imagine a regenerative future, and then identify the steps that will move us towards that vision. As Robin Wall Kimmerer said, “It’s as if we can see the world we want to live in just over time’s horizon; the question is how do we get there?”

RESTORD 2030 serves as a dissemination ‘portal’ echoing and enhancing the work of RESTORE with new reflections on education and awareness interventions.

Martin Brown is an innovative sustainability ‘provocateur’, advocate, and business improvement consultant with his Fairsnape practice, based in the Forest of Bowland, Lancashire, United Kingdom. He is Vice Chair of Restore and Vice President of Living Future Europe.

Carlo Battisti is a sustainable innovation manager and consultant, based in Bolzano, South Tyrol, Italy and Chair of the Restore project, on behalf of Eurac Research, Institute for Renewable Energy. He is also President of Living Future Europe.

COST Action CA16114 RESTORE: REthinking Sustainability TOwards a Regenerative Economy,
Final Action Dissemination Publication
ISBN 978-3-9505018-0-3 (Online)
ISBN 978-3-9505018-1-0 (Print)

Cover: Marcellin Bric on Unsplash