Cultures and Local Practices of Sustainability

ROUTES Towards Sustainability Network

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Contenido

Introduction

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The book *Cultural and Local Practices of Sustainability* is the result of a collaborative and interdisciplinary academic effort developed in the context of the Routes towards Sustainability University Network. This book emerges from a conference held in Santiago and Villarrica by the end of 2018 related to the International Symposium on Cultures and Local Practices of Sustainability, where cultural, educational, and practical challenges were discussed for three days to move forward in terms of dynamics and notions about sustainability.

The Routes towards Sustainability University Network, born in 2012, is an association of twenty universities from different continents that hosts symposiums, conferences, lectures, study programmes, and projects from an interdisciplinary vision on sustainability.

This book is founded from a multidisciplinary approach, in which we integrate cultural elements from the environmental humanities, design, economy, urbanism, and innovation, to understand conceptions about sustainability from a complex and systemic perspective, addressing different areas of knowledge and requiring an integrative view.

We have organized the book in two sections, for didactic purposes only. The first section deals with the elements of humanities, including a critical re-reading of studies on utopias in classical texts by Thomas More and Vasco de Quiroga; the role of children's literature in the shaping of eco minds of children in Chile; and the need to change perspectives

related to the design industry in Colombia. These three dimensions show precise connections between literature, education, and design, as central elements to understand and direct necessary changes in concepts —traditional and current— on how the challenges of sustainability must permeate cultural constructs.

The second section of the book seeks to highlight practical and methodological experiences connected to the challenges of the culture of sustainability. We incorporate visions from innovation, economy, and urban and territorial regeneration, adding collaborative and participative mechanisms to build sustainable environments.

In the first section, Spinozzi proposes a discussion on the challenges of sustanability of the habitats, from the original concepts of Thomas Moore and the work by Vasco de Quiroga, based on his experience in the Americas in the early 16th century. Her chapter compares Moore's theoretical vision with the colonialism of Mexico, both looking for answers for a sustainable living under a framework of utopias.

In a second article, Casals introduces us to environmental humanities from an ecocritical perspective. Her discussion presents concrete cases from three books, an article, and an exhibition related to marine ecosystems with a pedagogical approach. However, the language, images, and —most likely— a lack of a real interdisciplinary approximation blur the objective of fostering future ecological minds that some of these texts declare.

The third article of this section introduces us to an experience of application of the Sustainable Learning and Education Model in the area of Clothing Design, to question the practices of a fashion industry in crisis. From the concept of multiple footprints, Builes and Suárez propose a critical discussion on the effects of the fashion industry and the possibilities for transforming academic training and research in this area, providing professionals with a wider outlook on the impacts of their job.

The second section of the book begins with an article by Kemp and Turkeli discussing "the evolutionary nature of innovation and social development" and incorporating an analysis of eight notions from ecology towards innovation for sustainable development. They conclude that, to move

towards a sustainable development, we require changes towards more relational ways of living, which constitutes a quasi-evolutionary process.

Following, the article by Dal Negro, Madjitey, and Mazzanti establishes the dilemma of the actual impact of financing for the development of countries in East Africa. Their results are discouraging in terms of sustainability, since they show that investing decisions are often based on profitability rather than on other aspects of development, and that their impact focuses on countries with more stable economies, increasing the breach among the countries of the continent.

Cerreta and Mazzarella present us with an approximation to circular economy based on urban regeneration through collaborative decision-making processes, in the context of a case study in Naples. This experience emphasises a methodology that allows incorporating a group of stakeholders to transition towards sustainability.

Within the urban context, Cuervo, Lalinde, and Botero present an applied research exercise of an experimental project of technological and social innovation on housing design with sustainable criteria in Colombia. They propose a methodology called The Sustainable Habitat Integrative Workshop, to empower social transformation and provide solutions to design problems.

In contrast to the previous articles, Cannavò, Celani, and Zupi centre their attention on inner landscapes, which are fragile areas separate from big metropolis and cities that, from a new narrative of the territory, can be transformed in a more sustainable way, preserving their heritage, traditions, and knowledge. This approach, from the landscape framework, responds to a change beyond the logic of development and growth.

Finally, the section concludes with the article by Celani and Ali, in which they propose a multidisciplinary model for improving cultural assests in Europe.

The set of articles in this book allow to connect different dimensions of the transitional challenge towards sustainability, focusing on cultural

and methodological changes implied and not on the techniques, which often dominate over academic discussions on these topics.

It is necessary to claim that the articles in this book were written by each of their authors during 2019, went through a double-blind peer review, and then were revised once again by their authors at the beginning of 2020, before the pandemic of COVID-19, which has strongly impacted the ways of living in the planet at a global scale. For this reason, the time of publication has been slower than normal, and readers will not find references to the pandemic, to the possibility of envisioning more sustainable lifestyles in a post COVID-19 world, or references following 2019. Nonetheless, we believe that the contribution of this book is not focused on the systematical change of daily individual activities that might possibly occur in a post COVID-19 world —and which undoubtedly help—, but on the way in which we must think this route towards sustainability; from an integrated vision connecting humanities, culture, education, and practices to generate profound transitions towards a reality that is different from the current one.

Prologue

Gianfranco Franz[1]
University of Ferrara

"We are also made of stories"
Eduardo Galeano — *Los hijos de los días*

In 2015, following the Paris Climate Conference (COP21) and the ratification of the United Nations 2030 Development Agenda with its 17 Sustainable Development Goals (SDGs), the debate on sustainability attained renewed vigour. However, as soon as the global political direction seemed settled, turbulent contestations emerged. Global enthusiasm was challenged, first by the election of Donald Trump in 2016, and later by global populism emerging in Europe and Latin America. What sparked

[1] Gianfranco Franz has a degree in Architecture from the University IUAV of Venice. He is currently a full time professor of Policies for Sustainability and Local Development at the Department of Economics and Management of the University of Ferrara, Italy. His major research interest has been urban planning since the 90s. From 2003 to 2015 he coordinated the first international and interdisciplinary MA programme in *EcoPolis - Policies for Sustainability and Local Development* at the University of Ferrara. Since 2006 he has been involved in strategic planning practices in Italy and Brazil, worked on urban regeneration and creativity, developed policies and tools for smart cities and, recently, for circular cities and regions. Since 2017 he has elaborated theoretical views on cultures of sustainability, the Anthropocene, and Ecological Footprints, encompassing a humanistic, social, and economic perspective. At present ecological thinking and cross-disciplinary methodologies are at the core of his research. He is membre of the International and Interdepartmental PhD programme in Environmental Sustainability and Wellbeing. In 2012, he founded *Routes towards Sustainability*, an international university network promoting multi, trans-and cross-disciplinary approaches to the development of places, cities, and communities within the framework of sustainability and wellbeing.

like a unitary front responding to global warming clashed and was further blown by the 2018 election of Jair Bolsonaro in Brazil.

At the same time, silently and unexpectedly, the symbolic *first* Friday for Future took place. Greta Thunberg, at fifteen, refused to enter the classroom until the Swedish elections calling out politicians' neglect of the climate crisis. Shortly, her individual act empowered youth worldwide to express their concerns against their governments' indifference towards climate change. In December of 2018, Thunberg gave her first speech at COP24 in Katowice, Poland, where representatives from 196 states met to put the Paris agreement back on track. A year later, originally to be hosted by Chile, the climate conference (COP25) was held in Madrid because of the social revolt in the original location. Briefly, the world's media focused on the politics of global warming, offering an extraordinary stage for young generations and their environmental claims. Nonetheless, this attention was disrupted in early 2020 by the COVID-19 crisis.

The Madrid Climate Conference became the latest demonstration of global leaders' near-sightedness. It occurred a few months after a relevant yet controversial event: in August 2019, 200 major US companies —the globe's capitalism elite— gathered at the Business Roundtable to sign the periodic Corporate Governance document with which all committed to follow the same ethical and business principles.[2] This document was hailed as revolutionary. For the first time since 1972, when the Business Roundtable was founded —coincidentally, the same year as the publication of *The Limits to Growth*, the very famous book of Club di Roma, edited by Donella Meadows and others— the MIT colleagues declared they will "respect the people in our communities and protect the environment by embracing sustainable practices across our businesses" (Business Roundtables, 2019, para. 16; Grove et al., 2020).

[2] Those corporations include American Airlines, American Express, Amazon, Apple, Boeing, Bayer USA, BlackRock, Caterpillar, Cisco, Citygroup, Chevron, Coca-Cola, FedEx, Deloitte, Exxon, Ford, IBM, General Motors, Goldman Sachs, LyondellBasell, Johnson & Johnson, JP Morgan Chase, Lockheed, Marriott, Nasdaq, Mastercard, Moody's, McKinsey, Motorola, Procter & Gamble, Pepsi Cola, Siemens USA, Walmart, United Airlines, Visa, Western Union, UPS, Whirlpool, Xerox.

This affirmation by the Business Roundtable rhetorically overturns the behaviour that multinational corporations have long assumed. In 1997, they signed a similar document stating that the only end of a business was to create value and profitability for its shareholders. In any case, between 2018 and 2021, thanks to Thunberg's and Fridays For Future —together with the disastrous fires in Alaska, California, Siberia, the Amazon Rainforest, Africa, Australia, and the many fires in Southern Europe—, the debate on global warming, climate change and global integration of our societies and economies has taken on a magnitude that has not been seen since the Rio de Janeiro Summit. In this context, this prologue voices the need to think through concepts and cultures of *positive* sustainability. After decades of scientific effort measuring *un*sustainability, with concepts such as 'development', 'efficiency', 'competitiveness' and 'prosperity', we have reached these seemingly end-times. Positive sustainability rather requires focusing on cultural and emotional dimensions that have been left aside.

Currently, we may be excused for feeling optimistic that the fifty-year discussion about the bases of human sustainability appears to be coming together at last. It seems that the dramatic experience of the COVID-19 pandemic is helping humanity to reverse the path of excessive mobility and senseless growth promoted in the last twenty years. Even contemporary science and medicine have come together in response to the pandemic —which I see as a case of *positive* globalisation—. We appear to be taking off on a journey to rebalance human needs and habits, planetary requirements and larger ecologies of life. As Jared Diamond (2004) argued in *Collapse: How Societies Choose to Fail or Succeed*, any civilisation can die from excessive isolation, but also for excessive integration.

Having said that, an enormous task remains ahead, and we are caught in old paradigms. Western civilisation has already gone far beyond the Earth's threshold, exceeding scientifically verified planetary limits, pushing forward a seemingly unlimited economic globalisation that advocates for barrier-free economic interconnection. If, as we have known since the early 1970s, growth has physical and biological limits, then

global economic interconnection must also have boundaries. We must reflect on curtailing unsustainable global supply chains and re-orienting the world's dependence on Asian production systems; the centre of mass production after 40 years of industrial relocation.

Vigorously limiting the dominant global system of production and consumption will undoubtedly impact the current economic, political, and cultural systems, but this shift remains both desirable and necessary if we are to have a sustainable future. We must act strategically. How can we best manage the transition from the current model of economic globalisation to a more balanced, but still globally connected, way of organising life on this planet? How can we foster ecological thinking? Can we recover and revalue previous scientific and cultural contributions? How can we make visible the kind of ecological thinking that is often silenced by triumphant neo-liberal globalisation?

Although mass consumption derives specifically from the post-World War II recovery and contemporary standards of living in the West have been brought about by scientific and technological developments over the past 150 years, I believe we can still shape a new story. To that end, it is essential to invest significant financial resources and intellectual energies in the transition towards circular communities, economies, and cities, highlighting the benefits of healthier habits, and making evident the problems with hegemonic consumption models. Making visible the cultural dimension of sustainability, disseminating scientific and social knowledge together, entangling these with non-academic knowledge in an ecological mode will be fundamental. We can achieve this through slow sedimentation of critical and generatively hopeful messages, working together on new shared cultural constructs; by means of symbols, emotions, and beauty in whatever way they may be expressed and communicated.

However, after fifty years discussing about sustainability, we seem to have failed due to multiple interconnected factors. First, the guiding terms of sustainability were *consumed* beyond a meaningful framework of principles and practices. Sustainability became the rhetoric of governments and corporations, written into hollow speeches and

corporate reports, as if using the correct word was enough, stripping the breadth and depth away from sustainability. Structural unsustainability continued across the world's major economies, while the moral imperative was allotted to local enactments and consumers' choices.

Secondly, following Rio and Kyoto, while few ecological attuned countries restrained unsustainable practices, global capitalism intensified. The early 2000s emerging economies entry into the World Trade Organization (Brazil, Russia, India, China, and South Africa; i.e., the BRICS) signalled a radical shift in the world's economic and political forces. For the first time, the expanding middle classes in the BRICS and other areas of the Global South sought access to high-mass consumption. Then, the US financial bubble burst (2007–2008), spreading its negative effects to many economies across the world, destroying wealth and jobs, it overshadowing climate change and sustainability issues. Divorced from environmental concerns, growth-oriented policies focused on decreasing unemployment and poverty rates.

Underlying is the weakness of ecologically oriented thinking across different political cultures. This flaw has not yet been solved, despite abundant examples of best practices promoted by cities, community-based organisations and green businesses. Emissions of greenhouse gases have exponentially increased together with the ecological footprint worldwide. The global industrialisation of agriculture continues to degrade the land, while the global fishing industry continues to turn the world's oceans into parcels of managed —and depleted— resources, the dispersion of plastic is now being watched remotely by tracking and measuring waste-flows, and the illegal disposal of toxic waste has turned into a transnational business. Paradoxically, all this is still called *development*.

Wolfgang Sachs explained almost 30 years ago how the concept of development had already been worn out by the 1970s, forcing us to use adjectives to reinvigorate it. As Sachs (1995) writes, there is no longer development in current discourses without sustainability; no longer sustainability without development, precisely to demonstrate the conceptual artifice of keeping together the disease and its therapy. Often

held up as one of the progenitors of contemporary sustainability thinking, Gro Harlem Brundtland has been criticized by Sachs who defined the Brundtland Report as the "conceptual roof for both violating and curing the environment" (p. 29).

As I wrote in an article recently published by the *Review of Studies on Sustainability* (Franz, 2020), in the 1960s, the radical pioneer White Jr (1967) pointed out that "the issue is whether a democratized world can survive its own implications. Presumably we cannot unless we rethink our axioms" (p. 1204). Citing him, so close to our own concerns yet so distant in time, reminds me of the myth of Cassandra, and how resistant humanity is to warnings of existential danger. Even though the ecological crisis that we face in the 2020s is much more serious than the crisis anticipated by the beautiful minds of ecological thought in the twentieth century, we have yet to re-think the axioms of sustainable development. This long history, an archaeological excavation of still-recent but almost-forgotten knowledge, highlights how long it takes to transform a shared cultural construct. The search for sustainability necessarily requires time, but radical cultural transformations and evolutions do too.

As Enzo Ferrara (2016) explains, it is necessary to act on culture without waiting for palingenetic decisions to come from national and global political representatives. The hope for global governance is a mirage, particularly given that existing bodies continue to present economic policy as a solution to the ecological crisis itself. Ferrara emphasizes how the concept of *growth* worked for centuries in our minds, making us unable to differentiate the concept of development associated with economic growth from that of progress. As White Jr. (1967) points out, during an epoch of human history dominated by science and technology, approximately 350 years long, the pillars of unsustainability and the *hubris* of science were built, marginalising humanistic knowledge and cultural contributions to understanding human and ecological flourishing:

> I personally doubt that disastrous ecological backlash can be avoided simply by applying to our problems more science and more technology [...]. Despite

> Copernicus, all the cosmos rotates around our little globe. Despite Darwin, we are *not*, in our hearts, part of the natural process. We are superior to nature, contemptuous of it, willing to use it for our slightest whim (p. 1206).

To cultivate positive sustainability, it is therefore necessary to dismantle an extraordinary cultural and scientific castle, built by other wonderful minds before us. I am not proposing to deny the legacy of Descartes, Galileo, Copernicus, and those whose work has separated us from nature. That would be equally harmful. That heritage is miscellaneous and there are still many things to learn from it. For example, in 1865, the Scottish economist William Stanley Jevons (1866) demonstrated the fallacy of the concept of *efficiency*, noting that technological innovations in energy production led to an increased consumption of energy; the Jevons' paradox. What we must avoid though are edifices erected around the compulsion to measure. The *Castle of Measurement* has rooms for images, poetry, stories and narration, but they are sequestered, as are other ways of seeing the world. Even mathematics has become a prisoner of hyper-specialization, erroneously regarded as progress. Numbers have become prisoners of indicators, and indicators have taken the place of aspirational goals. As Serge Latouche (2000) reminds us, decades after the first theoretical formulations of poststructuralism and its critique of grand narratives, we are still coping with the hegemonic doctrine of progress and material development. Before Latouche, this point was investigated by David Orr, professor of environmental studies and founder of the Meadow Creek Project in Arkansas, a pioneering ecologically self-sufficient community. In his keynote address for the Annual E.F. Schumacher Lectures, Orr (1993) argued against the predominance of measurement:

> The architects of the modern worldview, notably Galileo and Descartes, assumed that those things that could be weighed, measured, and counted were more true than those that could not be quantified. If it couldn't be counted, in other words, it didn't count. Cartesian philosophy was full of potential ecological mischief, a potential that Descartes's heirs developed

> to its fullest [...]. Descartes was at heart an engineer, and his legacy to the environment of our time is the cold passion to remake the world as if we were merely remodeling a machine (p. 3).

The modern machine has now been thoroughly criticised (Foucault, 1972), but years before the philosophers began its deconstruction, the Cartesian *cogito* was called into question by literary writers. For example, the Argentinian writer Julio Cortázar wrote *Las babas del diablo* (1959) (*Blow-Up* in English); the beginning of the story is eloquent:

> It'll never be known how this has to be told, in the first person or in the second, using the third person plural or continually inventing modes that will serve for nothing. If one might say: I will see the moon rose, or: we hurt me at the back of my eyes, and especially: you the blonde woman was the clouds that race before my your his our yours their faces. What the hell (p. 100).

Upon reflecting on three decades of sustainability thought and action —hundreds of books, official documents, scientific papers, some good practices, and countless political speeches— my mind always returns to the famous sequence of a tennis match without a ball inspired by Cortázar's short story in Michelangelo Antonioni's *Blow Up* (1966) (Rimini, 2004). A boy and a girl playing tennis are watched by a small and very involved audience. The two youngsters mimic athletic gestures with elegant moves, but there is no tennis ball. The *non-ball* leaves the field; the young photographer, although reluctant, enters the game because the girl asks him to go and collect the ball. He finds it for the continuation of the non-game. What is it? A joke? An illusion?

By analogy, transposing this scene to the efforts of at least two generations of scholars, environmental activists, ecologists, politicians, and green entrepreneurs, we could say that we have all been playing a game without a ball. The concerned public have become our accomplices. Outside of that virtual game, which has sparked enthusiasm, solemn

political promises, great scientific-technological progress, and innovative *green* goods, the rest of the world remains comfortably in the clubhouse of consumption, material wellbeing, and technological efficiency. These are treated as ends in themselves. If we live in a satisfied world, which continues to talk about growth and GDP, it is because, as in the film *Blow Up*, we continued to play without a ball. Intellectuals continue to acclaim the speeches and resolutions made at the international meetings. Researchers continue to obtain funds for research and technological innovation. However, as William Easterly (2015) clearly highlights in his comment on the Sustainable Development Goals, the *What Should We Do?* industry does not show any signs of going out of business soon. Sustainability gives us public intellectuals something to talk about and it gives politicians something to recommend.

The ball that was missing in the long match between *sustainability* and *growth* over the last three decades is a cultural sense of positive sustainability; narrative and artistic endeavours to express what a flourishing alternative looks like. We have forgotten to listen to the words of artists such as the Uruguayan writer Eduardo Galeano (2012, April 21) when he says: "Scientists say we are made of atoms, but a little bird told me that we are also made of stories".

I am convinced that we as humans are also made of stories, but this statement does not seem serious or academic because stories are not based on data and are not elaborating numbers, the sole elements we trust to solve problems. On the contrary, we should convince ourselves that stories, novels, and arts are the most powerful tools to change our minds. The engine of sustainability is still working, but to use it more effectively it will be necessary to narrate different visions of the world and tell the stories of generative practices. A new ecological thought and an effective narration of it requires an ecologised language that is unpolluted by *contaminated words* such as *growth*, *competitiveness*, *efficiency*, *prosperity*, and so on. The *hubris* of Measurement; the exactness of numbers, the amount of indicators we seek to describe world conditions with, the negative power of algorithms. Measurement with a

capital "M" does not in itself pull us back to less competitive lives and will not bring us back to a more balanced relationship with Nature. One of the nine Planetary Boundaries (Steffan et al. 2015), a very interesting and complicated model to measure the environmental condition of the planet, considers and observes the so-called *Novel entities*, chemically and bio-chemically unknown, and possibly very dangerous elements that humans have produced by means of polluting and contaminating water and air. I think that reflecting around these problems is paramount, but at the same time, we also need novels!

I invite faculties, scholars and students, young people, and ordinary citizens to read this book that illustrates efforts to consider measurement and data, together with positive experiences of sustainability, as well as narratives. Many of the authors in this book are colleagues and friends; since 2012 within the Routes Towards Sustainability International University Network we have been telling stories and exploring these possibilities, making space for a multi-disciplinary research environment and even working towards a trans-disciplinary space of knowledge that is reflected in this book.

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I. The Environmental Humanities and Education

Thomas More's Utopia and Vasco de Quiroga's *República* as Sustainable Habitats

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Abstract

Societies have struggled with sustainability for centuries and the notion of sustainable society, widely debated nowadays, invites an investigation into the early modern age when social models were conceived. Utopia as a genre thrives on the assumption that human ingenuity can produce good habitats, in which every tangible and intangible aspect of existence is carefully planned. As an early modern expression of anthropocentrism, the genre exhibits the impact of utopian projects on the natural, human,

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and built environment. Thomas More, an Englishman born in London in 1478, and Vasco de Quiroga, a Spaniard born in Madrigal de las Altas Torres in 1470, envisioned ideal places based on their legal education, religious convictions, and political expertise.

More's *De Optimo Reipublicae Statu deque Nova Insula Utopia* (1516) and Quiroga's *Información en Derecho del Licenciado Quiroga sobre algunas provisiones del Real Consejo de Indias* (1535) oscillate between the intellectual vision of a new world and the historical discovery of the New World. By adopting the perspective of the ecological humanities and ecocriticism, it will be possible to shed light on the sustainability of a utopian society theorised in Tudor England and realised in colonial Mexico in the sixteenth century. The island purportedly discovered during one of Vespucci's voyages and the Pueblos-Hospitales built during the colonial enterprise in Mexico indicate that More and Quiroga will continue to be strong catalysts of discussions on sustainable habitats.

Keywords: Utopia as a genre, sustainability, ecological humanities, ecocriticism, Thomas More, Vasco de Quiroga, New World, Golden Age.

1. Sustainable Utopias?

Societies began to struggle with sustainability centuries ago. The contemporary pursuit of integral development is the most recent evolution of long-term dynamics which can only be explained by adopting a historical approach (White, 1967; Spinozzi, 2021). Investigating the notion of sustainable society in the early modern age, when ideal societies were conceived, will offer an insight into temporal and spatial stratifications. The sustainable development goals pursued by Thomas More in Tudor England and by Vasco de Quiroga in colonial Mexico unfold along an intercontinental trajectory. More and Quiroga were contemporaries and received a formal education as lawyers: the former, an Englishman born in London in 1478, worked in the King's service, acted as Lord Chancellor between 1529 and 1532, and died in 1535; the latter,

a Spaniard born in Madrigal de las Altas Torres in 1470, moved to Mexico in 1531 and died in Uruapan, Michoacán, in 1565.

More's literary text in Latin inspired Quiroga's colonial enterprise in Mexico and legal treatise in Spanish. Scholars have long studied why More's οὐ/εὐ-τόπος, an abstract place of wellbeing disconnected from history, became a model of commonwealth and shaped the early modern history of ideas in Europe and worldwide.[2] Vast investigations have been devoted to the theoretical and practical relationship between More's *De Optimo Reipublicae Statu deque Nova Insula Utopia* (1516) and the colonization of the New World,[3] to More's utopian thought as Quiroga's source of inspiration,[4] to the outcome of Quiroga's colonial enterprise in Mexico and the impact of *Información en Derecho del Licenciado Quiroga sobre algunas provisiones del Real Consejo de Indias* (1535).[5] Studies have also been dedicated to the circulation in Latin America of the other canonical early modern utopia, Tommaso Campanella's *Città del Sole* (1602).[6]

The intellectual vision of a new world and the historical discovery of the New World will be considered as the expression of specific geopolitical and intercultural environments and will be studied from the perspective of the ecological humanities and ecocriticism to assess the sustainability of a utopian society theorised in Europe and realised in America in the sixteenth century.

2 See Firpo (1964), Prévost (1969), Davis (1981), Fortunati (2008) and, more recently, Spinozzi (2013) for the importance of More's *Utopia* as a socio-political model.

3 See Cohen (2004), Hallberg (2010), Chordas (2010), Beauchesne & Santos (2011).

4 See the unrivalled work by Zavala (1937, 1947, 1948, 1955, 1981, 1987, 1989), Beuchot (1991), Florescano (1997), Armella (2018), Witeze Junior (2018).

5 See Jarnés (1942), Martín (1957), Warren (1963), Miranda (1984), Verástique (2000), Krippner-Martinez (2001), Zarandona (2006).

6 See Scramaglia (1985), Headley (1995).

Figure 1. Image of Ambrosius Holbein's 1518 Map of Utopia, from Thomas More's De Optimo Reipublicae Statu deque Nova Insula Utopia

Figure 2. Juan O'Gorman's Mural (1942)

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2. A New World and the New World

In the summer of 1515, More travelled to Flanders as a member of a royal trade commission. There, he drafted the description of an island called Utopia. After his return to London in October, the draft became Book Two, which presents an insular autarchic republic governed by an oligarchy reminiscent of Plato's Πολιτεία (*Republic*, 375 BCE) and organized as a self-sustaining early Christian community. Then, he wrote Book One, which discusses England during the reign of Henry VIII and European colonialism. Interestingly, *pars construens* was composed abroad, while he was in the best disposition to envision an ideal society, and *pars destruens* was written in London, during his service as advisor to the King. The two books form *De Optimo Reipublicae Statu deque Nova Insula Utopia, libellus vere aureus nec minus salutaris quam festivus clarissimi disertissimique viri Thomae Mori inclutae civitatis Londinensis civis et Vicecomitis*, published in Louvain towards the end of 1516, in Paris in 1517, and in Basel in 1518. The original Latin version and various translations into European languages circulated all over the continent and travelled to America with the *Conquistadores*. More was knighted and became Under-Treasurer of the Exchequer in 1521, was appointed Speaker of the House of Commons in 1523, Chancellor of the Duchy of Lancaster in 1525, and Lord Chancellor in 1529. As a strong defender of Catholicism, he refused to support King Henry VIII's schism with the Church of Rome and was beheaded in the Tower of London on the 1st of July 1535. He became a Catholic martyr saint in 1935. That small golden book with an impossibly long title, first translated into English by Ralph Robinson in 1551, has become a masterpiece of world literature and has shaped world history.

On December 13th of 1527, the Primera Audiencia, the highest tribunal of the Spanish Crown, was established by royal decree in the Kingdom of New Spain in Mexico. Corruption, murder, and exploitation of the Amerindians spiralled between 1528 and 1530, when the Audiencia was presided over by Nuño de Guzmán, who became infamous for his abuse of power. In 1531, Emperor Charles V sent the sixty-year-old Spanish

churchman and lawyer Vasco de Quiroga to the colony of New Spain. Quiroga's interest in the Pacific Ocean region of Michoacán was one of the main reasons why he was invested with the task of restoring stability with the Segunda Audiencia, the second court of appeals. In 1535, he published *Información en Derecho*, in which he examined the flaws of the slavery system imposed on the indigenous populations and set up legal and ethical norms on colonialization and evangelization. In 1536, he was nominated the first bishop of the newly established diocese of Michoacán by Sebastián Ramírez Fuenleal, President of the Segunda Audiencia and Bishop of Santo Domingo. After his nomination was approved by the Emperor and the Pope, the appointment became official in 1537 and Bishop Quiroga took office in 1538. He died in 1565, having accomplished his project of *mixta policía* (mixed policy) and being well regarded by the indigenous inhabitants.

3. England and the Republic of Utopia: A Focus on Slavery and Freedom of Religion

Peter Giles, a humanist, printer, editor, and town clerk in Antwerp, helped Thomas More publish his manuscript in Louvain. He is also the recipient of the prefatory letter of *Utopia* as well as one of the three characters in the narrative. In Book One, on his way back from the Cathedral of Antwerp, More encounters Giles and is introduced to Raphael Hythloday, a Portuguese mariner who has travelled with Amerigo Vespucci. Colonial enterprises and utopian travellers presented as eyewitnesses of geographical discoveries are a structural feature of utopia as a genre,[7] which More simultaneously constructs and deconstructs. Hythloday's journeys by sea and his acquaintance with the *Conquistadores* qualify him as a privileged observer, but Giles notes that "his sailing has not been like that of Palinurus, but more that of Ulysses, or rather of Plato" (More, 1516/2002, p. 10). Hythloday is a sailor who has been to America three

[7] See Fortunati (1996) and Hallberg (2012) for the relationship between utopia, travel writing, and the New World Travelogue.

times and a traveller of the mind whose sharp philosophical reasoning detects inequality and despotism.

Book One focuses on a heated discussion about economy and the law at the house of Cardinal John Morton, Archbishop of Canterbury, and More's mentor. The description of the sheep having become "so greedy and fierce that they devour human beings" (More, 1516/2002, p. 18) is a metaphorical reference to and critique of the Enclosure Act which was transforming fertile soil into pasture to increase wool trade. Deprived of their means of subsistence, farmers and small landowners were forced to move to town, where they were exploited as labourers and left with no choice but to resort to theft to survive. Therefore, death penalty was as disproportionate and unjust as it was useless because thieves ended up killing witnesses to avoid capital punishment. Hythloday illustrates the penal system of the Polylerites, who do not imprison thieves but condemn them to hard labour, then suggests that England should adopt similar measures. Cardinal Morton considers that such scheme could be tested and extended to vagabonds (pp. 23, 25-26). Hythloday also commends the Achorians for disregarding imperialist schemes and military conquests (p. 31) and the Macarians for pursuing social wellbeing through economic equity (p. 35). By illustrating policies of sustainability adopted in remote countries and using the Portuguese sailor as a sounding board, More skilfully eludes censorship and voices radical ideas about home and foreign affairs.

Book Two describes Utopia as an ideal society based on egalitarian communitarianism, which More envisioned as a form of government superior to aristocratic communism, described by Plato as the foundation of his *Republic*, and commercial capitalism, which was already vexing Tudor England. The core of the island is Amaurot, the fortified capital city crossed by the river Anyder and surrounded by fifty-four identical towns. Every town in Utopia is organized according to a principle of sustainability, starting from the number of inhabitants: "they cannot, of course, regulate the number of minor children in a family. The limit on adults is easily observed by transferring individuals from a household with too many into a household with too few" (p. 54). and redundant children are distributed

among less prolific families. The norm of even distribution is extended to all social and political relations. Every ten years, the Utopians move to a new house with unlocked doors and spacious gardens. Every year, thirty families consisting of at least forty members appoint their magistrate, called *Syphograntus* in their ancient language and now known as *Phylarchus*. A *Traniborus*, also known as *protophylarchus*, presides over clusters of ten *Syphogranti* with their families. The two hundred *Syphogranti* elect the *princeps* by secret ballot. Public and private affairs are discussed by the *Tranibori* and the *princeps*, who rules for life in the senate or popular assembly—unless he is suspected of tyranny. When crucial issues arise, all citizens are invited to express their opinion to the *Syphogranti* who hold an assembly and then inform the Senate.

There is no private property, economy is based on agriculture, everyone works six hours per day, enjoys public lectures, music, and educational games, eats frugal meals, and wears identical clothes; the only difference being the colour for gender and marital status. Women, from the age of eighteen, and men, from the age of twenty-two, can marry after passing a health and fitness test. Marriage can end only in case of death or adultery, which exposes the adulterer to social stigma and prohibition to remarry. Assisted dying is institutionalised and practised to patients who are affected by a painful and terminal disease and have sought advice from priests and magistrates, while suicide for reasons unrelated to illness is punished with a ban on burial (Spinozzi, 2016). Self-defence or protection of oppressed peoples are the only alleged reasons that could justify waging a war, which however will be fought by mercenary soldiers. The sustainability of Utopia is based on autarchy and economic self-sufficiency, whereby production is organized to satisfy the needs of all, as well as on homogeneity, which regulates every sphere and stage of life.

Human rights are a major sustainable development goal. The debate around natural and legal rights became prominent in the period of Renaissance humanism. As a humanist, More analyses various types of servitude in Utopia. In the chapter on "Slaves", Hythloday illustrates the efficient system established by the Utopians. They may choose to keep

prisoners from wars in which they themselves have been involved. The only slaves among the Utopians are those who have committed serious crimes, or more frequently foreigners who had been condemned to death in their own country and can be bought at a low price or even for free and in large quantities. They do not have to work all the time but are fettered. If Utopians become slaves, they receive a harsher treatment, having strayed despite the education they received. There are also paupers from other countries who have chosen slavery in Utopia and are treated with respect, as if they were citizens, with the exception that their workload is heavier, given their familiarity with labour. Should anyone want to leave, they may easily do so, in which case they receive a farewell gift (pp. 77-78).

> Generally, the gravest crimes are punished with slavery, for they think this deters offenders just as much as getting rid of them by immediate capital punishment, and convict labour is more beneficial to the commonwealth. Slaves, moreover, contribute more by their labour than by their death, and they are permanent and visible reminders that crime does not pay. If the slaves rebel against their condition, then, since neither bars nor chains can tame them, they are finally put to death like wild beasts. But if they are patient, they are not left altogether without hope. When subdued by long hardships, if they show by their behaviour that they regret the crime more than the punishment, their slavery is lightened or remitted altogether, sometimes by the governor's prerogative, sometimes by popular vote. (p. 81)

Besides being adopted as a form of punishment for serious crimes, slavery serves utilitarian purposes. While death penalty is useless, slavery is profitable, because it produces free labour force. The utilization of criminals as labourers is regulated according to specific case scenarios. If the attitude of convicts is recalcitrant and their behaviour is dangerous, death sentence can be applied. If they show good conduct, penalty reduction is granted, and freedom may be restored. The overarching principle is that slavery can be efficiently managed as a type of labour. The logical consequence is that it cannot be inherited by the children of slaves. Rationalization of human

resources defines More's conception of property law applied to people and will be at the core of Quiroga's view of productivity.

As a fervent Catholic, More devotes great attention to religious beliefs. In "The Religion of the Utopians" he develops a broad enquiry into faith, not as an individual manifestation but rather as a sphere that connects ethics and politics and is part of a system of beliefs about the supernatural, the transcendental, and the spiritual. The Utopians ignore the Revelation, reject atheism, intolerance, fanaticism, and materialism. They believe in an unknown, infinite Deity of the universe, support religious pluralism, and allow the performance of aniconic rites, in accordance with the principle of diversity. Throughout the island, some Utopians worship the sun, others the moon, others one of the planets, while others believe in mythological deities. Hythloday explores the issue of proselytism and conversion and explains that many Utopians have become Christian after learning about the life and miracles of Christ, the strength and spirit of sacrifice of the martyrs, the noble task of the missionaries and, above all, the community life shared by the apostles. While declaring that the impact of Christianity may be the result of concomitant factors, such as the secret inspiration of God and a natural predisposition of the Utopians, he draws attention to a specific aspect: "But I think they were also much influenced by the fact that Christ approved of his followers' communal way of life, and that among the truest groups of Christians the practice still prevails" (pp. 93-94). More's rhetorical talent emerges in the fine balance he achieves between an appreciation of pluralism and a preference for Christianity, motivated by divine intervention, human inclination, and especially communitarianism, which stands out as a powerful incentive.

Of the seven sacraments (Baptism, Confirmation, Eucharist, Penance, Matrimony, Anointing of the Sick, and Holy Orders) only baptism and marriage can be administered without a priest. The administration of sacraments in a non-Christian country and in a colonial context is a sensitive theological problem that More tackles with diplomacy. Hythloday explains that the Utopians who chose to become Christian were baptised,

but the absence of priests posed an obstacle to the achievement of a full religious status.

> By that time, two of our group had died, and among us survivors there was, I am sorry to say, no priest. So, though they received the other sacraments, they still lack those which in our religion can be administered only by priests. They do, however, understand what these are, and eagerly desire them. In fact, they dispute warmly whether a man chosen from among themselves could receive the sacerdotal character without the dispatch of a Christian bishop. Though they seemed about to elect such a person, they had not yet done so when I left. (p. 94)

Hythloday specifies that, when he left the island, the possibility of directly choosing a Utopian convert to be ordained priest was under discussion. It is a subtle narrative device that allows More to tackle the technicalities of conversion in a colonial scenario, leaving the problem open to avoid controversies. The absence of a priest was a problem that would not affect bishop Quiroga in the least, as he was appointed bishop. Neither was he concerned about the coexistence of different religions because the evangelization of the Amerindians was always one of the main goals of the Spanish voyages of discovery. In More's view of a sustainable society, the topic of proselytism requires great sensitivity because it must harmonize with the idea of pluralism and freedom of religion in a republic founded on equality. Christian converts can preach without restrictions, provided they do so with propriety and respect for other religions. Disparaging attitudes, aggressive coaxing, and any other form of extremism result in harsh punishment.

> Those who have not accepted Christianity make no effort to restrain others from it, nor do they criticize new converts to it. While I was there, only one of our communion was interfered with. As soon as he was baptised, he took upon himself to preach the Christian religion publicly, with more

> zeal than discretion. We warned him not to do so, but he began to work himself up to a pitch where he not only set our religion above the rest but roundly condemned all others as profane, leading their impious and sacrilegious followers to the hell-fires they richly deserved. After he had been preaching in this style for a long time, they arrested him. He was tried on a charge, not of despising their religion, but of creating a public disorder, convicted, and sentenced to exile. For it is one of their oldest rules that no one should suffer for his religion. (p. 94)

It is remarkable that the discussion of proselytism shifts from a theological to a social perspective: because freedom of confession is guaranteed, it must be regulated. Thomas More points to the difference between faith, deserving respect, and extremism, requiring containment. He also indicates that religion plays a key role in politics, as sectarianism is a factor of weakness that exposes a country to external attacks. Thus, religious unity is important from a spiritual and secular perspective. Nonetheless, acknowledging the danger of conflicts arising from a rigid pursuit of homogeneity, More allows for diversity, which involves intelligence in professing and proselytising.

> Utopus had heard that before his arrival the natives were continually squabbling over religious matters and he had observed that it was easy to conquer the whole country because the different sects were too busy fighting one another to oppose him. And so at the very beginning, after he had gained the victory, he prescribed by law that everyone may cultivate the religion of his choice, and strenuously proselytise for it too, provided he does so quietly, modestly, rationally and without insulting others. If persuasion fails, no one may resort to abuse or violence; and anyone who fights wantonly about religion is punished by exile or slavery. (p. 94)

The topic of conversion calls for closer inspection, considering how it affected the life of More, who chose to die rather than embrace the Church of England, and how it shaped the plan of colonization-cum-

Christianization pursued by Quiroga in Mexico. While confessional variety and the regulation of different preaching practices define Utopia as an ideal society, in reality More's religiosity proved as inflexible as that of Quiroga: the former refused to convert to the Church of England and the latter systematically evangelized all the indigenous people.

4. Michoacán and the Pueblos-Hospitales de la Santa Fe: A Focus on Mixed Policy

When More published *De Optimo Reipublicae Statu* in 1516, he presented a societal model, which humanist intellectuals would share and discuss all over Europe. Far beyond the cultural debate it elicited, that model came to be realized in Mexico only a few decades later by Quiroga, after he studied *De Optimo Reipublicae Statu*, the lives of the first Christians, the works of Saint Augustine, and Campanella's *Città del Sole*.

In 1531, he chose a hill known as Acaxúchitl, the indigenous term for cane flower, almost 3 kilometres away from the pueblo of Tacubaya, in the southwest area of present Mexico City; in 1532, he built Santa Fe de México. In 1533, he built Santa Fe de la Laguna, close to Pátzcuaro, in Michoacán, and Santa Fe del Rio close to La Piedad, also in Michoacán. Many more Pueblos-Hospitales de la Santa Fe (Hospital-Towns of the Holy Faith) were built in the following years, until two hundred of them were well established in the colony by 1580, fifteen years after Quiroga's death.

Recently, Geraldo Witeze Junior (2018) has filled a gap in scholarship by offering an insight into the multitude of indigenous ethnic groups in Michoacán. From what Quiroga wrote about them, it is impossible to establish which ones he was referring to:

> In the territory he was operating in, there were the Mexicas, the Purhépechas or Tarascans, and the fearsome Chichimecas. He does not specify their customs and he refers to Indians in generic terms [...]. Nonetheless, from what we know of his life and his movements in New Spain, it may be

> assumed that he had more contact with the Mexicas in the early days when he was a judge in Mexico City, and that, after 1536, when he was bishop of Michoacán, he was probably closer to the Purhépechas. (p. 55)

Quiroga blended hierarchical rules with principles of primitive socialism defined in More's *Utopia*. Each Hospital-Town was a settlement containing a school, a church, an open chapel, and three hospitals: one for the young, one for the contagious, and one for the non-contagious (Eaton, 2002, p. 82). Men and women wore identical clothes, owned no personal property, lived in extended families, shared collective buildings, and equally contributed to the common welfare by working six hours a day; mainly farming and learning a trade or craft. Every thirty families were guided by a *jurado*, the equivalent of the *Syphograntus*; every ten *jurados* were guided by a *regidor*, the equivalent of the *Traniborus* or *protophylarchus*. Above them were two *alcaldes ordinarios* and a *tacatecle*, corresponding to the *princeps* of Utopia. These offices were held by natives except for the highest role, the *corregidor*, which was held by a Spaniard appointed by the Audiencia. It is a mixed policy in which the Amerindians form the various layers of a pyramidal structure, and the Spaniards are positioned at the top. The traditional habits of the natives were replaced by a Christian lifestyle, while their pristine innocence was preserved through isolation from the colonizers.

In *Información en Derecho*, published in 1535, Quiroga examines slavery in America, illustrates new policies for the indigenous people, and defines a new social structure based on the Myth of the Golden Age, More's Utopia, the Primitive Church, the Prophesized Church, and the Hierarchical Church (Herrejón Peredo, 2006, pp. 89-102). Quiroga's primary aim was to dismantle the *encomiendas*, a system of land-tenure which granted Spanish settlers the right to own the land and to benefit from the unpaid work of natives who lived in semi-slavery.

A close reading of *Información en Derecho*, finely edited by Herrejón Peredo in 1985, will shed light into Quiroga's ideas of political reform. He believed that the natives were as innocent as the first Christians in the

Acts of the Apostles: properly housed and educated, they would become a model of Christianity. Quiroga's point of departure was More's model of sustainable society, in which serious crimes should be punished with slavery and hard labour, and freedom or mitigation of a sentence could be obtained with good conduct. The section dedicated to "El servicio entre indios" (Service among Indians) begins with the strong declaration that there are no real slaves. Instead, there is the possibility of renting work in perpetuity, whereby the natives retain their freedom and goods (pp. 32, 104-107). In "La doctrina del derecho romano" (The doctrine of Roman Law) Quiroga delves into the notion of slavery, explaining that whoever allows himself to be sold becomes a slave. Far from being permanent, that status can be revoked, as freedom can be restored via payment (pp. 32, 107-116). In "Entre indios: alquiler a perpetuidad" (Among the indigenous: perpetual rent) he acknowledges that they are sold only in cases of extreme necessity: "Los indios se venden por necesidad extrema" (pp. 33, 116). Under no conditions can they be enslaved. They do not lose freedom, dwelling or property: "No se dan las condiciones para esclavizarlos. No pierden libertad, lugar ni bienes" (pp. 33, 116-117). Those who sell their works in perpetuity, without losing their freedom, goods or place, are a kind of free men: "Los indios que venden sus obras a perpetuidad, sin perder su libertad, bienes ni lugar, son una especie de hombres libres" (pp. 33, 118-119). There are no slaves of war (pp. 33, 119-120). Relatives can obtain the freedom of those who sold their work in perpetuity, because they never lost their status of free men: "Los parientes pueden restituirlo a la libertad. En verdad, nunca perdió estado de ingenuidad o libertad" (pp. 33, 121-122). The section entitled "No hay verdaderos esclavos" (There are no real slaves) reiterates that real slaves cannot exist among the indigenous people, as they are free men who sell or rent their work in perpetuity. He adds that the same applies to those who were stolen as children or deceived as adults. Continuous oppression invalidates any kind of bondage, in compliance with the Codex Theodosianus. Those who are threatened or forced by their chieftains to accept slavery are also free. Quiroga laments that slavery in New Spain is

harsher than in Spain and does not understand why the Spaniards should hold the indigenous in such a harsh bondage (pp. 35, 137-143).

"La posibilidad de una policía mixta" (The possibility of mixed policy) shows Quiroga's ideas on sustainability, based on the conviction that new policies can be established by taking advantage of the natural good disposition of the Amerindians, who are as simple as humankind was in the ancient Golden Age. Quiroga compares the indigenous to a "masa blanda", a soft dough arranged by God so that the Spaniards would apply a good mixed policy. The model of republic he envisions is deemed feasible, considering all the differences of the New World from Europe, because the natives naturally respond to the sacraments and sustain the earth. While slavery can be justified in certain cases, the Spaniards should not take advantage of the slaves (pp. 39-41, 175-188). In "Semejanza con la edad de oro" (Similarity with the golden age), it transpires that the indigenous consider slavery only as a form of moderate service. The aim of Quiroga's subtle rhetorical discourse is the justification of slavery as serfdom: deplorable as a form of exploitation, it becomes viable as a type of labour.

To highlight the similarities with the Golden Age, the life of the Amerindians is described in terms of simplicity, freedom, and proclivity for celebrations. Quiroga believes that God inspired him with Lucian of Samosata's *Saturnalia* (pp. 41, 188-195). The ancient Roman festivities of Saturnalia held theological importance, symbolising the restoration of the Golden Age. During the upside-down world on December 17th, then extended to December 23rd, the slaves were treated as equals, wore their masters' clothes, and were served meals in remembrance of an earlier Golden Age initiated by the god Cronus (Saturn in Latin mythology). In Lucian's *Saturnalia*, the god Cronus himself declares:

> *Cro*. [Zeus] will be in authority again soon enough. Mine is a limited monarchy, you see. To begin with, it only lasts a week; that over, I am a private person, just a man in the street. Secondly, during my week the serious is barred; no business allowed. Drinking and being drunk, noise and games and dice, appointing of kings and feasting of slaves, singing naked,

> clapping of tremulous hands, an occasional ducking of corked faces in icy water, – such are the functions over which I preside. But the great things, wealth, and gold and such, Zeus distributes as he will. (Lucian, c. 125-180 CE/1905, p. 108)

In "La reforma de la Iglesia" (Church reform) Quiroga expresses his trust that God will reform the Church in the New World, where the natives' simplicity and freedom of animosity are proof of a novel Golden Age. A natural inclination towards the Christian faith, which More attributes to the Utopians and Quiroga to the Amerindians, confirms the affinity between autochthonous religions in the New World and the primitive Church. Compared to the New World, Spain is in the Iron Age, in which humankind pursues war and has become violent (pp. 41, 196-199).

"La república de Moro y la edad dorada" (The republic of More and the golden age) brings together the ancient classical myth and More's ideal society. To rule over the native populations, the Spanish colonizers must adopt laws that differ from the laws in Spain. The government envisioned by More in Utopia is ideal for the New World, since the indigenous are predisposed to receiving a mixed policy. The evolution of thought from Lucian to More and Quiroga is now clear. More, who translated Lucian, imagined his republic for people like the ones from the Golden Age. Since Quiroga believes that the indigenous are the expression of a new Golden Age, More's model suits them well for several reasons: it takes the bad aspects away from their nature and enhances the good ones, brings them together in towns, removes their idleness, and does not offer misleading examples. It is a model of sustainable social order based on containment. Quiroga notes that the indigenous populations subjected to slavery would not live long, which raises the question as to whether his willingness to change the colonial rules was aimed at establishing humane relationships or at setting up the conditions for an optimal utilization of the human capital. He also remarks that they satisfy themselves with too little and lack the ability to maintain or instruct themselves, which points to the importance and advantage of a pedagogical plan enforced

by the Spaniards. Truth is, he concedes, real slavery is not worthy of the Golden Age, also because all forms of freedom involve some form of service anyway (pp. 41-42, 199-203). His "Conclusions" clarify that what has been explained, if rightly understood, will be for the good of the New World. It would be wrong to assume that the indigenous are ill-natured and wicked or should bear the grievances of the colonizers. Obedience to God and the pursuit of wellbeing for all entails preserving, instructing, bringing together, and spreading Christian faith and good habits (pp. 42, 203-204).

In "Objeciones y respuestas" (Objections and answers) Quiroga addresses whoever may argue that such a perfect policy is unattainable and answers that his mixed policy is in fact viable, because it cuts possible evils at the root. As the local populations are held together, few religious people are needed to look after them. Families, *jurados*, governors, mayors, *corregidores*, and the Real Audiencia form an intercultural hierarchy that guarantees peace and justice in the republic. Thanks to this mixed policy, the temporal and spiritual powers complement each other, and the Christian law can thrive. To those who may object that the indigenous, being simple, are incapable of such a state of republic, Quiroga offers an argument from John Chrysostom, Archbishop of Constantinople, and prominent Early Church Father, who said that even uncouth men, when interested, show intelligence. Another answer, taken from St. Ambrose, is that God chooses the simple ones, as confirmed by his love for the humble. Such a state of republic may not be achievable in Europe, but it is possible for the indigenous because of their closeness to the Golden Age. Faith and the mixed policy are exactly at the foundation of the ideal republic they need if they want to survive and cope with their responsibilities. Quiroga's holistic view encompasses their preservation and instruction, their service to God and maintenance of collective wellbeing. His sustainable society includes spiritual values, such as peace and grace, as well as temporal values, such as justice and charity (pp. 42-43, 205-215). In "Advertencias y despedida" (Warnings and farewell) Quiroga submits his manuscript to the Church and recommends reading

More's *Utopia* to better understand the reasons for establishing such a republic, since the conditions of the New World were revealed to the Englishman. Finally, Quiroga apologizes for his repetitions, the typical flaws of lawyers (pp. 43, pp. 215-218).

The Pueblos-Hospitales were successful because they were sustainable. Private property or luxuries were not allowed; physical health was encouraged; education was egalitarian and encompassed reading, writing, singing, and music playing; the hungry, the sick, and the homeless were taken care of through a health and social programme; grievances were brought to ecclesiastical courts. Santa Fe de México reached the peak number of 30,000 Indians living together. The Colegio de San Nicolás in Michoacán, which Quiroga built in 1540 as a seminary for Indians and Spaniards, is one of the oldest and most renowned universities in America. He donated his personal library of 266 volumes, a prodigious number for the colony of New Spain in the mid-sixteenth century. Nowadays, the descendants of the indigenous people are highly appreciated as arts and crafts masters and Quiroga is celebrated as a benefactor.

> When he died, in 1565, Quiroga was just a few years short of centenarian status. Tata ("Father") Vasco, as he was known by the Indians, left an indelible mark. The skills he implanted among Tarascans of the Pátzcuaro region have been passed down to their descendants, who are considered among the most skilled craftspeople in Mexico. Quiroga trained his pupils in a variety of disciplines and his method of specialization by community endures to this day. You go to Paracho for guitars, Tzintzuntzán for pottery, Santa Clara for copper products and Nurío for woven woollen goods.
>
> The Spanish colonial era was one of astounding diversity. It could produce a daring conqueror like Cortés, a monster like Nuño de Guzmán, and a reformer as enlightened and benevolent as Vasco de Quiroga. (Tuck, 2008, para. 12-13)

Quiroga introduced steel to the lake region, allowing the production of steel tools that increased the artisans' output. Trees were chopped more quickly and provided larger quantities of wood for furniture. The "Santa Fe Style" gained popularity and became the most prized in Michoacán (Rose, 2000, Erongaricuaro section, para. 5). The economic and historical significance of the arts and crafts must be properly appreciated. Various forms of craftsmanship have become the distinctive feature of the Tarascans, connected to specific towns, and boosting sustainable local economy. Mexican craft towns on Lake Pátzcuaro ensure the continuation and positive reception of Quiroga's legacy as a great reformer and social educator in Mexico.

His project fused colonialism and interculturality, generating an ambivalence that transpires from various ambits. He believed that European values should be introduced among the natives yet suggested that their own values ought to be respected. The *encomiendas* should be abolished because they were inhuman, however, the ways of life of the natives required corrective measures. They were primitive and needed instruction, yet their very simplicity, humbleness, and innocence were the ideal prerequisites for Spanish colonization. While living within the congregations and becoming highly skilled in numerous arts and crafts, they were subjected to indoctrination and western acculturation.

The Spanish conquest of the Americas in the 15th and 16th centuries generated a heated debate about human rights. On December 21st of 1511, Fray Antonio de Montesinos of the Dominican Order at the Island of Hispaniola delivered a sermon, known as Christmas sermon, which may have motivated the Laws of Burgos. Issued by Ferdinand the Catholic on behalf of his daughter, Joanna of Castile, on December 27th of 1512, the Laws of Burgos regulated child labour, women's rights, wages, accommodation, rest, and holidays. Bartolomé de Las Casas and Juan Ginés de Sepúlveda at Valladolid continued to debate the sermon from 1550 to 1551.

The reasons why Spanish exponents of the Catholic Church magnified the prelapsarian innocence of the Amerindian populations can be explained by considering colonization and evangelization as parts of

a comprehensive refoundation of humankind. In his famous study *La modernidad de lo barroco*, Bolívar Echeverría argues that the societies built by the Spaniards on the Catholic destruction and conquest of Amerindian and African cultures encapsulate the long predominance, first central and open, then marginal and subterranean, of the Baroque ethos, generated by two antagonistic forces. A progressive and aggressive drive prevailed over a conservative and defensive one, which however could not be deleted and replaced (Echeverría, 2011, pp. 47-48).

> Un mundo histórico que existió conectado con el intento de la Iglesia Católica de construir una modernidad propia, religiosa, que girara en torno a la revitalización de la fe - planteado como alternativa a la modernidad individualista abstracta, que giraba en torno a la vitalidad del capital -, y que debió dejar de existir cuando ese intento se reveló como una utopía irrealizable.–A historical world existed in connection with the Catholic Church's attempt to build its own religious modernity, which revolved around the revitalization of faith—proposed as an alternative to abstract individualist modernity, which revolved around the vitality of capital—and must have ceased to exist when that attempt revealed itself to be an unrealizable utopia. (p. 49, my translation)

Echeverría exposes the polarities of a project that attempted to counteract the rise of the modern individualistic society with the establishment of a collective society founded on the erasure of an archaic endogenous culture and regulated by hierarchical Western principles. However, his point about the inevitable termination of the project does not apply to Quiroga's achievements. By importing the utopian model from England, enriching it with classical and religious sources, adapting it to his own Spanish background, and exporting it to Mexico, he enacted a social plan that has evolved for centuries owing to its intercultural breadth.

In the Introduction to his edition of *Información en derecho*, Herrejón Peredo argues that the implementation of the mixed policy throughout the New World was only partially successful. Colonizers adopted part of

Quiroga's plan, grouping the indigenous people, often by force, into villages built according to the model of a church and town council at the centre, but the spirit of Christian humanism that inspired the Pueblos-Hospitales de la Santa Fe was swept away by the demands of a colonialist state. The master and slave dialectic, growing on co-dependency, proved more enduring than the ideals of Christian utopias and social pedagogy (1985, pp. 23-24).

What deserves recognition is the intelligence with which Quiroga, who strongly believed in the law, religion, and colonialism, built up a legal framework thanks to which he validated the execution of his religious mission and political mandate. His assumption was one of superiority uniquely blended with compassion. While it would be anachronistic to claim that he pursued equality and diversity, it is evident that he cared for the wellbeing of the indigenous people. His mixed policy was successful in combining conversion to Catholicism and European domestication within a cohesive social order, maintained through solid work ethics and some recognition of human rights.

5. More, Quiroga, and Sustainable Thinking

It remains unknown whether More intended to present an abstract model of ideal society or a blueprint. Contemporary readers find the quality of life on the island of Utopia hardly desirable. Discussing *The Old World and the New Seen from Nowhere*, Carlo Ginzburg (2000) explores why a lawyer who engaged in a political battle for the rights of indigenous people could believe that the Golden Age mentioned by More and Lucian was real. The golden age described by Lucian in *Saturnalia* originates from a ritual of inversion, whereby private property is suppressed, ambassadors wearing sumptuous clothes and jewels are taken for slaves, and gold and silver are used to make chamber pots. More elaborates on Lucian's upside-down society to see what nobody else had seen before: a reality paradoxically reversed, an island in which the sheep devour human beings. The separation between fictional and historical narrative still

stands, generating an extraordinarily powerful fiction and maintaining a strong grip on reality (Gnoli, 2002).

The path that connects the myth of the Golden Age, Lucian, More, and Quiroga is rooted in the utopian mentality, which incorporates satire and the upside-down world, prompting a series of mental leaps: the first occurs through the deconstruction and subversion of reality, which generates a sense of estrangement and opens the possibility of accessing other hypothetical realities; the second involves exploring them, while seeing one's own world from a distance; the third coincides with the return to reality, now illuminated and changeable.

Mundaca Machuca (2010) has highlighted a historical paradox, by drawing a lucid comparison between More's speculative critique and Quiroga's social and religious empiricism. The former never meant to introduce his reformist ideas in England, his aim was rather to write an ironic and parodic literary work without any practical claim beyond that of a thorough critique of the society of his time.

> After the terrors experienced in the first years of the conquest, *Utopia* in America is examined with critical force by Quiroga, as a compass pointing to the future horizon. And just as Thomas More brilliantly combined his appropriate moral and social critique with a free intellectual game, an imaginary American world was used [...] to offer a new and alternative world to European societies. (*La Utopía* section, para. 6, my translation)

It is true that, after the terrifying first Audiencia of Mexico, Bishop Quiroga adopted utopian ideals. It is true that Bishop Bartolomé de las Casas and the religious and political utopia of the Franciscans adhered to these ideals because New Spain was indeed the ideal place to develop them throughout America. It is also fundamental to distinguish between the terror and destruction caused by some Spanish colonists and the productive social models established by others. It is less comfortable to single out good colonists, evangelizers, religious educators, and social reformers, as their goal was the efficient exploitation of natural and human resources

rather than the advancement of the Amerindians. Certainly, there were colonists driven by a true utopian impulse, but scholars of utopia have become more and more aware that what may look like an ideal habitat to the eyes of the utopian thinker very often looks like a dystopian enclosure to everybody else and becomes a place of detention for those who are presented with no other choice but to stay there.

Chordas (2010) noted that "if More's Utopia turned out to be a fiction, however, it was ultimately a fiction not confined to the pages of a book" (p. 66). The world would look quite different if More's small golden book had been confined to the realm of the imaginary, and while counterfactual reasonings may sound superfluous, Quiroga's impact on history continues to polarize scholars. The assessment of More's and Quiroga's sustainable thinking cannot reach a critical poise, it must oscillate.

Renaissance utopian thinkers explored ideal forms of state based on homogeneity and autarchy. More invested in the notion of human capability and Quiroga acted on that investment. Both More and Quiroga supported utilitarian ethics, convinced that the wellbeing and efficiency of society depended on a productive regulation of human resources. However, the linearity and coherence of their conceptions can hardly be validated. Theoretically, More believed in relativism and pluralism, then chose to die and preserve his integrity as a Catholic. Quiroga elaborated a mixta policía that takes interculturality into account yet capitalizes on mass conversion to Christianity. The island purportedly discovered during one of Vespucci's voyages and the Pueblos-Hospitales built in Mexico call for further studies from the perspective of sustainability. More's and Quiroga's works are and will continue to be strong catalysts of discussions on sustainable habitats. They will prompt readers to ask themselves what it is that should be sustained and whether it may also be desirable. Pairing sustainability and desirability seems as arduous in history as it does in utopia.

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Towards the formation of ecological minds: marine imaginaries in texts for children

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ABSTRACT

In this essay, I will first discuss ecocritical inquiry and the broader framework of environmental humanities. Later, I will describe a constellation of five cultural productions aimed at rising environmental awareness, scientific exploration, and activism, which have circulated in the Chilean context recently, four of them related to children's cultures. This amalgam of cultural productions exceeds the category of the literary, as well as definitions of genres within children's literature, and at the same time, reaches out to the interdisciplinary, together with international collaboration. The degree to which these boundaries are blurred seems to contribute to the extent to which the creations succeed in raising ecological awareness. The assemblage encompasses three children's books, one chronicle and a scientific exhibit, all of them related to marine life and cultures.

Keywords: picture books, environmental awareness, marine imaginaries.

This essay originates from a three-year postdoctoral research aimed at describing both the presence and/or absence of environmental awareness in Chilean picture books published in the new millennia[1]. The project encompassed assessing over 3950 titles published between 2000 and 2015 registered in the national ISBN index under the children's literature category. Considering paratextual information such as the publishers' online descriptions, the National Library's entry, any interview, or marketing evidence found in the media, the cover, the title, and the author's trajectory, the research sorted out whether the texts would potentially embrace environmental significance to any extent. Thus, this first evaluation reduced the number to 900 books with potential environmental significance; after the second closer evaluation, 85 books were considered in the study and thoroughly assessed, following specific criteria on a matrix devised for this project.

Consequently, this research is aligned with the agenda of the environmental humanities. In this essay, I will first discuss ecocritical inquiry and the broader framework of environmental humanities. Later, I will describe some suggestive cases found in the aforementioned research, in contrast with two cultural productions beyond the children's literature category, in order to present how they contribute to raising environmental awareness, fail to do so, or even betray their own intention.

As the Meadows Report warned almost fifty years ago (though we do not seem to have been paying much attention)[2], Gianfranco Franz (2018) alerts us again in the title of his presentation that we are "close to the limits". Nonetheless, Franz's profound insights offer hope in as much as we can still work together to shape the ecological minds and cultures of sustainability required to overcome the current crisis. To this ambition, environmental humanities are a fundamental foundation, as they contribute to assessing and prompting ecological imaginaries in the arts and humanities. Quoting the Stanford Humanities Center (n.d.):

1 Casals, A. (2017-2019). "Conciencia ambiental en la literatura y escritura infantil chilena ilustrada del nuevo milenio." Postdoctoral Research Project #3170134. Financially supported by Fondecyt-Conicyt and sponsored by Pontificia Universidad Católica de Chile.

2 See Meadows et al. (1972). *The Limits of growth*.

> The humanities can be described as the study of how people process and document the human experience. Since humans have been able, we have used philosophy, literature, religion, art, music, history, and language to understand and record our world. These modes of expression have become some of the subjects that traditionally fall under the humanities umbrella. Knowledge of these records of human experience gives us the opportunity to feel a sense of connection to those who have come before us, as well as to our contemporaries.

However, if we are to consider environmental or ecological humanities under this broad umbrella, what we are trying to do now is not only "to feel a sense of connection to those who have come before us [or] our contemporaries", but more pressingly, to develop a sense of connectedness to the future generations and those —humans and more than humans— who are already suffering the consequences of living in an environmentally damaged world; a sense of connectedness that hopefully fosters an ethics of care and active commitment. As Ursula K. Heise (2017) puts it in the Introduction to *The Routledge Companion to the Environmental Humanities*: "The environmental humanities … envision ecological crises fundamentally as questions of socioeconomic inequality, cultural difference, and divergent histories, values and frameworks" (p. 2). Thus, following Sverker Sörlin, Heise quotes:

> It seems this time that our hopes are tied to the humanities …. We cannot dream of sustainability unless we start to pay more attention to the human agents of the planetary pressure that environmental experts are masters at measuring but that they seem unable to prevent. (Sörlin, 2012, as cited in Heise, 2017, p. 3)

As an ecocritic, I investigate texts. Mostly illustrated fiction, but also poetry, nonfiction, film, song lyrics, and other cultural objects to map out how artists, creators, and composers process and document … experience. Yet, as an educator, I am not satisfied with analysing texts that

document past and contemporary experiences only; I am also interested in how texts may shape our frameworks, values, and cultures, as Heise indicates. Moreover, I am interested in how narratives for the young audience can empower "ecological minds" (Franz, 2018) and imaginaries, and figure the years to come. As Margaret Atwood stated in Ursula Le Guin's obituary: "In all her work, Le Guin was always asking the same urgent question: what sort of world do you want to live in?" (Atwood, para. 4). This is one of my main concerns as an ecocritic: the imaginaries of prospective experience.

As many thinkers have argued, we have overestimated the role of technological solutions for a sustainable development in a society that is unquestionably driven by forever-infinite-growth in a finite planet; Heise asserts: "Scientific understanding and technological problem-solving, essential [as] they are, themselves have shaped such frameworks…." (p. 2), referring to the socioeconomic, cultural, ethical frameworks mentioned above; the same frameworks that have led us to the very crises. In that sense, Le Guin's narratives figure future scenarios where the focus is not on the likelihood of the technological devices, but, again, in the pressing questions: *would we want to live like that, is it sound, is it ethical?*

Le Guin was criticised for her more fantastic rather than technologically informed Science Fiction worlds, figuring, for example, an instant communication device, the *ansible*, that has become part of the sci-fi culture. Experts in technology seem to agree that the *ansible* is inconceivable. Yet, following Atwood, I argue that more than its plausibility, the questions about the worlds Le Guin proposes are more important. As a composer of fiction narratives, Le Guin's imaginative worlds invite us to think critically about our expectations of the future. My point here is that perhaps, in the need to compose compelling narratives that help us think out of the box, narratives that bring together questions and perspectives from a variety of disciplines, storytellers must let go and press the boundaries of *disciplinary correctness*.

As ecocritics, we analyse what such narratives are revealing about the cultural moment when they are written, and the anxieties or certainties

they project. When describing ecocriticism, Greg Garrard (2004) explains that "environmental problems require analysis in cultural as well as scientific terms, because they are the outcome of an interaction between ecological knowledge of nature and its cultural inflection" and he adds, "[t]his will involve interdisciplinary scholarship that draws on literary and cultural theory, philosophy, sociology, psychology, and environmental history, as well as ecology" (p. 14). Though Garrard has left art, music, and religion aside —going back to Stanford's definition of humanities—, his description can be understood as what we recognise today more broadly as environmental humanities; thus, ecocriticism and environmental humanities rely on interdisciplinarity.

Garrard continues asserting that "[t]he study of rhetoric supplies us —ecocritics— with a model of a cultural reading practice tied to moral and political concerns, and one which is alert to both the real or literary and the figural or constructed interpretations of *nature* and *the environment*" (p. 14). In this sense, I would like to note that most scholars originally self-identified with ecocriticism were academics in the literary field. Therefore, analysing the rhetoric potential of works with an environmental preoccupation has been ecocritics' most common occupation. We work with representations, that is, with "how people process and document the human experience", knowing that these representations or "records of the human experience", mirror the beliefs, aspirations, and anxieties of a society at the times of its creative productions and circulation (as stated in Stanford's definition).

This is also true for the study of young people's literature. Specialised scholars agree that any study of literature for young people is also a cultural study (Reynolds, 2011; Lerer, 2008; Hunt, 2001). As Franz asserts, "literary narratives and artistic expressions … have always shaped the human mind" (2018, para. 4); more so, academics interested in young readers literature agree that literature for young people is a privileged site for socialisation and that many ideas that we grow into and regard simply as common sense, are concepts instilled in us at an early age from the stories we were told or read, because "children's

literature has always been ideological" (Mickenberg & Nel, 2008, p.1) simply because "all stories are products of their times" (p. 4). As an ecocritic, this acknowledgement compels me to question young readers' texts in search for understanding to what extent, as cultural objects and socialisation agents, these narratives contribute to the construction of eco-critical thinkers and ecological citizens. The task is not as easy as it seems, considering the complexities of writing for young readers; for example, composing appealing, profound, and aesthetic works with restrictions (such as limited vocabulary and limited time spans), reducing both description and internal dialogue (Nicolajeva, 2014).

For the last three years, I have been working with seemingly eco-friendly picture books. The task is therefore even more complex, given that picture books are composed in two codes: the icon or image and the conventional written text (Nicolajeva, 2006). To achieve what I call an "environing" reading experience (Casals, 2018) or prompting a "reading ecosystem" (Ramos & Ramos, 2011) that is completed in the interplay between the readers, the narrative, and the iconic texts, together with the materiality of the book as an aesthetic object, I need to consider the actual text, the illustrations and paratexts, a method which also involves the physical book and design features. Thus, as a professor of literature, I have had to go beyond the conventional limits of literary criticism and close reading to explore disciplines, such as visual art theory and design, to understand the full meaning of picture books. Added to the analysis of the environmental content or ecological history itself, I challenge myself to go beyond the rhetoric appreciation of the written text and move across from the boundaries of literary interpretation to apply research tools from linguistics and, more specifically, from ecolinguistics (Stibbe, 2015).

As a show case, I will present and describe a set of cultural compositions intended to raise awareness about life at sea. To illustrate how works of creative interdisciplinarity contribute —or not— to compelling ecological compositions, I will deal with them in a comparative manner, which is one way in which literary scholars often work.

Creative texts can be categorized as fiction, whereas seemingly objective texts that present facts, are categorized as non-fiction; though the fine line between them, as we shall see further on, is many times blurry. Under the category of non-fiction, information books are complementary to the school system and they are intended to entertain, while triggering the reader's curiosity in a specific subject matter, usually scientific ones. The information in them should be accurate and updated, though the texts should be brief, and their meaning expanded by images, pictures, and simple graphics. These books should be attractive objects. It sounds easy, but, again, explaining complex ideas in simple terms is a demanding matter. There are many decisions at play, not only those related to the written and iconic content that must complement and expand each other's meaning, but also related to the design elements that should enhance the composition; considering, for example, font size and style, or the display on the page spread, which should be seamlessly balanced into a captivating composition.

Figure 1. Chile es mar (2016), endpapers

The book *Chile es mar: guía para aprender, conservar y cuidar nuestro océano* (2016) makes an explicit callout to protect the Chilean Pacific coast and sea. It is a huge hardcover blue book (25 cm wide and 33.5 cm tall), like an information book about the ocean —I guess— should be. The authors are all experts in marine biology and ecosystems, and the book is coedited by a prestigious local publisher and the Wildlife Conservancy Society, which suggests a reliable source. However, the language used betrays their intention in as much as, for example, the written text consistently refers to the "resources" and "products" rather than the living beings in the ocean; conveying the idea that nature is ours to exploit, as if the renewability of the oceans were equivalent to infinite. This idea is emphasized by the colourful cornucopian image on the endpapers, where the repetition of marine fauna and some flora conveys an endless image; Figure 1 shows only one eight of the endpaper spread (see Figure 1).

Likewise, an element that is suspiciously absent in the text is the allusion to the large fishing industry as one of the main agents responsible for the depletion of marine life; the text vaguely refers to drift nets pulled by ships as if these ships had a life of their own. The text describes fishing techniques, but the vague language and failure to mention industrial fishery, the tiny size of the fishery ships at the bottom of the page, and the proximity of these images to texts referring to artisanal fishermen, may lead to understand that traditional or subsistence fishing is responsible for exhausting the oceans.

As stated above, all the authors of *Chile es mar* belong to the area of marine biology and ecosystems. I believe that this team lacked, at least, a multidisciplinary approach; the contribution of an ecocritic who could point out at the cornucopian trope in which the book was rooted, or the input of a style reader who could have pointed out at the redundant use of words in the semantic webs of "production" and "resources" could have warned the team of the unforced error. Their intention to provide a guide to protect the ocean —our ocean, as the subtitle explains— is overshadowed by this *lapsus linguis* that reveals an anthropocentric and extractivist ideology underlying their discourse, despite their explicit intention.

Contrasting the scientific tone of this book, the article published by the National Geographic Society celebrating the creation of the marine parks Las Desventuradas and Juan Fernández off the Chilean coast is written in the first-person tradition of travel writing, as an "I-witness" that offers testimony. The authors of this article deploy a variety of adjectives to explain the effectiveness of the Humboldt Current in generating an ecosystem that yields such large diversity and amount of marine life in the area. Moreover, the authors specifically celebrate the agency of the organized local community in managing the lobster catch, highlighting that already in 1935, this community implemented criteria such as the size of the catch and the prohibition to capture females with eggs. The authors also foreground the community' activism in promoting the declaration of the area as marine parks. In this sense, we have a persuasive narrative that is mindful of its textual and iconic language, deploying critical hope, as proposed by Paulo Freire (1972), in as much as it recognizes the existing threats and difficulties, while presenting the community as a role model in ecological activism.

The third example that I would like to present is a multidisciplinary exhibit that was held from August to November of 2018 at Centro Cultural Palacio de la Moneda in Santiago, called *Ballenas: voces del mar de Chile*. I say multidisciplinary, and not interdisciplinary, because the exhibit included separate spaces, each one addressing Chile's cultural relationship to whales from a different disciplinary area; though a variety of disciplines contributed to the exhibit as a whole and offered a variety of perspectives to its diverse audience, these did not seem to produce any specific outcome or object as a result of actual interaction.

Because of the architecture of the Centre, there are two exhibition rooms separated by a large hall. At the centre of the first room (Sala Andes) there was a skeleton of a whale, which performed as the heart of the exhibit, and everything else revolved around it. In the second large room (Sala Pacífico), all the displays revolved around the large, animated projection of an apparent aquarium where whales swam.

The ceiling of this room was covered with recycled plastic bottles that helped to create an underwater atmosphere given the combination of transparent, blue and green bottles, together with calling the audience's attention to the plastic islands that float in the oceans. Towards the edges of both rooms, there were tools, artifacts, and realia related to whale hunting and travelling, crafts, posters, oil paintings and photos related to marine imaginaries, a collection of Chilean books covering related topics, video explanations of oceanography, marine ecosystems, and so on.

I would like to point out at the explanation on how the presence of the Humboldt Current ensures the large diversity and quantity of marine life in our coast that was offered at the exhibit. Differing from the information book *Chile es mar* mentioned before, the language used here was cautious yet eloquent. The captions explained that the Humboldt Current is "rich in nutrients" and "sustains a huge amount of marine life", avoiding words in the semantic webs of productivity and resources. Forwarding a variety of documents that reveal our imaginaries and epistemologies on South Pacific whales, their ecosystems and ecological history, the exhibit nurtured a sense of wonder —to use the words of Carson (1956)— curiosity and empathy, especially for the whales that are part of our marine ecosystem.

Finally, I will describe two books that feature clever, curious girls as protagonists in offshore adventures. Along the research, I stumbled upon books that could not be classified as fiction nor were they strictly catalogued as part of the children's literature tradition. I called them hybrid books. The main function of these books is evidently to convey scientific information, but they are presented as a story, as an imaginative narrative. The two stories described below are inspiring examples of what interdisciplinary collaborations and international partnerships may achieve.

Sophie Scott Goes South (2013) or *Sofía viaja a la Antártida* in Spanish (2014) is set in the Southernmost seas. As the title suggests, it is a travel narrative told by an Aussie girl who accompanies her father on a short journey to Antarctica. The focus of the tale is on Sophie's expectations,

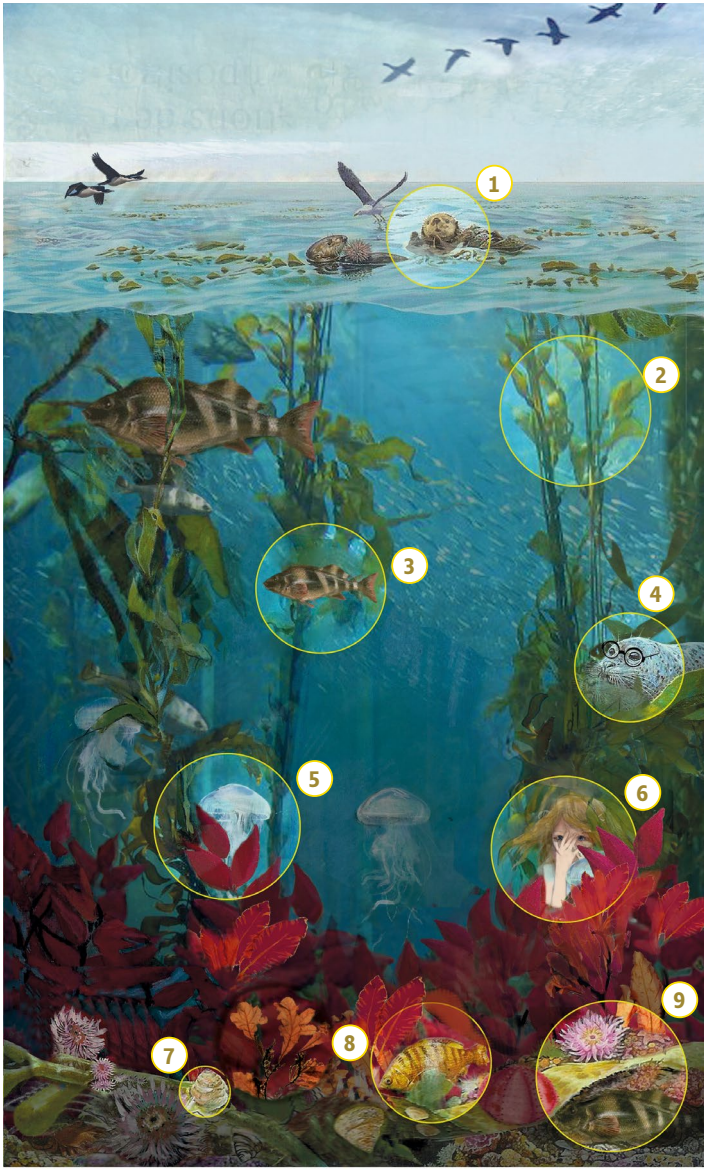
experiences, observations, and descriptions. Complying with the travel writing genre, the narrative voice offers precise information of natural phenomena, such as the formation of icebergs, the *aurora australis*, the weather, and travel history. The narrative further intertwines Sophie's own reactions to the events described and includes an array of documents such as explanatory sketches, drawings and pictures by Sophie that expand the meaning expressed by words and give the narrative an "air of reality" (James, 1884, para. 7), as if the reader was actually looking at Sophie's scrap book (see Figure 2).

Seamlessly figuring an interdisciplinary gender-balanced team on board, the story features female adventurers and scientists, and manages to model interdisciplinary and intergenerational collaboration. The Spanish edition expands the possibilities of collaboration to the international sphere, including a postscript with a letter addressed to Sophie from a Chilean girl living in Villa las Estrellas, at the Antarctic Peninsula, who explains what it is like to live in Antarctica. Along this narrative, readers encounter an adventurous girl —two, in the Spanish version— with a voice and agency who is interested in the world around her. Blurring the boundaries of genres, such as information books, travel journals, scrap booking, and storytelling, the composition is attractive and inspiring.

Figure 2. Photos, stamps, and illustrations. Day 22 in Sofía viaja a la Antártida (2014)

Figure 3. Alicia y el bosque de algas (2018), p. 24

— ...Pero aquellas me parecen mucho menos familiares.
— Es normal, porque es el lecho marino de Chile y el bosque de la costa del Pacífico de ese país.



Alice et le forêt d'algues (2018) or *Alicia y el bosque de algas* (2018), is a French-Chilean collaboration. With a clear and meaningful intertext with Lewis Carroll's *Through the Looking Glass*, the narrative tells the journey of a French-Chilean girl who lives at Île de Batz off the north-western French coast. The story begins when she receives a postcard from her Chilean grandfather who is a seaweed gatherer, like many people in Batz are too. She knows the harvest has not been good, and wonders if seaweed could eventually disappear. At this point, she sees a talking seal in the sea who summons her to come along and explore the seaweed forests under water. Like Carroll's Alice, she jumps through her reflection on the water's surface and goes down and down... Undersea, Alice and Aronnax, the seal (a clear reference to marine biologist Pierre Aronnax, the main character in Jules Verne's groundbreaking novel *Twenty Thousand Leagues Under the Seas: A World Tour Underwater*), hold a didactic dialogue where Aronnax explains the diversity of algae and diversity amongst one single species, their cycles and interdependences within their ecosystems, and so on. Clever as she is, Alice proffers interesting questions and precise summaries, crosschecking what Aronnax is telling, and she can even add information from her own experience as the curious and caring child she is, easing Aronnax's speech, and making the text dialogic and friendlier to the reader.

The illustrations, inspired by Henri Rousseau, expand the story and invite the readers to jump into the fluid ecosystem of the book (see Figure 3), combining full page spreads of environing landscapes and seascapes, and information-book-like diagrams. The illustration displayed here is a duller copy of the book's cover page (in grey scales here), which is, at the same time, a creative appropriation of Rousseau's "Tropical Forest with Monkeys" (1910). The intertext to the French artist, seduced by Mexico's southern geography, builds on to the overseas narrative, underlining the cultural and natural similitudes in the French and Chilean coast. The blurry colours of the illustration are interrupted by brighter circles spotting certain species within the composition, which appear in more vibrant tones in the original, each one identified with a number. The text above the composition displays a guessing game, where Aronnax invites Alice to try

to say the name of each species. A note, printed with a smaller font than the one used for the main text, appears at the bottom right of the picture, indicating that the correct answers are at the back of the book. Thus, the book breaks the dialogic structure with an interactive suggestion inviting the readers to play the guessing game along with Alice.

The three books, the *National Geographic* article, and the whales exhibit are all contemporary documents that reveal our current concerns for the sustainability of marine life. All five of them disclose a pedagogical function. Yet, none of them imagines plausible futures, as Verne suggested. Rather, they give testimony of the state of the art, encouraging the reader to learn more, care and, hopefully, become involved (though the message in *Chile es mar* can be misleading because of the lax lexicon and somewhat hasty design). However, it would be farfetched to ask these texts to be speculative in as much as none of them qualifies as fiction texts, least as science fiction. Nonetheless, at the end of Alice's story, she imagines her grandfather in Chile harvesting *cochayuyo*[3] and wonders if he will be able to carry on with this activity: "¿Podrá su abuelo seguir trabajando en su hermoso oficio?" (p. 43). The narrative finishes with the assertion that like true guardians, seaweed forests continue to look after our common future in the planet, "Como verdaderos guardianes, los bosques de algas continúan velando por nuestro futuro común en el planeta" (p. 43), stressing the agency of the algae.

Overall, I have compared five cultural artifacts that explore and represent cultural relations to the ocean (three children's books, a chronicle, and an exhibit). Two of these were completely Chilean fabrications: the information text *Chile es mar* and the exhibit *Ballenas: voces del mar de Chile*. Both hybrid books, *Sofía viaja a la Antártica* and *Alicia en el bosque de algas* are translations, the former from an Australian book, and the latter its French counterpart. Finally, the chronicle in the *National Geographic en español* was written by Alex Muñoz, a Chilean activist who is the Latin American director of National Geographic Society's

[3] *Cochayuyo* is the local name given to algae that are commonly harvested in the Chilean coast; the name is Quechua and it means "sea plant".

Pristine Seas project, and Enric Sala, the leader of National Geographic Society's Pristine Seas. Thus, this constellation of cultural artifacts that have circulated in the Chilean context in the past few years is, in itself, an expression of international collaboration targeting a global concern. None of them, however, represent what scholars in the environmental humanities would recognise as Latin American ecological literature (*literatura ecologista*, following Paredes & McLean, 2000), an indigenous Hispanic American literature (*literatura hispanoamericana indigenista*, Marrero, 2010), or mestizo writing (following Casals, 2016). Yet, as Heffes, following Binns, proposed, these artifacts "exceed the category of the literary" (Heffes, 2013, p. 52; my translation). On the other end of this interdisciplinary combination, as texts aimed at a younger audience (disregarding the chronicle in the *National Geographic en español*) the three books and the exhibit manifest a clear pedagogical function, which is inherent to children's literature. In spite of the limitations I have pointed at, particularly regarding the underestimated footprint of the language used in *Chile es mar*, these multimodal compositions foregrounding the marine ecosystem, "contribute to the formation of future ecological minds" (Franz, para. 69) that may wonder what kind of world we want to live in and what can we do to let it be. Or, as pope Francis puts it: "One should not think that these efforts will not change the world" (Francis, 2015, Sec. 212).

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Changing perspectives: formative research at the Faculty of Clothing Design as a transforming mechanism of the textile and clothing industry in the city of Medellín

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Abstract

This reflection is the result of teaching experiences in research training for clothing design, focused on the application of Sustainable Learning and Education (SLE). First, we give some context on the city and the faculty, concerning the issues and crisis also inherent to the global industry. Then, we analyse the SLE and the academic structure of the research area of the Clothing Design program from Universidad Pontificia Bolivariana; the courses, the Fashion, City and Economy study group, and the development of the monograph's themes around sustainability in fashion to graduate as a Clothing Designer. We finish with some conclusions around the practice of SLE in formative training and the importance of a professional clothing designer, capable of changing processes and provide solutions from a sustainable approach.

Key words: clothing design, SLE, research, curricula, design research.

Introduction

The greatest economic activity in Medellín has been concentrated on the textile industry, and it continues to be like this nowadays. Until today, the development of the fashion design cluster has had a great impact and supported the growth of the textile industry. Fashion, Clothing and Costume schools and institutes have acted as the cradle of young national designers. Over time, and with the opening to global economic dynamics, the textile industry has sustained an important transformation. Textile production began to compete with global markets, while production, marketing, and design emerge to complement the industry's productive system.

Initially, the economic vocation of the city was focused almost entirely on the industry, specifically on production. At the time of the national government protectionist policies (almost 60 years ago), the textile industry generated such prosperity and wealth that it has become the

second most important capital of the country to this day (Botero, 1996). According to Colombian fashion and design historians, the weak textile industry at the time was consolidated thanks to the boom of coffee as a product and its export processes, economic activities like mining, and the protectionist policies of near half of the 20th century. With this, and a growing supply chain of yarns, textiles, and clothing in the region, the perfect conditions were created to project the textile, clothing, and fashion industry in Medellín (Dominguez, 2004).

The strong productive concentration that this industry had in the city generated great impact, not only at the national level. At the end of the last century, factories of the most important textile companies of the country were built, the main-working class neighbourhoods were planned and designed (which were most of the residential and urban fabrics of the city), and the fashion, clothing, and costume schools were constituted. Designers, especially fashion and clothing ones, were involved among other agents responsible for making decisions in the chain.

During late 1980s and early 1990s, with the arrival of the economic opening, Medellín (and Colombia in general), began to lose ground in the market, after being the national hyper-centre of the fashion industry. The traditional national production, without an added value, was not able to compete with the international products (Quiñones, 2003). National and local governments had to initiate processes to modernise the industry and its offer. Medellín was especially forced to change its mode of operation as a textile and fashion city (with which it had obtained so much wealth and prosperity) and had to face this new dimension of the market, reassessing itself in the business (Pineda & Builes, 2020, pp.116-118).

Fast fashion products began to appear, competing with the national market in terms of quality and costs, and without a proper evaluation of the social and environmental impacts this had on the city. They generated substantial pollution issues such as different and non-identified typologies of gas emissions from multiple companies day and night; chemical and toxic effluents to the Medellín River: an increase in industrial urban waste; a rise in carbon and water footprint from the textile industry in general

(Vanegas-Ochoa, 2020); questionable working conditions for men and women in these companies, and so on.

Hence, within the supply and demand, the government and other associated institutions were focused on protecting the industry and boosting economic growth regardless of the social, environmental, and economic footprints. Design schools started to review their programs according to these notable changes at the local and national context. As a result, the question that arose in academia was: how could they train clothing designers to face the challenges of the multiple footprints of the textile and clothing industry? The answers pointed to promoting actions that prevent, mitigate, and correct the environmental and social impacts of the industry and the market. Understanding the multiple footprints of the textile and clothing industry requires an analysis focused on the different social, economic, productive, and cultural processes around clothing and textile products. Therefore, it is fundamental to rethink, restructure and reconsider the ways in which these processes have been investigated in academia.

The training of clothing designers requires new practices that develop critical, analytical and reflective skills, so that through research and innovation, they recognise the multiple footprints, take stances and implement product or service developments that mitigate the effects of these impacts and, at the same time, contribute to sustainable development.

Clothing Design Faculty at Universidad Pontificia Bolivariana

According to Quiñones (2003), after national and local development plans, the National Development Plan approved in 1995 in Colombia specified the need to include professionals from the design field in companies for industrial modernisation. In the city of Medellín, there was a wide acceptance of industrial design professionals from Universidad

Pontificia Bolivariana that specialized in fashion. This is because, unlike their other colleagues, they had a profile that not only addressed the technical aspects of clothing construction, but also social, cultural environmental, and economic issues when working in design projects. The industrial design programme promoted a profile that was very close to the fashion industry in the final semesters at university, focusing on relevant contents of the discipline (Suárez, 2020, pp. 13-14).

By the end of the 1990's, it was decided that, in order to provide professionals with a more complete training in the field of clothing, it was better to divide specialties in separate programs. Hence, the clothing design program was born. The Faculty of Clothing Design at Universidad Pontificia Bolivariana was created in 2000, as a response to certain needs in the textile industry. It is part of the School of Architecture and Design, along with the Industrial Design, Graphic Design, and Architecture programmes.

Clothing Design, as a specialty in the field of design, is beyond meeting only the requirements of fashionable clothing (which responds to this phenomenon of trends and speed). It is broader proposal, where the axis is the act of dressing and everything that goes through it. The programme arises in a design school with a strong inclination for disciplinary activity; therefore, the main objective is the study of the body-artifact-context relationship. It was the first programme in this field of knowledge to receive high quality credentials from the Ministry of Education in Colombia. Within the design schools that have been inclined towards this approach, the first university in Latin America that chose to create an educational programme under the name of Clothing Design was the University of Buenos Aires (UBA) in 1989, as *Diseño de Indumentaria* (conceived under the model from the Polytechnic of Milan) (Fernández, 2016, p.188).

It is important to emphasize that, for this article, we will use the term clothing design, since there is no direct translation into English for *vestuario*. However, it is also relevant to note that this term is different from Fashion Design or Costume Design. Costume has a connotation of artistic or ritual pieces, while fashion applies to clothes corresponding to the social and market phenomena. In this way, we connect clothing (in

English) and *vestuario* (in Spanish) because clothing, as a verb, refers to the act of putting on clothes and, as a noun, it speaks of the elements that cover the body. That is, the act of dressing as a verb and noun, which is where the interest of the clothing designer lies.

According to the professional programme of Clothing Design of the School of Architecture and Design at Universidad Pontificia Bolivariana, this term is understood as:

> [A] universe of the field of work, which transcends the issue of fashion, as something momentary and ephemeral, to reflect more on the cultural, anthropological, academic, and epistemological implications of the motivations and repercussions that stem from the act of dressing the human body and its environment, as an integral, interdisciplinary, and transdisciplinary project in a multicultural environment (Cano et al., 2014, p. 15, our translation).

Under these guidelines, the clothing designer must be prepared to make broader and more rigorous readings of context rather than just problems focused on fashion and trends. Within the Educational Project of the Clothing Design Programme (2006), which today governs the curriculum, research competences are required from both, the professional and the occupational levels.

In the professional profile, the trained clothing designer supports the act of dressing by being: "A researcher capable of reading and analysing critically the requirements and trends of the context in all its dimensions, for the generation and development of knowledge" (p.40, our translation).

In the occupational profile, the clothing design professionals may work as a researcher. They must be capable of generating knowledge and concepts around wardrobe, both diachronically and synchronically; they should also be able to build communication strategies as articulators and creators of languages, and of perceiving specialized needs to turn them into opportunities that develop business management based on knowledge (p.41).

Within this educational programme, there are some defined "Areas", based on what is considered as necessary knowledge. These are: Project Area, the Theory Fundamentals Area, and the Technical Area; each of them is made of Axes, which are defined as "the 'do's' of operative, cognitive, theoretical, practical, and theoretical-practical order that constitute the educational components of this discipline" (p.49, our translation). Some of them are the Project axis, Research axis, History axis, and Management axis. With these areas and axes, the courses given are proposed to students in their training as a clothing designers.

For ten semesters, the clothing designers in training (who are in a deep relationship with the context and the purpose of dressing projects), begin to develop skills and abilities to generate knowledge and schematic configurations of reality through formative research. In some courses of the research axis of the programme, teachers began introducing new methodologies and strategies, such as those described in the *Sustainable Learning and Education* (SLE) model. A philosophy which is founded on the principles of sustainability (Hays & Reinders, 2020).

Applying SLE in the Clothing Design Faculty

Conventional approaches to learning and teaching in an unconventional world are likely to be ineffective and perhaps counterproductive (Hays, 2017). Little remains as conventional as the scope of problems, and possibilities extend beyond traditional understandings and tried-and-true strategies. When educating for the textile and fashion industry, a new paradigm for learning and teaching is needed, for a variety of reasons. The main one being the extreme difficulty of current models to keep pace with the disruptive nature of technological and social changes (Fukuyama, 2017). Sustainable Learning and Education is designed to overcome the insufficiencies of a replication of solutions and incremental learning (Stroh, 2015). This is only possible through new ways of thinking about learning, on its focus, and how it is achieved; thus, a paradigm shift (Kuhn, 1962).

According to Hays and Reinders (2020), the intent of Sustainable Learning and Education is to create and proliferate sustainable curricula and methods of learning and teaching that instil the necessary skills and dispositions to thrive in complicated and challenging circumstances, and to contribute positively in making the world a better place. What makes SLE different than an empowering, liberating education (Shor & Freire, 1987), is its focus on sustainability, self-sufficiency, and consciousness. To produce such new capacity, it requires the dramatic reinvention of traditional education and professional development.

Changing principles and paradigms through Sustainable Learning and Education implies introducing subjects like: Principles and Practices of Sustainability, Theory and Behaviour of Complex Adaptive Systems, Wicked Problems, and Vicious and Virtuous Cycles, as suggested by Hays and Reinders (2020). In the following section, we will present the way these concepts are introduced in the Research Axis courses.

Research training: courses and teaching strategies of the SLE

It is important to acknowledge that research through Design is inserted within the design process. Understood from its scope in *Research For-About- Through Design* (Frayling, 1993; RTD, 2015a, 2015b), Design appears from a technical perspective of use, which consolidates the way designers work. This variable is appropriate mainly from the art and architecture point of view, from where it is known and conditioned to the different divisions of the exercise. There, characterizations specific to the discipline are used in the teaching of research for the realisation of the project in the curriculum.

For the field of design and its research objectives, these scopes are used by combining, mixing, and appropriating them without concern. However, these goals are often only achieved by the teaching team and not by the student(s). Therefore, the intention to demonstrate the application of

research processes and SLE within established courses in the curriculum as a new strategy in teaching design (for the understanding of multiple footprints) is of great relevance for its achievements in the assessment of the process as a method, connecting with one of the objectives of this work.

In the implementation of most design projects, a first stage of research on the subject (almost always called research), is taken into account. Research is based on the creation of new knowledge, directed towards the development of a set of organized knowledge (Best & Kahn, 2003). Nonetheless, this is difficult to achieve in a design project in its first stage. This first phase of the design project is far from a true investigation, considering its process, its care and theoretical review that must be taken for the creation of new knowledge; especially when one speaks of processes of less than six months in an undergraduate program with a purely technical focus, or based on the development of artifacts.

However, for some teachers and most students, this information seems new and relevant, and it creates knowledge for the project. It is research, from an individual perspective, but if we go for a simple definition, we would be defining the process of research as creation of new knowledge. If we point out the error, we understand that research is not achieved in its totality. It is only framed and transcended in the form of a product. However, it serves to establish future scopes and help students in their formation. It is possible that, later on, it can take those processes to deeper instances and become research that is created from the field of design for the creation of new knowledge.

In the Clothing Design Faculty, this recognition in the process happens from the first year. Students are encouraged to search, investigate, and compose for their professional growth. They assimilate this and understand that it will be the first step to take in their academic life and possibly in their professional life for their individual or collective projects.

The courses included within the curriculum that have been specifically formulated for this purpose are: Research Fundamentals, Research Electives, Observatory 1, Observatory 2, Observatory 3, and Monographs. It is necessary to say that within all the courses of the

Project Area, from its division between Workshop and Theory classes, the integration, application, and improvement of the skills acquired in the Research courses is allowed, connecting theoretical knowledge, praxis, and context. Specifically, the research axis poses:

> [A] series of systematic, organised, and objective processes which, in clothing design, allow us to characterise the conceptualisation of the discipline and potentiate its prospective, increasing its knowledge and exploring its interaction with other disciplines. It is a process immersed in all the areas and that is particularised in the practice of each one; it goes through different levels, going from simple research to the simulation of quantitative and qualitative phenomena. (Educational Project of the Clothing Design Programme, 2006, pp.49-50, our translation)

Consequently, research as a primary exercise in the designer's project is constituted in their training through formative research. In the making of research, with purpose in designing, it is conceived for the production of knowledge, reflection and criticism, even for the questioning of the same practice of design.Fernandez - Silva and Zuleta (2015), in their paper *Los retos de la formación en investigación en diseño de vestuario*, state that "training in and through the project, as a pedagogical strategy for design and architecture, has been considered in itself as training in the research process" (p. 4, our translation).

The first level, Research Fundamentals for Clothing Design, begins with tasks related to qualitative research and raises awareness of the contextual needs of clothing design in the research field. An epistemological basis is built around the research paradigms and, essentially, the concepts of design research (reading context) and research for design (knowledge production) are differentiated. In addition, through processes such as observation, analysis, synthesis, deduction, induction, and comparison, are enhanced for the research exercise.

Then, the research elective deepens in research tools, such as ethnography, or interpretative analysis systems. Subsequently, the

courses called Observatory 1, 2, and 3, rather than indicating levels of increasing difficulty, propose spaces for observation of different themes; Observatory 1, as a laboratory for training and information capture, and for the understanding of functionality and technology in the world of clothing; Observatory 2, as a space in which diverse knowledge and views of a social phenomenon are articulated, read from a socio-cultural perspective; Observatory 3 introduces the concepts of socioeconomic studies of clothing and fashion. For this paper, we will concentrate on this course since it was the first one in which SLE strategies and methodologies were applied.

Observatory 3 centred the discussion in the socio economical processes (production, consumption, and distribution) of the textile and fashion industry and its impacts in the city. It is fundamental that, within the research exercise, both in the theory and in the practice of research, the student is given the opportunity to deepen in topics of contemporary relevance, such as the multiple footprints of the textile and fashion industry. Tools, concepts, instruments, and methodologies are provided, following the fundamental question that each student poses, maintaining the critical questioning on these as a unit. In addition to a theoretical framework, in this case in the economic and productive field concerning clothing, the students confront the impacts and traces of the textile and fashion industry and debate with the profile that they have built as clothing designers.

Furthermore, through the configuration of the Research Incubator and the Research Group on Clothing and Textile Design, research training continues to be strengthened. The research group has three research lines: Functional-Technological, Socio-Cultural and Economic-Productive. Additionally, the annual realisation of the event *Experiencias Investigativas del Vestir y la Moda* can be included since 2010, which today is constituted as an international event, and a proposed space for reflection, debate, exploration and deepening of the relationships between body and clothing. Teachers are permanently encouraged to participate in academic meetings and scientific committees to propose research projects that link students and other fields of knowledge to the production for specialised

publications as a result of their research exercises. At this point, the teaching experience is linked to the research exercise of students.

As a result of these discussions, the Fashion, City and Economy study group was formed, as an exercise of exploration within the same structures that constituted the economic model on which the urban and economic development of the city of Medellín was based. It also provides a space to discuss designers' practices in this chain. The production of clothing with textiles of dubious origin, re-labelling, and questionable working conditions for those involved in the production chain, among others, allowed discussions among researchers, professors, and students around the multiple footprints that the textile and clothing industry has generated (here, with specific local impact). As a result, the group, formed by undergraduate and master students of Clothing Design, Industrial Design, and Architecture, and researchers from various disciplines (economists, engineers, designers, and architects), formulated a research project entitled: Fashion, City, and Economy. This project focused, for two and a half years, on the impacts caused by the consumption, distribution, and production of clothing products on the territory.

All strategies, methodologies, and practices become evident in student's monographs to apply to the undergraduate title, while the implementation of SLE in research courses materialises in various monographs between 2014 and 2019. Students research questions centred around multiple footprints of the textile and fashion industries, since the SLE was introduced in these courses. As you can see in the following table, we collect some of the monographs written by the students between 2015 and 2019.

Table 1. Monographs written by students between 2015 and 2019 related to sustainability

Monograph Title	Theme	Year of presentation
Retazo y cero residuos	Reducing waste in the production chain.	2018
Cíclico – más conciencia, nuevos ciclos	Re-interpreting the production, consumption, and distribution cycle of clothing.	2018
Smog Capital	Wardrobe for air pollution solutions	2018
Nuevos ciclos: impulsar la sostenibilidad ambiental en la industria de vestuario de Medellín	To promote the use of sustainable environmental strategies in clothing companies in the city	2018
Estudio de caso del *denim* y su impacto medioambiental en Fabricato: sostenibilidad de la industria textil en Medellín	Sustainability and multiple footprints in the textile industry. Case study: Denim	2018
Consumo consciente: modelo de negocio enfocado en la transformación de vestidos de novia bajo la práctica del Upcycling	Sustainable business models	2017
Comunicación visual sostenible	Visual sustainable communication	2019
Sostenibilidad y reciclaje: elaboración de ropa de hogar usando muestras sobrantes y residuos de lavandería, procesos y acabados del Denim de la empresa textilera de Medellín.	Recycling and Upcycling	2015
Educación sobre el consumo sostenible de moda	Sustainable Education for fashion	2019

As it is evident in this table, there is a rising preoccupation around sustainability and multiple footprints regarding the textile and fashion industry and sector. The discussion in courses, seminars, and research groups was also enriched by the students' interest and works.

Monographs are cited as an example of the use of SLE principles in the Clothing Design program. For instance, the work *Estudio de caso del denim y su impacto medioambiental en Fabricato: sostenibilidad de la industria textil en Medellín* (2018), focused the research exercise on the following SLE principles: 1) Transformation and change: recognising how employees of the *Fabricato* denim industry where equipped with the skills, capacity, and motivation to plan and manage change towards sustainability within an organisation; 2) Critical thinking and reflection: understanding the capacity of the organisation individuals and groups to reflect on the organisational experiences to challenge accepted ways of interpreting and engaging with the world; and 3) Participation: recognising participation as critical for engaging groups and individuals in sustainability.

Another example that can be pointed out is the work entitled *Sostenibilidad y reciclaje: elaboración de ropa de hogar usando muestras sobrantes y residuos de lavandería, procesos y acabados del denim de la empresa textilera de Medellín* (2015). It focused on the exercise of four SLE principles involving the textile industry to gain trust, manage change through partnership, envision a better future, and apply system thinking as the fundamentals for economic and environmental sustainability of the project in the future. More examples can be listed, as the number of research works have increased regarding environmental sustainability and multiple footprints.

Additionally, students applied SLE through the development of different proposals in project design courses. *+ Conscience-Water* was a prototyped strategy designed by Sofía González, Laura Vallejo, and Manuela Granda, which focused on raising awareness and educating the consumer of garments on the use of resources in their production, particularly, the excessive use of water. Designed from elements of design for behaviour change and design for education, from macro-trend

analysis and research with industry experts, it connects with SLE from an approach to individual, organisational, and societal change. With this, the principles (Hays, 2020) to which they adhered were: principles and practices of sustainability; theory and behaviour of Complex Adaptive Systems; Ecology; the nature of knowledge and knowing; self-direction and learner autonomy; Action Learning and Action Research; and individual accountability and collective action.

The project was intended to be a means for the empowerment of consumers, it sought to destroy and question that hierarchy that made decisions in favour of economic surplus value and not in favour of the protection of a resource such as water. As Suárez (2020) explains in her research, the project could be located within the sense of a design for transition, which Gutiérrez (2016) defines as:

> A movement that starts from the recognition that we live in transitional times, whose central premise is the need for societal transitions towards more sustainable futures with design (or designs), open to a greater spectrum of knowledge playing a key role within them (Irwin, et al., 2015, as cited in Gutiérrez, 2016, pp. 28-29).

Conclusion

From the conception of the multiple footprints, several spaces of conversation have been generated, which have allowed to question, from different perspectives, the very practice of clothing design. Rethinking academic research implies approaching authors who are critical of the same profession, those who point out the "painful truths" of the industry.

Due to the deep secrecy of the processes related to the impacts of the textile industry, the contexts where the research action takes place, make the action of the researcher more complex or limited. It is therefore recognised that there are political and legal limits to the academic research carried out by the SLE, exemplified by the situation of students

who have not been able to complete the research process because they have made sectors of the industry feel uncomfortable with their questions.

Restructuring formative research was one of the strategies that the faculty applied for the understanding of these multiple traces in the textile industry. This transformation calls for tools, instruments, methods, and classroom learning actions that are different from those traditionally used in the design discipline. Using SLE in the curricula formed clothing designers with new paradigms of action, who now are starting to transform the textile and clothing industry in the city of Medellín in different levels. Not only by working inside textile or fashion companies, but also in the creation of their own brands and businesses as we evidenced in the interviews with clothing designers.

Traditionally, design, designers and more specifically, clothing designers, have been not related with research due to the stereotype that sells publicity. But from this reflection, it is possible to affirm that to confront the current world crisis and the crisis of the sector itself, finding actions from multiple perspectives is essential; the formative research with SLE strategies is a mechanism that provides students with a wide vision, and the possibility of questioning and finding answers around the multiple footprints and all the impacts of the textile and fashion industry.

In personal communications, many managers from big fashion companies in the city of Medellín have recognized the valuable ability and capacity of clothing designers from Universidad Pontificia Bolivariana to analyse, reconsider, and propose many solutions that could be considered as sustainable, which is an added value to the fashion industry today.

Formative research and SLE have been an important factor in the university professional training of these new professional designers worried about finding better solutions for today's world. It is necessary that all the disciplines reconsider research to understand these multiple traces, give it more relevance and to categorise it as a fundamental factor on all the industries and companies.

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II. Cultures & practices of sustainability

Sustainable development as redirected evolution. Insights from innovation studies and ecological humanities

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Abstract

In this chapter, we describe and discuss similarities and differences between human evolutions with natural evolution. This is done after a bibliometric study of the use of eight concepts from ecology in the literature on innovation: evolution, eco-system, variation, retention and selection, niche, bio-mimicry, co-evolution, and the helix metaphor for collaborative arrangements between business, government, academia and civil society organisations. We argue that sustainable development should be understood as redirected evolution: getting closer to sustainable development requires a multitude of changes, each of which is subject to quasi-evolutionary processes of variation, selection, retention. The way forward is to recognise evolutionary potential and make good use of this. For this, concepts from ecology are useful. From the arts and ecological

humanities, two key contributions are the recognition of immaterial needs and an ontology of connectivity.

Key words: Evolution, Innovation, Ecological Humanities, Sustainability

1. Introduction

The literature of innovation for sustainable development (SD) is replete with notions from ecology. Some examples are evolution, eco-system, variation, retention and selection, niche, biomimicry, co-evolution, and the use of the helix metaphor for collaborative arrangements between business, government, academia, and civil society organisations (CSOs). Sometimes, there are slightly different terms being used; for example, innovation scholars speak of complementary technologies and assets, instead of mutualism. There are other differences as well: people are evaluative beings whose relationship with the world is one of concern (Sayer, 2011); another difference is that social worlds have human-made institutions, such as regulation, as the outcome of collective deliberation and choice. Because of this, social evolution possesses teleological qualities, in contrast to biological evolution in which mutations are blind.

In this paper, we describe and discuss the use of 8 notions from ecology in the literature on innovation for sustainable development (section 2). The notions are the most prominent ones (in terms of their frequency of use and/or being foundational in the ontological understanding of innovation for SD). In section 3, we discuss crucial differences between natural and human evolution, such as social structures, power, and politics, and people having goals and well-developed capacities for evaluation and deliberation, all of which are important for innovation and for sustainable development as goal-oriented evolution (based on the Sustainable Development Goals or SDG). In section 4, we investigate the insights from ecological humanities for sustainable development, especially the role of the arts and humanities for thinking about sustainable development and achieving it.

To us, an important contribution form the arts and humanities is that they show that people have immaterial needs, and that well-being can be found in less-material ways, which lends support to a welfare view of a good life (where well-being is not reached at the expense of the natural environment and other people's well-being). For everyone to have a good life, we need a higher moral economy and capabilities and contexts for flourishing, something which requires social innovation and structural change in terms of types of workplaces that cater to autonomy, relatedness, and to the competences people have. Access to education and services, fair pay, and purpose are additional elements. Section 5 states the conclusions.

2. The use of ecological concepts in innovation studies

A word count of ecological concepts in journal articles, with the words "innovate" in the title or topic, revealed that the words evolution and ecosystem are the two most used concepts from ecology in innovation studies.

Table 1. The use of ecological concepts in journal articles on innovation that appeared in the economics domain and which are related to sustainability

Concept	Number of innovation articles in which it is used				
(March 2020)	% in all innovation publications 1989	% in all innovation publications 1999	% in all innovation publications 2009	% in all innovation publications 2019	
Evolutionary	19670	0.6723%	4.7445%	6.0808%	5.5968%
Eco-system	5033	0.0000%	0.5615%	0.9112%	2.3654%
Variation	124				
	0.0000%	0.0561%	0.0271%	0.0235%	
Selection	317				
	0.0000%	0.0281%	0.1263%	0.0657%	
Retention	39				
	0.0000%	0.0000%	0.0090%	0.0070%	
Niche	727				
	0.0000%	0.1404%	0.1804%	0.2417%	
Co-evolution	888				
	0.0000%	0.1123%	0.4060%	0.2722%	
Helix	1080				
	0.0000%	0.0842%	0.2436%	0.4599%	

Source: personal calculations. The year in which it achieved the highest share of the 4 years included in the analysis is in bold (1989, 1999, 2009, and 2019).

The word evolution is used in two ways: as a process of change which is evolving (happening rather than being pre-ordained/controlled), and as a process of change in which variation, retention, and selection are important aspects. The second meaning is that of biological evolution.

In economics, the most well-known evolutionary approach is that of Nelson and Winter (1982), which is based on routines and differential growth of firms because of selection. Like species, firms have characteristics they cannot change at will. Routines are like genes, although they involve learning and capabilities. The notion of variation is notably absent, but variation generation is mentioned in Dosi and Nelson (1994) in their discussion of economic evolution as a dynamic process:

We use the terms evolutionary to define a class of theories, or models, or arguments, that have the following characteristics. First, their purpose is to explain the movement of something over time, or to explain why that something is what it is at a moment in time in terms of how it got there; that is, the analysis is expressly dynamics. Second, the explanation involves both random elements which generate or renew some variation in the variables in question, and mechanisms that systematically winnow out extent variation.

Variation refers to innovation, a mindful deviation from what exists (Garud & Karnoe, 2001) rather than blind mutation. The term innovation includes business innovation but also social innovation (new relations between actors) and (green) system change. In a study of the dye industry, van de Belt and Rip (1987) came up with a quasi-evolutionary approach, in which variation and selection are viewed as actively coupled: the selection environment is shaped by firms (through marketing, collaborative relationships, and lobbying) and variation is not blind but guided by the promises of success. As noted in Rip and Kemp (1998):

> [C]oupling between variation and selection can be institutionalised in a nexus, of which test labs in the dyestuff industry (van den Belt & Rip, 1987) are an example, environmental staff and departments in large firms

> (Schot, 1992) are another example. (...) Alliances and networks can play a similar role in linking variation and selection.

It is noteworthy that, of the three biological elements, retention is given far less attention than variation and selection. Examples of retention are dominant designs of products, capital goods, organizational forms, routines, and ways of thinking inherited from the past, which are beyond choice and evaluation or decisively kept. Nature does not leap ("*natura non facit saltus*") and neither does technology which, despite expressions of revolutionary technology and radical technology, is cumulative with occasional discontinuities (Bassala, 1988; Ziman, 2000). Complex technology systems evolve out of simpler systems, based on the "adjacent possible" (Kauffman, 1995; Johnson, 2010). In the development towards greater complexity, there are strong similarities between biological evolution and socio-technical evolution, in the sense that they are both not designed into being, but the product of variation and selection. The interaction between variation and selection may give rise to technologies, designs, fuels, standards, practices, and expectations which are not easily abandoned (especially if the costs of changeover are large).

Nowadays, the view that variation and selection are coupled is widely shared among innovation scholars. The interaction may give rise to evolutionary patterns, based on variation and selection, resulting in trajectories that exercise selective pressures on radical novelties that break away from those trajectories, and which, because of competition from well-developed alternatives, are able to exist and grow in niches, places where selection pressure and resources are congenial to the existence of an innovation (Schot, 1992; Kemp et al., 1998), another notion from ecology.

Niches are one layer of the multi-level perspective of socio-technical transitions (Elzen et al., 2002; Geels, 2002, 2004). The other layers are regimes and landscape. The landscape (another notion from ecology) is a landscape in the literal sense, something around us that we can travel through; and in a metaphorical sense, something that we are part of, that sustains us (Rip & Kemp, 1998), making certain changes easier than

others. The landscape involves the built environment but also cultural beliefs and policy agendas, as elements of a fitness landscape. Regimes are the central element of the multi-level perspective (MLP). In ecology, regime shifts are large, abrupt, and persistent changes in the structure and function of a system. Socio-technical regime shifts are defined in the same way; they refer to a change in

> the coherent complex of scientific knowledges, engineering practices, production process technologies, product characteristics, skills and procedures, and institutions and infrastructure that are labelled in terms of a certain technology (e.g., a computer) or mode of work organization (for example, the factory-based system of mass production). (Rip & Kemp, 1998)

Such changes are viewed as the result of landscape pressures, internal tensions of a regime and competition from niche innovations.

Whereas, in ecology, regime resilience is viewed in a positive light. From the point of view of achieving sustainability goals, the resilience of environmentally harmful regime practices and technologies acts as a great barrier to sustainable practices. The big question for steering is ¿How can we escape from lock-in in ways that are politically feasible and attractive for users? The general answer to this question given by evolutionary steering models is to alter the dynamics of variation and selection (Nill & Kemp, 2009).

The first strategy is that of Strategic Niche Management (SNM) (Kemp et al., 1998). SNM is an evolutionary approach aiming at fostering innovations with sustainability benefits and securing the sustainability of those innovations as a dual challenge. It is about growing promising alternatives into economically viable ones, something that has been done successfully through cumulative efforts for renewables.

The time-strategic evolutionary policy approach (Sartorius & Zundel, 2005) starts from the diagnosis of a possible lock-in problem working against the market introduction and diffusion of environmental technologies. It considers that the extent of lock-in and path dependence

may vary over time, with stable and unstable phases of technological competition. The time-strategic approach to environmental innovation policy attempts to exploit these uneven techno-economic dynamics to make transitions towards more sustainable technologies easier. Three corresponding policy strategies are specified in accordance with the diagnosed time-dependent states:

- window preparation,
- window creation, and
- window utilisation.

The third strategy, transition management (Rotmans et al., 2001; Kemp et al., 2007; Loorbach, 2010) is concerned with portfolios for change. To avoid a new lock-in to suboptimal technologies, different paths should be explored, by actors taking an interest in those paths. The role for governments is to mobilise actor networks, support research, and innovation activities in promising paths. A mechanism of self-correction based on policy learning and social learning is part of transition management. It offers a framework for policy integration, helping different political actors and ministries to collaborate. Transition management is not done by a transition manager but consists of a set of principles informing transition endeavours by public and private decision makers.

The evolutionary model on innovation is based on a systems perspective, which holds that "innovation by firms cannot be understood purely in terms of independent decision-making at the level of the firm [but] (....) involves complex interactions between a firm and its environment" (Smith, 2000). The interaction takes place on two different levels: the level of interaction between a firm and its network of customers and suppliers, and a wider level, involving "broader factors shaping the behaviour of firms: the social and cultural context, the institutional and organizational framework, infrastructures, the processes which create and distribute scientific knowledge, and so on" (Smith, 2000).

One system model for innovation is the technology innovation system (TIS) model. TIS is a framework for emerging technologies that constitute alternatives to regime technologies (the phase out of regime technologies and products and dynamics of socio-technical regimes is not part of the framework). It is a socio-technical approach for studying the formative phase of emerging technologies characterised by:

- large uncertainties prevailing regarding technologies, markets, and applications,
- price/performance of the products being not well developed,
- a volume of diffusion and economic activities that is but a fraction of the estimated potential; demand being unarticulated, and an
- absence of powerful self-reinforcing features (positive feedbacks) and weak positive externalities (Markard, 2019, based on Bergek et al., 2008, p. 419).

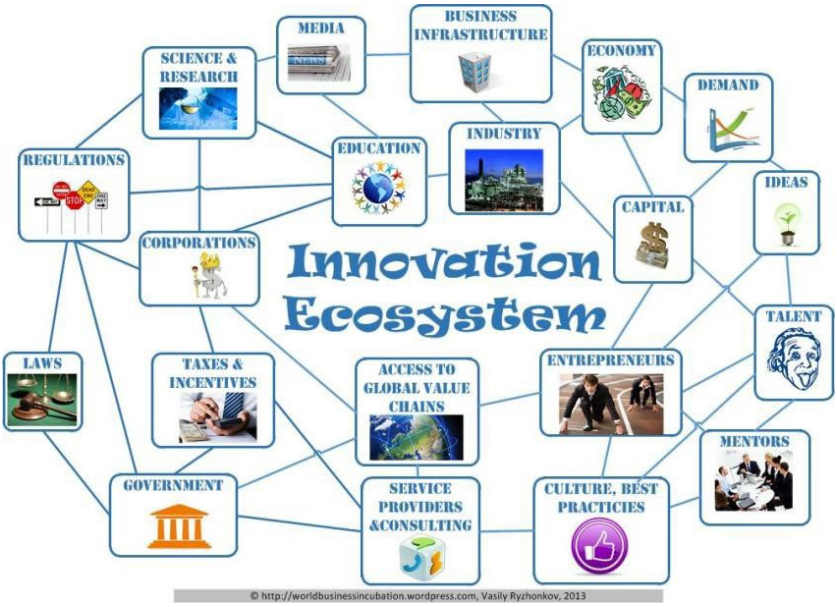
The TIS framework can be used for assessing the performance of a selected technological innovation system and for making policy recommendations on how to improve it (Markard, 2019), by drawing attention to key processes of building up a technological innovation system which are: experimentation, knowledge development, knowledge diffusion, guidance of innovation search activities, market formation, resource mobilisation, and creation of legitimacy (Bergek et al., 2008).

The metaphor of an eco-system for innovation

The importance of positive interaction effects (mutualism) for newly emerging technologies and business model innovation is captured in the use of the ecological concept of eco-system in the business literature. Again, references to the ecological literature are sparse, but the term achieved great prominence (it is the most used concept from ecology,

after evolutionary). The ecosystem concept captures "the link between a core product, its components, and its complementary products/services ("complements"), which jointly add value for customers" (Jacobides et al., 2018). A graphic representation of the eco-system notion, which also includes finance is given in Figure 1.

Figure 1. A representation of the eco-system notion (Rhyzonkov, 2013)



The element of competition and hierarchical elements is missing from this model. It is underdeveloped in terms of the kind of interaction effects and locational aspects (such as the importance of regional proximity) (Oh et al., 2016).

Interaction effects

In an important article in Research Policy, Pistorias and Utterback (1997), differentiate between 3 types of interaction:

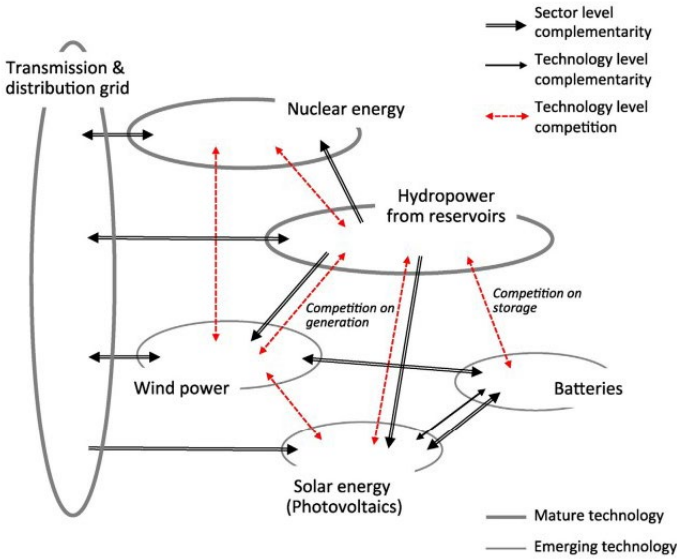
- Pure competition, where an emerging technology has a negative influence on the growth of a mature technology, and the mature technology has a negative influence on the growth of the emerging technology.
- Symbiosis, where an emerging technology has a positive influence on the growth of a mature technology, and the mature technology has a positive influence on the growth of the emerging technology (in biology this type of interaction is called mutualism).
- Predator-prey, where an emerging technology has a positive (negative) influence on the growth of a mature technology, and the mature technology has a negative (positive) influence on the growth of the emerging technology.

Table 2. Multi-mode framework to assess the interaction among technologies (Markard & Hoffman, 2016)

		Effect of A on B's Growth Rate	
		Positive	**Negative**
Effect of B on A's Growth Rate	**Positive**	Symbiosis	Predator (A) - Prey (B)
	Negative	Predator (B) - Prey (A)	Pure competition

Source: Pistorius and Utterback (1997)

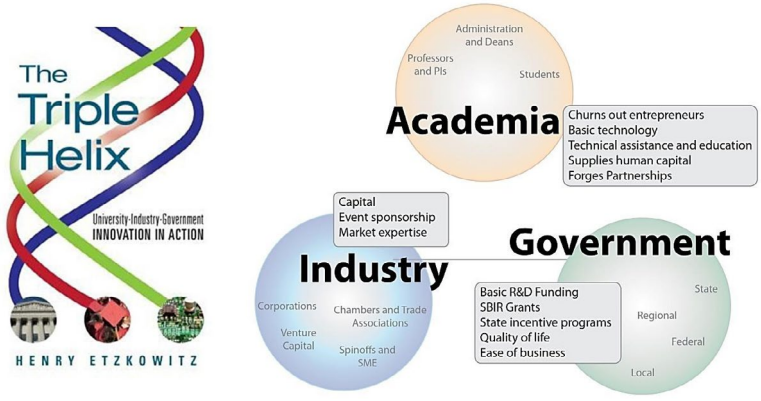
Figura 2. Complementarities and competition between technologies in electricity supply



An attempt to map relationships of complementarity and competition between technologies in electricity supply is provided in Figure 3. It shows the co-existence of different types of relations, the interaction of which gives rise to complex dynamics. According to Markard and Hoffmann (2016, p.67) in the beginning of a new technology innovation system, complementarities are mostly unilateral, with the focal technology depending very much on other technologies, products and services of suppliers, and human and financial resources. When maturing, it will attract more and more specialized services (for installation, maintenance, insurance, financing, for example), tailored to the focal technology for normal market reasons. In addition, the growing economic prospects may lead governments and investors to fund critical infrastructures or to force infrastructure owners to open their infrastructure to others. New systems require system building activities, but free rider problems and limited resources (time and money) in the early stage of development often leads businesses to focus on their

own business and networks of collaboration (collective action problem) (Planko et al., 2016, p. 2344, in a study of smart grids).

Figure 3. Complementarities and competition between technologies in electricity supply (Markard & Hoffman, 2016)



On co-evolution

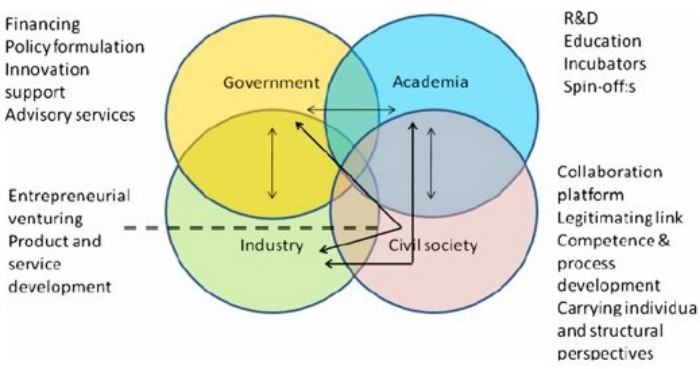
Oftentimes, the term co-evolution is used in studies that view socio-technical change as an evolutionary process. The term coevolution refers to a situation when two or more evolutionary systems are linked together in such a way that each influences the evolutionary trajectory of the others (Safarzynska & van den Bergh, 2010). In socio-economic realism, co-evolution can be viewed as a special type of interdependency, where A influences but does not determine B and C, both of which in turn influence but do not determine A, although both A, B, and C change irreversibly (Kemp et al., 2017); in co-evolution, the different units of evolution enjoy relative autonomy in development. Since supply and demand are quite closely related, it is not sensible to talk about the co-evolution of supply and demand, but it is reasonable to say that technical change coevolves

with institutional change (within systems of governance and organizations and culture) and talk about the co-evolution of the economy and the natural environment (Norgaard, 1984). Co-evolution helps to appreciate a special type of complexity, which stems from the relative autonomy of unlike processes, allowing steering to be concerned with different processes; for instance, the invasion of market thinking in new domains and the dynamics of natural eco-systems influencing variation and selection processes in energy. In the Netherlands, the use of transition management ideas for sustainable energy from 2002 to 2008 was undermined by the market liberalisation process (Kern & Smith, 2008).

Helix models for cooperation

The closer ties between universities, business, and government in the commercialisation of innovation led Etzkowitz and Leydesdorff (1995) to conceptualise such interactions as a helix model of cooperation. Helix models are vertically layered and horizontally differentiated (Leydesdorff & Ivanova, 2016).

Figure 4. The quadruple helix (Lindberg et al., 2014)



The triple helix model (in Figure 4) was superseded by the quadruple helix and penta helix model with civil society and intermediaries as

additional actors. From the point of sustainable development, the inclusion of both types of actors is critically important because NGOs are needed for securing markets for green products and intermediaries for fulfilling critical functions with respect to mediating, informing, connecting, and coordinating (Gustedt, 2000, as cited in Guy et al., 2012). Next to connecting organisations, they may help them find new roles and strategies (boundary change) (Diepenmaat et al., 2020).

Cradle to cradle and Biomimicry as Nature-Inspired Design Strategies

Whereas evolutionary models of innovation tend to give a great prominence to retention and selection of innovation, design models are focused on variation. In the field of sustainable product development, two Nature-Inspired Design Strategies are: biomimicry and Cradle to Cradle (de Pauw, et al., 2014). The idea behind Cradle to Cradle is to "take nature as a model for making things" and design products that after their useful lives become resources for new products (McDonough & Braungart, 2002). The book received an enormous amount of attention, much more than Biomimicry ever got. The core idea of Biomimicry is to use designs from nature since nature has developed highly effective, sustainable ways of performing functions (de Pauw et al., 2014). Ideally, the two nature-based design strategies are combined with quantitative design tools for evaluating the environmental impact of the solutions across the product life cycle to maximize and secure benefits for the environment (de Pauw et al.,2014). In this regard, artificial intelligence (AI) can be viewed as a nature-inspired design (an example of biomimicry), since it tries to mimic a natural evolutionary form, a human brain with its logical, computational, and inferential faculties. AI can be used as part of Environmental Decision Support Systems, especially for Environmental Impact Assessment (Cortés et al., 2010).

3. Crucial differences between technological systems and biological systems

In this section, we examine crucial differences between technological systems and biological systems. According to Ziman (2000), editor of the book *Technological Change as an Evolutionary Process*, technological systems differ from biological systems in the following ways. A first obvious difference is that novel artefacts are not generated randomly, but almost always are the products of conscious design. Second, there is no strict technological equivalent of a biomolecular gene. Technological traits can be viewed as memes, units of cultural transmission, or a unit of imitation and replication, but memes as codes of instruction can be altered, disregarded, and combined at will with other codes, something that is not true for genes: "In technological evolution, memes from distant lineages often recombine, and multiple parentage is the norm" (Ziman, 2000, p. 6). Ziman notes in this regard that "the 'cladogram' of a technological artefact usually looks more like a neural net than a family tree" (p. 6). According to social constructivism, "all technology is socially constructed and therefore reflect purely the social interest of relevant social groups rather than any selection rational, technical or economic criteria" (Constant, 2000, p. 219), but this overlooks the role of complex interaction effects and changing circumstances that change people's interests and ideas. In a time where fossil fuels are under criticism, the interests of fossil fuel manufacturers change. Under increasing selection pressures, they struggle and must adapt their products and processes or obtain special protection through lobbying to survive.

The most fundamental difference between social and ecological systems is that the former is subject to evaluation and planned actions based on human consciousness. According to Westley et. al. (2002):

> Ecological systems key dimensions are space and time. While social systems include those dimensions, a third one, symbolic construction and meaning, is also added to fully understand the system. Essentially, this

third dimension significantly contributes to the difference between the two systems. It includes four elements of its own: the creation of a hierarchy of abstraction, which loosens the power of time and space, the inherent capacity of such meaning structures for reflexivity, the ability to generate expectations and look forward, and the ability of humans to externalize these symbolic constructions in technology. These elements also help to explain the fundamental lack of responsiveness or adaptability to environmental signals that characterize much of natural resource management. This chapter has merely outlined the nature of these challenges.

4. Insights from the arts and ecological humanities on sustainable development

Sustainable development is about reducing environmental pressures and increased material wealth. It is oriented towards the needs of consumption for those who are poor and the needs of all people regarding clean air, safe drinking water and protection against water flooding, heat, and droughts. The Sustainable Development Goals (United Nations, 2015) widened the focus to immaterial needs. Immaterial well-being is not a well-defined concept but can be considered to include political voice, gender equality, less unequal opportunity, and human flourishing in the broadest sense: in productive activities that are a source of satisfaction, uplifting and meaningful, feeling appreciated as a person, returning appreciation to others (because of mutual support and care), and absence of harassment and discrimination.

SD as the *wholly grail*, constitutes an ever-continuing quest (struggle) for societies and for individuals because of the intrinsic trade-offs and distributional effects of winners and losers. SD, as a progressive goal, is a difficult concept for policy because it is normative, elusive, and involves contradictory requirements of support (for green development and innovation) and control. Innovation may help us get closer to sustainable development goals but for sustainable development there are no engineering

solutions, nor are their management principles (such as Cradle-to-cradle) through which sustainability development can be achieved.

Ecological humanities (or environmental humanities) offers a different lens on sustainable development which is absent in triple bottom line approaches and sustainability transitions: an ontology of connectivity and the importance of immaterial needs and ethics. Connections of people with places, nature, and landscapes are foregrounded. Indigenous knowledge and the arts are viewed not only from the point of view of achieving something but as aspects of being.

Gus Speth, a US advisor on climate change said:

> I used to think that top environmental problems were biodiversity loss, ecosystem collapse and climate change. I thought that thirty years of good science could address these problems. I was wrong. The top environmental problems are selfishness, greed, and apathy, and to deal with these we need a cultural and spiritual transformation. And we scientists don't know how to do that.

Buen vivir, as a community-centric, ecologically balanced, and culturally sensitive model of development, is often held up as a model for sustainable development. *Buen vivir* translates from Spanish into a "good life", according to Skidelsky and Skidelsky (2012), and it consists of the following seven elements: health, security, respect, personality, harmony with nature, friendship, and leisure.

A relevant new development is the demand, especially strong amongst young people (the millennium generation), for work that fits with values of autonomy and justice (Dumitru, 2015). As put by Melissa Stuckless in a LinkedIn discussion group on young professionals:

> We want to feel part of something bigger than our jobs. We are much more likely to stay with a company that is transparent and engaging. We want employers who are ethical and fair, not gluttonous, and harsh. We are loyal

to those who care about us; this is something that has been slowly changing the culture of management and continues to make developments.

The focus on green products and clean production in much of the discussion of sustainable development hides from view ways in which human flourishing is impaired through consumerist and individualistic lifestyles. Feeling connected, enjoying a great deal of autonomy, and having jobs that are purposeful and fitting with one's talents is shown to constitute basic psychological needs (Sheldon & Ryan, 2011). Different contexts can either foster need or satisfaction, and thus actualise our potentials for growth, creativity, intrinsic motivation, effective functioning, and well-being, or lead to need frustration and/or need thwarting, thus activating our vulnerabilities towards defensiveness, pathological functioning, and ill-being (Vansteenkiste & Ryan, 2013). All this points to the need for an alternative economy and social innovation that is catering to immaterial needs including self-actualisation.

SD, as redirected evolution, goes beyond greener products and less environmentally damaging production in questioning the process of accumulation, consumption growth, and competition as a good thing (which is the economic consensus). "If growth automatically generated well-being we would now be living on paradise" (Latouch, 2009, as cited in Gouch, 2017). The reality is that fixed resources are depleted, oceans are polluted with plastics and overfished, biodiversity is falling, and land is increasingly used by humans for production, reducing the space for other species. Humans are also responsible for climate change, by using fossil fuels for heating, motive power, and electricity production, and for financial investments in the last 200 years. Climate change is increasingly referred to as the climate emergency; even as climate crime, calling for drastic measures.

This hints at the need for system change in multiple sectors. From the point of steering, this presents a huge challenge because the system changes should occur in an orderly manner, producing positive outcomes in terms of enhanced well-being (material and immaterial), and using

other technologies, practices, and institutional arrangements. According to Schumacher (1973), this requires social innovation in the form of smaller units of decision-making:

> What is the meaning of democracy, freedom, human dignity, standard of living, self-realisation, fulfilment? Is it a matter of goods, or of people? Of course it is a matter of people. But people can be themselves only in small comprehensible groups. Therefore, we must learn to think in terms of an articulated structure that can cope with a multiplicity of small-scale units. If economic thinking cannot grasp this it is useless.

Sociotechnical system changes are studied in the literature on sustainability transitions (Geels 2002, 2005; Schot & Geels, 2007; Markard et al., 2012) and in the literature on innovation (Garud & Karnoe, 2001; Planko et al., 2018). They unequivocally show that system change is difficult, even when system faults are being accepted by consumers and policy makers because structures, interests, and dispositions cannot be changed at will and because it takes time and effort to build convenient alternatives. As every development has unintended consequences and is surrounded by uncertainty about the effects, the various routes towards sustainable development are best pursued through guided evolution based on trial and error, informed by ideas of how demands for mobility and electricity, goods, etc., can be met more sustainably rather than by idealist visions. Fairness and justice should also be part of this to create "just transitions" (Swilling & Annecke, 2012).

It is easier to cater for fairness and justice in commons-based activities found in the social economy, whose activities are not subject to the discipline of profit-maximization and hierarchy: "social economy organizations are animated by the principles of reciprocity and mutuality for the pursuit of collective economic and social aims, largely through the social control of capital". According to Wright (2010):

> The social economy is the pathway of social empowerment in which voluntary associations in civil society directly organize various aspects of economic activity, rather than simply shape the deployment of economic power (...). The "social economy" constitutes an alternative way of directly organizing economic activity that is distinct from capitalist market production, state organized production, and household production. (pp. 140-141)

The social economy is thus a critical element of sustainable development when this is understood as a development that caters to the material and immaterial needs of people. From the point of need or satisfaction (which includes empowerment), a diverse economy is desirable. It is interesting to look at the arts, as an element of social life, a set of economic activities (operating under commercialisation pressures) and source of creativity and well-being:

> The arts, and the study of the arts as part of any rounded education, constitute in many ways the fabric of any society, in relation to which political and economic institutions and processes are expressions rather than determinants of the cultural life. These are the sources of individual and collective identity formation and of the kind of empowerment that comes through the recognition that one has expressive and performative capabilities – a recognition that also lies at the heart of art-based therapies for psychological and emotional disorders (Landy and Montgomery 2012: 167-219). One of the pathologies of contemporary civilisation is the tendency for the economic and political to make culture their handmaidens, rather than the other way around. (Clammer, 2014, p. 66)

It seems that marketization not only drives organizations to short product cycles (planned obsolescence) with an excessive exploitation of natural resources, but it is also undermining the arts so important to human flourishing (Tay et al., 2018): "sustainability is not just about economics, environmental concerns, and social issues but rather how

those weave into an aesthetic of life with elements of ethics, spirituality and emotional interaction".

To us, human needs, in particular immaterial needs, should be put more firmly into discussion of sustainable development, something which is only weakly done within the SDG.

5. Conclusions

In this chapter, we discussed the evolutionary nature of innovation and social development. Because of evolutionary dynamics, society may get locked into unsustainable technologies, financing, production and distribution systems, and consumer practices. Escaping this is a huge challenge for individuals and society. A different consciousness (less consumerist and more eudemonic) is a key aspect of sustainable development, which, in our view, can only be developed through experience, commons-based activities of financing, production, and ways of living that are more relational, based on values of empathy, care, and mutual support.

Getting closer to sustainable development requires a multitude of changes, each of which is subject to quasi-evolutionary processes of variation, selection, and retention. The way forward is to recognise evolutionary potential and make good use of this: "what really matters is the evolutionary potential of the present and the incrementalist actions that are required to instigate the changes that are needed" (Swilling, 2020, p. 6).

From this follows the conclusion that sustainable development requires guided, self-correcting evolution, based on visions and ideas of progress but relying on evolutionary change in the form of 'Darwinist' processes of variation and selection (instead of relying on blueprints) for innovation. Experimentation is one way of fostering diversity of innovation but, as societies, we must be concerned with selection and retention too, via state policies that internalise negative effects, the nourishing of a social economy, and a phase out of unsustainable systems, products,

processes, and practices. Precisely, getting rid of what exists (has been retained), is a huge task for individuals and society, which will not be achieved through consensus or benign dictatorship. It is a task for policy and not just politics.

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Financing sustainability: A trend analysis of impact fund allocation in East Africa

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Abstract

The East African region has become a thriving market for investment with increasing inflows of private capital within Sub-Saharan Africa. Despite this regional progress, East African countries are still characterised by social exclusion and poverty, translating into a common need for impact funds. Notably, the amount of impact funds deployed in the region is non-homogeneous, as their allocation tends to occur on more mature markets such as Kenya's, Uganda's, Tanzania's, and Ethiopia's, while countries with relatively lower levels of social inclusion such as Burundi, Somalia, and South Sudan are left behind. This article focuses on the potential of impact investment in financially sustainable projects and activities that seek to generate positive social and environmental value alongside financial returns and, therefore, investigates the existence of trends in the allocation of impact funds to various countries and projects in East Africa.

Keywords: investments, innovation, financing, impact investing, sustainability, East Africa.

Introduction

Tackling social and environmental challenges in Africa has long been left to the realm of Official Development Assistance (ODA) via public sector and non-for-profit entities, whose efforts have been undermined by a series of structural inefficiencies and financial constraints, especially after the financial crisis of 2008 (UNDP, 2015). Consequently, leveraging the private sector's ethos in improving the status quo via conscious investing and, more precisely, impact investing, has become a priority to ensure the financial solidity of global efforts toward more sustainable and equitable global growth. With the primary goal of intentionally and actively generating measurable positive social and environmental impact, in addition to financial returns, impact investments are the ideal private investment tool for financing the annual USD 5-7 trillion

estimated to be required for the implementation and accomplishment of the Sustainable Development Goals globally (IFC, 2020). Indeed, since the term was coined in 2007, impact investment has grown at a substantial rate from a global market size of approximately USD 228 billion in 2017, to USD 502 billion in 2018 (GIIN, 2019). Impact investments are made across asset classes, geographies, and high impact sectors including agriculture, clean and renewable energy, healthcare and information technology by high-net-worth individuals, and financial institutions.

Notably, impact investors are risk-takers, as they provide patient capital by accepting longer time periods for investment maturity (Viviers, Ractliffe, & Hand, 2011). They are typically found in market domains characterised by imperfect information, uncertainties regarding the achievement of financial returns, governance problems, limited exit strategies, small deal sizes, and rigid institutional practices (Brest & Born, 2013). Moreover, impact investors can be classified based on the financial returns that they expect (Brest & Born, 2013); concessionary investors are those who are risk-taking, as they may demand lower financial returns or below standard market rate returns and usually provide seed or patient capital for start-up social enterprises (Brest & Born, 2013). Non-concessionary investors, on the other hand, demand superior returns on their impact investments (Brest & Born, 2013). It is important to note that the different financial returns are based on investors' strategic objectives, with some even accepting a return of capital at minimum (GIIN, 2020; Mudaliar & Bass, 2017). Mudaliar & Bass (2017) define private equity, private debt, and real assets as the most preferred asset classes on the impact investing continuum. It is also worth noting that most impact investors do not consider themselves 'impact investors'. They may operate under private equity, venture capital, foundations, and social entrepreneurs (Arosio, 2011). Therefore, impact investment strategies and venture capital and private equities share similar characteristics (Arosio, 2011). For instance, the estimated value of the global impact investing market of USD 502 billion is found in assets collectively managed by 1340 investors (Mudaliar & Dithrich,

2019). According to Mudaliar & Dithrich (2019), asset managers account for 64% of these 1340 investors, showing a global preference for indirect investments primarily dealt in equities, venture capital, fixed income, and real assets. The remaining 36% includes Development Finance Institutions, foundations, banks, pension funds, insurance companies, NGOs, and family offices (pp. 5-7). Developed countries and, mainly, the USA, Canada, and Europe are the largest sources of impact funds and they are expanding their investment activities to emerging markets, with Sub-Saharan Africa representing their preferred destination (GIIN, 2019).

Looking more closely at the area of study, the East African region has become a thriving market for impact investment with increasing inflows of private capital occurring within Sub-Saharan Africa. The relevance of social and environmental concerns related to impact investment has been emphasised throughout the development of the concept. Clearly, impact investments vary geographically and among individual investors. For instance, the Global Impact Investing Network (GIIN) and Open Capital Advisors (2015) recount that 155 impact investors had collectively deployed more than USD 9.3 billion through more than 1000 direct deals in the region as of 2015 (p. 9). Although a vast majority of impact investors operate in several markets or countries within East Africa, Kenya has received the lion's share of the USD 9.3 billion followed by Uganda, which has received 13 percent; Tanzania, which has received 12 percent; Ethiopia, which has received 7 percent; and Rwanda, which has received 4 percent with little or no active impact investments made in the remaining East African countries. Kenya remains the main destination for impact investment in Africa (Alliedcrowds ltd, 2018).

With the aim of bringing to light new empirical evidence on the criteria employed by impact investors in allocating funds and thereby contributing to the body and growth of knowledge in this regard, this article builds on the following question: What variables influence the allocation of impact funds and how do macroeconomic country-specific conditions influence fund allocation?

The first chapter of this work introduces the reviewed literature and highlights the key research findings of this field. The second chapter describes the methodology, data sources, and data treatments used. Finally, the third chapter presents the analysis, the key findings, and a concluding discussion chapter which provides an interpretation of the evidence.

1. Relevant literature

The concept of creating social impact through investment has been long existent, despite bifurcated attitudes that separate business returns from social improvements. Indeed, it has been assumed that capital donated to generate social and environmental progress (with no regard for monetary gains) is philanthropic, while the one invested to prioritise financial returns with little or no consideration for social or environmental improvements constitutes investment (Bugg-Levine & Emerson, 2011; Trelstad, 2016). In effect, historical trends of impact investment date back to early investments that challenged the predominant line of thinking, characterising investments with the sole responsibility of generating financial returns (Bugg-Levine & Goldstein, 2009). Some of these efforts include early investments made by church/faith-based investors, microfinance, community reinvestment, Socially Responsible Investment (SRI), investments in clean technologies, and the community finance sector (Bugg-Levine & Goldstein, 2009).

Regarding the significant growth of the global impact investment market, there must be reasons why people undertake impact investing (Dorfleitner & Utz, 2014). In East Africa, for instance, the United States of America and Europe are the largest sources of impact funds, the focus of which is gradually drifting away from high-risk investments to concentrate more on business returns and demanding commercial terms (Lighting Global & Dalberg advisors, 2018; Jackson & Harji, 2016). That is, their criteria for allocating capital relate to investment risks, returns, and the likelihood of liquidating their stake (Jackson & Harji, 2016; Dorfleitner & Utz, 2014).

The first line of reasoning focuses on the strong financial performance of impact investments (GIIN & Cambridge Associates, 2015). Overall, a continuing and long-standing debate comparing the financial performance of social investments to conventional ones has yielded positive, neutral, and negative responses (von Wallis & Klein, 2015). A number of studies have shown that: (1) strong financial performance is a critical driver of impact investments or SRI (Mudaliar & Bass, 2017)[5] (2) financial returns are primary objectives, while social aspects are considered secondary conditions (Revelli, 2017); and (3) investors are applying conventional financial strategies to their investments (Revelli, 2017; GIIN, 2020; Lighting Global & Dalberg advisors, 2018). Cortez et al. (2009), Erragragui and Lagoarde-Segot (2016), and Hamilton et al. (1993) found a neutral relationship between the financial performance of SRI and conventional investments. Additionally, Brest and Born (2013) posit that the achievement of social impact alongside commercial returns is unlikely to occur. Their assertion emerges from growing concerns about what they describe as "potentially unrealistic expectations of simultaneously achieving" social impact and standard market-rate or superior returns (p. 22). Applying the notion of causation, these authors believe that the expectation of market-rate returns by both impact and conventional investors will result in: 1) less impact investments as the social change perspective becomes an extra cost for the impact investor, and 2) conventional investors automatically investing for impact when the same returns are to be generated (Brest & Born, 2013).

By contrast, evidence from the *Annual Impact Investor Survey*, conducted by the GIIN (2019), reveals that most impact investors who participated in the survey pursued competitive standard market-rate returns comparable to the fiduciary sphere of conventional investments. In fact, out of the 266 survey participants, 66 % had pursued market-rate returns, 19 % had accepted less than but closer to market-rate returns, and 15 % had accepted close to capital preservation or the return of capital

[5] (GIIN & Cambridge Associates, 2015; Arosio, 2011; Pena & Cortez, 2017; Revelli, 2017; Nilsson, 2008; Kempf & Osthof, 2007; Statman, 2000)

(GIIN, 2019). For instance, revenue generation is prioritised due to the high cost or riskiness of investing in the off-grid solar market serving quite low income off-grid populations (Lighting Global & Dalberg Advisors, 2018).

Another motivation (behind impact investing) stems from the availability of entrepreneurs. In their study on the attractiveness of various emerging markets for private equity and venture capital investments, Groh & Liechtenstein (2012) show that the state of the economy of a country (like, income, growth, employment levels, the size of the economy, the type of capital market (whether it is made up of banks or a stock market), taxes, legal structures and the protection of property rights, human and social environments, innovative capacity, and bureaucracy) have positive effects on investments. Notably, their study identifies a predominant role of entrepreneurial activity, which absorbs and reflects the impacts of the abovementioned parameters (Groh & Liechtenstein, 2012). In other words, entrepreneurial activities directly affect investments as they occupy the demand sphere. One impact investment company in Uganda, namely, COSEF, recalls that small to mid-size enterprises (SMEs) make up 98% of all businesses in Kenya, well over 3 million enterprises in Tanzania and Uganda and over 72,000 SMEs in Rwanda (COSEF, 2018).

The view on private sector being the engine of progress through technological activities and innovation stemming from proprietary firms is touted by Joseph Schumpeter (Nelson, 1990). Technology affords entrepreneurs access to a wide array of information, both on trending problems that need solving and possible solutions (Bornstein, 2007). Again, innovation has been identified as a driver of market competitiveness, sometimes with positive consequences for social and environmental issues (Corradini et al., 2014; Gilli et al., 2014). As social value creation alone may not be enough incentive to drive innovation in the private sector, innovation efforts toward social progress would not be exploited, as financial incentives are lost from the public good of innovation information and free riding (Léger & Swaminathan, 2007; Corradini et al., 2014). For an innovation to be undertaken in the private sector, there may be a need for financial incentives because innovation

may be too expensive to be adopted at a systemic level, and this scenario is when government intervention via intellectual property rights is needed most. At this point, the suggestion of mixed good-related financing for environmental improvements proposed by Corradini et al. (2014) furthers the concept of impact investment based on economic reasoning.

Nelson (1990) also sheds light on the predominant role of government in the success of technological activities, which the scholarship of capitalism fails to address. Such governmental roles target the foundations of innovation, including university research funding, investments in higher education, and policies encouraging education and industrial research and development (Nelson, 1990). Some practical examples include free secondary education in Tanzania and the Adolescent Girl's Initiative (AGI). The AGI is a comprehensive training programme for girls in Rwanda and South Sudan provided through a partnership between the governments of these countries and the World Bank (World Bank, 2014). Literacy rates are of 82% in Kenya as of 2018, of 78 % in Tanzania as of 2015, of 77 % in Uganda as of 2018, and of 73 % in Rwanda as of 2018 (World Bank, 2019), and they follow an entrepreneurial culture, prompting business ideas and impact investments in these countries. A government can also boost innovation by establishing and strengthening national innovation systems or, better still, innovation ecosystems (Nelson, 1990).

Porter and Van der Linde (1995) summarise the contributions of public regulations to the achievement of desired environmental and economic benefits with six points, namely: (1) regulations render companies aware of the harmful effects of their activities on the environment, which could serve as a potential cause for environmentally benign innovations; (2) regulations report information that could benefit companies; (3) regulations reduce uncertainties of environmental investments; (4) regulations push companies to be environmentally innovative; (5) regulations reduce the cost of environmental innovation and, finally, (6) regulation sets the record for return appropriability (pp. 99-100). According to Hall and Jones (1998), variations in institutions and government policies explain the gaps

that exist across countries in terms of capital accumulation, educational attainment, productivity, and income (p. 114).

Furthermore, research regarding the impact of population growth on economic performance, investments, and productivity have yielded positive, negative and, in some cases, neutral stances. Bloom et al. (2003) identified the age structure of population as a critical issue that has been insufficiently investigated in previous literature. A report produced by the African Institute for Development Policy (AFIDEP) and the University of Southampton (2018) contributed to this line of literature by indicating that youth of the East African Community (EAC) exhibit a great capacity to accelerate growth and development in East Africa, should they be in good health, skilled, and employed. Ideally, the youth bulge in East Africa and its position as the most populous region in Africa renders the region a viable destination for investments in terms of the availability of cheap labour and of a sizeable and addressable market (GOGLA, 2019).

A challenge of the impact investment debate is reflected by the idea that every investment made in Africa constitutes an impact investment due to high levels of social exclusion and poverty characterising the African continent (Jackson & Harji, 2016). To this end, Bugg-Levine and Emerson (2011) argue that even though all investments can create social change, impact investment prioritizes environmental and social value creation. Therefore, simply placing capital in poorer geographic regions does not qualify as impact investment. The intention to seek social and environmental impact and the measurement of impact as a management practice are mandatory to qualify an investment as an impact investment (Bugg-Levine & Emerson, 2011).

The following chapters clarify strategies that impact investors use in allocating impact funds in East Africa.

2. Methodological frameworks

Impact funds are increasingly being allocated to East Africa but to specific countries within the region (GIIN & Open Capital Advisors, 2015). While some investors may choose to invest in frontier markets, the vast majority prefer to invest in more mature ones. In this article we aim to identify which micro-level conditions are motivating impact fund allocation and the role of macro-level conditions in countries of business implementation. Accordingly, we employ a semi-structured qualitative research methodology, typically involving the use of secondary and primary data sources. Considering the United Nations Development Program conclusions (UNDP, 2015), the research draws on a systematic review of synthesized secondary sources of data, supplemented by case studies and interviews held with impact investors in East Africa. In doing so, information gaps and inconsistencies surfacing during the research are bridged and clarified while research outcomes of secondary sources are verified against real world examples to ensure high-quality and transparent research.

Data sources

Primary data were collected through semi-structured questionnaires and interviews held via email from May 23rd to August 29th of 2019. Semi-structured interviews and questionnaires were considered suitable for this study because they focus on addressing questions in an exploratory way, using open-ended questions as opposed to purely structured surveys, which require participants to choose from a "range of predetermined possible answers" (Blandford, 2013, p. 3). We should note that some questions were developed during the interviews. A request for an interview attached to a set of pre-determined questions was sent out to over thirty East African impact investors and stakeholders. Their various websites were initially analysed to gather data to be used to answer the research question. Then, the interview consultations followed, undertaken to

retrieve any relevant information that was not publicly available. The selection of impact investors and stakeholders was limited to those who actively operate within the sectors of agriculture, renewable energy, information, and communications technology (ICT), and healthcare in East Africa. Four respondents agreed to participate, and interviews were conducted remotely. One respondent is an impact investor in smallholder farmers whose investment portfolio focuses on Tanzania. Another respondent is a recipient of impact investments from Tanzania of the renewable energy sector. The third respondent is a representative of an organization for private equity and venture capital funds in East Africa, and the last respondent is a representative from a development institution in East Africa that invests impact capital in agriculture and agribusiness, renewable energy and adaptations to climate change, financial services, and communications systems. The case study methodology was used to develop a deeper understanding of the practicalities of impact investment and of approaches that impact investors employ based on detailed explanations and descriptive examples (Heale & Twycross, 2018).

The analytical framework of this article derives from a thorough evaluation and assessment of all data at hand from both primary and secondary sources. The framework was fragmented into descriptive and thematic analyses of approaches to impact investing in East Africa (Dionisio & Raupp de Vargas, 2019). The thematic perspective was assessed from two angles: a micro-level analysis of approaches to impact investment among East African businesses and a macro-level analysis of the conditions in countries that motivate impact investment in various East African countries. This analysis was done to understand which private and public characteristics have strong effects on impact investment decisions, considering that impact investment is an impure, public good-related activity, according to Corradini et al. (2014). The concept of the impure, public good has already been applied in the context of charity by Andreoni (1989), who terms it “impure altruism” (p. 1449).

Area of analysis

The East African region is made up of thirteen countries characterised by diverse and unique cultures, different stages of development, and youthful populations with a median age of 18.1 years (UN World Population Prospect, 2019; AfDB, 2019). It is the most populous region in Africa, with a population of approximately 441,151,114[6] (UN World Population Prospect, 2019). Countries within the East African region include Kenya, Uganda, Tanzania, Burundi, Rwanda, Comoros, Ethiopia, South Sudan, Sudan, Eritrea, Djibouti, Seychelles, and Somalia (AfDB, 2019). Data from the *East Africa Economic Outlook* (2019) indicate that, in 2018, East Africa was the fastest growing region in Africa, with a leading level of gross domestic product (GDP) growth estimated at 5.7 % (AfDB, 2019, p. 5). It is the most regionally integrated area of Sub-Saharan Africa and it is a member of The Intergovernmental Authority on Development (IGAD), the Common Market for Eastern and Southern Africa (COMESA), the African Continental Free Trade Agreement, and the East African Community (EAC). The EAC is an intergovernmental organization of East African countries designed to create a single trading bloc through the Customs Union Protocol monetary union; a single political authority and common market facilitating the free movement of goods and people among participating countries (EAC, 2017). It currently includes Burundi, Kenya, Rwanda, Tanzania, South Sudan, and Uganda (EAC, 2017) and has been described as the fastest growing and most integrated region in Africa (EAC, 2017; AUC, AfDB & UNECA, 2016).

Available investment instruments in East Africa include: (1) challenge funds, which are a form of financing purposely provided to decrease the riskiness of impactful projects or businesses for further investments; (2) seed or patient capital, representing a type of funding that targets early-stage business ideas; (3) venture capital, targeting small companies or start-ups with high growth potential; (4) private equity shares, which

[6] Data elaborated by www.worldometers.com, sourced from "*World Population Prospects: The 2019 Revision*", United Nations, Department of Economic and Social Affairs, Population Division (2019).

represent ownership in an entity that is not traded on a public stock market; and (5) debts, which are loans paid back on a schedule. Quasi-equity is an innovative finance mechanism developed from existing mechanisms that have been developed among stakeholders in the impact investment industry of East Africa to address the financial needs of businesses whose monetary demand is too low for equity financing or that do not meet requirements for equity financing. Other innovative capital instruments used in East Africa include micro venture capital, meta finance, blended capital, and growth capital. Finally, the value of capital provided by impact investors in East Africa ranges from below USD 500,000 to over USD 50 million (GIIN & Open Capital Advisors, 2015) with an average investment duration of five to ten years (UNDP, 2015).

Sectors of analysis

The areas of impact investment listed below were selected because they represent key areas for achieving sustainable development and positive impacts from economic, social, and environmental perspectives.

Starting with Agriculture, it is relevant to note that it remains the largest sector in the region, employing 70 % of the East African population. The economies of most countries within the region are fuelled by agriculture, despite the dominance of smallholder farmers who still rely on traditional methods of farming to earn their livelihoods. Thus, investing in agriculture means investing in environmental sustainability, and investing to improve the quality of life of a vast majority of the East African population. For this reason, agriculture is a prominent area of investor interest.

One unfavourable yet prevailing socioeconomic challenge facing East Africa concerns the access to electricity. Only 50 % of the populations of almost all East African countries are connected to electricity and approximately 9 % of the population of Burundi had access to electricity as of 2017 (World Bank, 2018). With an abundance of renewable energy resources in the region (mostly solar and wind systems), renewable

energy systems constitute a viable solution to ensuring broader access to affordable, reliable, sustainable, and clean energy in accordance with the 7th Sustainable Development Goal. This is an impactful venture that has attracted substantial impact funds, as universal access and a stable electricity supply enable the informal business sector, which is prominent in the region, to work longer hours, leading to increased incomes.

The African health service sector has been described as the poorest in the world (World Bank, 2008, p. vii). For this reason, attention is geared toward the private sector, justifying the need for impact investments to address structural deficiencies.

Finally, the ICT service sector has been resourceful in being socially and financially inclusive of poor and marginalized communities (The Swedish Trade and Invest Council, 2016). ICT has promoted innovation, green and inclusive business models in equally relevant sectors such as agriculture, healthcare, and renewable energy to the point of being considered a proxy of sustainable development in low-income communities. An example of the extent of digital inclusion in the region is reflected by the regional digital health plan outlined by the East African Health Research Commission (EAHRC), in its quest to achieve an improved and unified health sector (USAID, 2017). Another example concerns the adoption of mobile money as a payment mechanism for goods and services, and this adoption has led to the expansion of the customer base of businesses to rural areas with mobile phone penetration. Finally, the pay-go financing model is critical to energy access in the off-grid solar sector.

Data treatment

Retrieved information and data were treated with confidentiality and anonymity where requested and citations have been applied where needed.

3. Analyses

Our findings mainly stem from four interview consultations and evidence gathered from a critical analysis of the websites of thirty-five active impact investors in East Africa. Findings were delineated into macro and micro level conditions. From our investigation, three key preconditions for justifying the disbursement of impact funds at the micro level were identified:

1. **Returns:** Evidence gathered from the interview consultations and from the critical analysis of websites of a significant number of impact investors in East Africa revealed competitive returns as an attractive parameter for the selection of projects or businesses to invest in. How many financial returns were expected on investments was not explicitly expressed. However, one respondent mentioned that Africa is perceived as a "high-risk investment destination by a number of investors" (personal communication, June 3rd, 2019). Hence, this is a likely explanation to why impact investors expect a high return.
2. **Technology intensity and innovation:** Successful, innovative, and dynamic business models with a proven track record are crucial to boosting local growth. For instance, digital business strategies provide a wide array of business growth opportunities within the aforementioned sectors of analysis, from customer intelligence to innovation. One respondent mentioned that sectors and businesses using technology to improve or leapfrog livelihoods are those that are invested in most. Two respondents identified "technology-based interventions" in the energy and agriculture sectors, such as mobile money-related financing of financial innovation and solar irrigation technologies, as important drivers of impact investments (personal communications, June 11th, 2019; June 20th, 2019).
3. **Scalability:** Another relevant criterion for impact capital allocation concerns the growth potential of a business and, namely, the ability of a venture to expand its activities and become profitable, successful, and financially sustainable over the long run. This ability often derives

from a good management team, operational capabilities, technical expertise, adequate internal controls, and entrepreneurial experience in the local market segment within which a company operates.

To combine the above elements with country-specific macro-economic conditions that may additionally influence the allocation of impact funds, the following context-dependent variables were identified from available primary and secondary data.

- **Investment opportunities:** Investment opportunities concern political and economic infrastructure. Evidence gathered from critically analysing the websites of a significant number of impact investors in East Africa revealed the availability of human capital, the availability of entrepreneurs and SMEs, a robust private sector, population growth, and emerging or high growth markets and industries and stable incomes[7] as relevant macro-scale conditions considered for investments. Two respondents mentioned economic infrastructures such as road networks, free lands, mobile phone penetration and mobile banking as integral to strategies for investment (Personal communications, June 3rd, 2019; June 20th, 2019).
- **Investment incentives:** Respondents mentioned business registration systems, state-led objectives, subsidies, and tax credits as key considerations for impact investments made in the various countries in which they operate.
- **Regional trade integration:** Another condition the respondents considered is how well a country is connected along its borders and its relations with neighbouring countries for business expansion and trade or so-called strategic locations. Regional integration influences impact fund allocation in East Africa because it is considered a single market with a common currency. More specifically, parameters for the measurement of the most integrated countries include trade

[7] Impact investors consider populations with a stable income for marketable products in the renewable energy sector, for example.

integration, regional infrastructure, production integration, people's free movement, and financial and macroeconomic integration. With respect to these variables, countries such as Ethiopia, Eritrea, Sudan, and Djibouti rank the lowest in the African Regional Integration Index of 2016 with Uganda and Kenya representing the most integrated countries (AUC, AfDB & UNECA, 2016).

- **Stability and transparency:** A peaceful and stable political environment void of any form of violence is a necessary condition for investment to grow. One respondent recounted that East African countries with some sort of political stability and economic viability such as Kenya, Tanzania, Uganda, and Rwanda are some of the leading destinations for impact capital. Another respondent also identified corruption as a basic problem and a reason why their company is no longer investing in Tanzania.
- **Conducive fiscal and monetary policies:** Various macroeconomic policies, such as foreign exchange sales adopted in Kenya, Ethiopia, Rwanda, Seychelles, and Tanzania yielded stability in exchange rates as recorded in the various countries in 2018, whereas inflation rates remained high in Ethiopia, Burundi, Sudan, and South Sudan in the same year (AfDB, 2019). Again, the ability of Kenya to maintain a stable interest rate policy renders it the largest and most developed capital market in the region (Africa Financial Market Initiative, 2019).
- **Privatization of public infrastructure:** A key element of the economic reform and reconstruction efforts of the EAC government is rooted in a recognition of the private sector as an engine of growth (EAC, 2017). Ethiopia, Eritrea, and Djibouti are the only three countries in the world wherein state monopolies on telecommunications still prevail (Fukui, 2019). However, the Communications Service Regulation Proclamation approved by the Ethiopian government on June 13 of 2019 will see to the privatization of the telecom sector of Ethiopia, which has long been monopolised by the state (Kiruga, 2019). In opening its telecom sector to competition, the Ethiopian government seeks to attract both domestic and foreign investment to improve the sector (Fukui, 2019).

4. Discussion

This chapter begins from the premise that the criteria considered by impact investors in allocating impact investments at the micro-level include returns, technology-based interventions, and scalability. Seemingly, at the country level, the abovementioned characteristics generate a conducive environment, which was repeatedly identified by respondents as leading to fruitful investments in East Africa. A notable point in this regard concerns the fact that Ethiopia, Rwanda, and Uganda are landlocked countries and yet receive greater funds than the other countries of this category. Rwanda, despite its small market and geographic location, exhibits high degrees of mobile phone penetration and internet coverage relative to other countries in East Africa (UNCTAD & ICC, 2012), which are important drivers of investment. This phenomenon suggests that country-specific conditions do not need to stand simultaneously and yet may be differently tracked in East African countries.

Overall, according to the investigated literature and primary data collected to understand the priorities of fund allocation, it is worthy to note that impact investors like mainstream investors are characterised by rational behaviour prioritizing returns over any other aspect. Inasmuch as social impact drives impact investment, there is a preference for business returns with economic value creation, representing the key impact indicator from which other positive social or environmental impacts may eventually be generated. An example of this preference is illustrated by the case of Mtanga Farms Ltd., a Tanzanian farming operation founded in 2008 with the objective of improving potato farming in the tropical climate of the country by introducing disease-free potato seed varieties for the first time in the territory. The potato seed initiative of the farm attracted four impact investors whose investment decisions were influenced by the financial opportunities of the farm for investors, smallholder farmers, and the farm business itself, after which social and environmental benefits were tracked over the medium to long run because of the investments

provided (GIIN, 2011). That said, the profitability of impact investments remains the number one criterion for impact investors.

Another interesting point that emerges from this research concerns the provision of technical assistance as a form of in-kind impact investment, providing knowledge and expertise together with money. This provision is relevant as a de-risking tool for ensuring further investments and the growth of early-stage businesses, especially in very fragile economies where funding opportunities are scarce. The Africa Enterprise Challenge Fund (AECF) is a development institution that is transforming lives in poor rural areas of Africa by providing concessional financing alongside technical assistance to agribusinesses and renewable energy enterprises, as well as supporting adaptation to climate change technologies. The technical assistance and business advisory support services provided aim at strengthening investee financial management, capacity building, and business sustainability and at creating value and enhancing impacts at the beneficiary level. In understanding the high costs of investing in fragile regions such as Somalia (AECF, 2019), the need for successive rounds of project financing, and the inefficiency of investees in attracting further investments, investors tend to provide non-monetary resources to minimize the risks of monetary losses.

To understand why the measurement of social and environmental impact by impact investors in East Africa is inconsistent, it is relevant to recognise that such impacts are complex and difficult to track, especially by firms based in poor communities, as small companies find standard impact assessment tools expensive or mostly developed for large companies, leading to expensive processes of data acquisition (UNDP, 2015). Such companies, in turn, develop and use diverse impact measurement strategies, most of which gauge impact from the growth of businesses, the number of people served, and the number of job opportunities created, which are not necessarily proxies of inclusive and sustainable growth. Recently, a frequently employed tool to measure social and environmental goals of business ventures in East Africa is the Sustainable Development

Goals (SDG) framework developed by the UN 2030 Agenda for Sustainable Development. The SDG are often used as reference points to keep track of social and environmental performance, primarily due to their free access and less stringent enforcement (GIIN, 2019; UNDP, 2015).

Conclusion

The overall trend of impact fund allocation in East Africa is moving toward improving the livelihoods of beneficiaries by supporting profitable ventures regardless of additional and measurable social impacts that may stem from such businesses.

East African countries such as Kenya, Tanzania, Ethiopia, Uganda, and Rwanda receive the most impact funds primarily due to the presence of strong business-enabling climates deriving from political and economic infrastructures, strong regional integration, conducive fiscal and monetary policies, youthful populations, human capital, the privatization of public infrastructure, and stability and transparency.

In conclusion, the concept of impact investment points at supporting ventures that generate local growth; however, economic value creation for beneficiaries remains the main priority of impact assessment in East Africa relative to social and environmental impacts. Indeed, it is possible to say that investors are adopting a conventional approach based on financial returns under the label of impact investment simply because they are based in Africa, a continent with a lower human development index. In this sense, a deeper investigation of the real meaning of "impact" is required not to rebrand a mainstream fund allocation process just to gain visibility and stakeholder praise.

To further strengthen the above conclusions, a broader analysis may be conducted, based on evidence sourced from sectors other than those of agriculture, renewable energy, health, and ICT. Expanding the geographic area of investigation to West African countries could also extend the reach of our analysis.

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Appendix

Direct Sources:

1. Interview consultation with Cheetah Development on June 3rd, 2019.
2. Interview consultation with Mr. Victor Ndiege (Sector Team Lead – Renewable Energy and Climate Technologies) Africa Enterprise Challenge Fund (AECF) on June 11th , 2019.
3. Interview consultation with Devergy Energy Services on June 14th, 2019.
4. Interview consultation with the East Africa Venture Capital Association (EAVCA) on June 20th, 2019.

Questionnaire

Research title:

Financing sustainability: An Analysis of the Existence of a Trend in the Allocation of Impact Funds in East Africa.

Summary:

Impact investment is evident in East Africa, yet several studies have revealed a growing disparity in the deployment of impact capital about country-specific cases. Therefore, this research builds on the following question: What variables influence the allocation of impact capital? The research aims to contribute new knowledge and understanding to a growing body of knowledge in the field of impact investment with a focus on Africa.

1. What are the three top characteristics that a business should have to be supported by your organization or by impact investment?
2. What government policies, institutional frameworks, and macroeconomic conditions favour impact capital allocation in East Africa?
3. What countries and sectors within the East African region are included in your impact investment portfolio? Why have you selected these countries and sectors?
4. How would you rank the agriculture, ICT, healthcare and renewable energy sectors in terms of impact fund allocation? Is there a reason for such an allocation approach?
5. Is the impact market competitive in East Africa, and does this affect capital allocation?
6. What sectors would you like to make future investments in?
7. What measurement mechanisms do you have in place to track the performance of investments?

Interview consultation with Devergy Energy Services on June 14th, 2019.

Questionnaire

1. Why are your services based in Tanzania?
2. Do you use local investors as local sources of finance?
3. What makes your company attractive to impact investors?
4. Roughly how much has been invested in your company since its inception and what are some of the return expectations of your investors?

Collaborative decision-making processes for adaptive wastescapes regeneration

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Abstract

the challenges introduced by the Circular Economy make it possible to elaborate new approaches and tools capable of activating changes in resource management and territorial transformations. Considering the city as a complex system, like a living organism, urban metabolism identifies the processes and flows that can help recognise waste as resources. In this perspective, a central role is taken by the decision-making processes which, if structured according to an approach based on collaboration and cooperation, allow to support the identification of regeneration alternatives, and manage the transition to the circular economy. This paper describes the collaborative decision-making process structured within the H2020 REPAiR project, where the interaction among different tools can activate a regenerative process for the waste territories, called wastescapes. The case study of Naples is the context of experimentation, where the methodological process has been tested.

Keywords: decision-making processes, circular economy, co-design, living labs, geodesign.

1. Collaborative decision-making processes in circular economy perspective

Most of the current environmental challenges are caused by human activity in urban settlements. Social capital, made up of human and built capital, are an integral part of natural capital, from an ecosystemic viewpoint, where ecosystem services represent bonds between man and the environment (Costanza et al., 2017). The concepts of space justice (Soja, 2010) and environmental justice (Alier, 2012) are complementary to guarantee the right to the city (Lefebvre, 1996), equity, and well-being in urban and natural areas. In this context, the Sustainable Development Goals (SDG) have sustainability and equity objectives, such as Goal 3 “Ensure healthy lives and promote well-

being for all at all ages"; Goal 10 "Reduce inequality within and among countries"; Goal 11 "Make cities and human settlements inclusive, safe, resilient and sustainable"; Goal 15 "Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss", and Goal 16 "Promote peaceful and inclusive societies for sustainable development, provide access to justice for all and build effective, accountable and inclusive institutions at all levels" (IN TEXT CITATION). However, some of these objectives are generic, leading to possible contradictions regarding social equity if no better expressed (Hickel, 2019). The satisfaction of fundamental human needs (Max Neef, 1991) and the landscape services (Termorshuizen & Opdam, 2009; Vallés Planells et al., 2014) present in urban settlements are a starting point for activating regenerative development. The priorities of national and local political measures are focused on economic development, underestimating the importance of environmental, social, and cultural factors as drivers of growth and wellbeing.This lack of balance in the sustainable dimensions for development makes human activities unsustainable for urban and peri-urban areas. The linear economy —based on the take, make, dispose model— consumed the carrying capacity of the natural resources and the economic model is self-regulating with a new environmental ethic (Raworth, 2017) which discusses about growth concept (Latouche, 2008). Considering cities as living systems, like cells, the study of metabolic flows leads to Urban Metabolism (UM) studies (Allen et al., 2012; Currie et al., 2017; Cui, 2018; Fan et al., 2019): metabolism quality is determined by the flows of matter and energy that enter, circulate, and leave the urban organism. Energy and materials incoming into an urban system foster multiple human activities, which produce services, goods, emissions and, on top of that, a big amount of waste. The UM concept applied to the city considers the biological notion referring to the internal processes by which living organisms maintain a continuous exchange of matter and energy with their environment to enable operation, growth, and reproduction (Céspedes Restrepo & Morales-Pinzón, 2018). At the same time, the UM

concerns and is influenced by the way urban communities self-organise and make decisions, consume and save, degrade and recycle resources, share community services, design, and use infrastructures (Sanches & Bento, 2020). According to this perspective, the Circular Economy (CE) paradigm (Ellen Mc Arthur Foundation, 2019) is one of the several approaches that cope with multidimensional urban challenges toward sustainability, to reduce or avoid waste, and generate multiple positive effects.

In the economy of Nature, waste does not exist. Each material is reintroduced in the natural metabolic process. With these predictions, CE brings huge benefits in the application of circular process models to human productions. The actions of reducing, refurbishing, reusing, renovating, and recycling build together new urban systems, leading to two external effects: on the one hand, to a reduction of natural material extractions, and on the other hand, to a non-production of waste; and finally, to innovative urban dynamics. Some cities in the world are on their way to become fully circular in the next decades, by creating growing synergies, thus creating a network of existing and new economic activities. CE embraces all economic activities, and the challenge for innovation offers the opportunity to create a wide range of new jobs and urban scenarios. As complementary elements of social capital, human activities and territories are strongly influenced by each other. The huge amount of daily produced waste has a life cycle impact that once in the landfill, in form of illicit dumping, causes strong environmental injustice events, often occurring in difficult territories.

Human activities and territories can be deeply connected to paths of *unsolved territories* in between (Russo et al., 2018). Unsolved territories proliferate from wasted lands that are consequence of different factors. Following the concept of drosscape (Berger, 2006; Gasparrini & Terracciano, 2016), *wastescapes* are considered those parts of cities not necessarily polluted —but where risk exposure is high— like ghettos, abandoned areas (Russo et al., 2018; Amenta & van Timmeren, 2019; REPAiR, 2017), and those places where social risk caused segregation. In Naples, our case study, the so-called *Land of Fires* (Senior & Mazza, 2004; Alisa et al., 2010; De Rosa,

2018), dangerous materials have been illegally dumped and stocked in the past years, with serious impacts on the health of inhabitants (Membretti, 2016). As a result, contaminated soils and unresolved parts of land that have become wastescapes, bring with them a negative cultural perception that over time takes root in certain areas of the peri-urban landscape. Wastescapes also include agricultural land housing illegal constructions, portions of abandoned historical heritages, housing or productive facilities confiscated by the government from the criminal organisations, partially condoned unauthorized building lots, estates never registered by the tax authorities, unfinished, abandoned or soon to be abandoned buildings, and areas and infrastructures designed to host marginal lives.

From the perspective described above, circular cities can comply with many spatial sustainable challenges, like wastescape reclamation, but they need innovative, adaptive, and synergic approaches where UM management is combined with regional policies and spatial planning (Batty, 2017; Roggema, 2019). Starting from these assumptions, the H2020 REPAiR project, *REsource Management in Peri-Urban Areas: Going Beyond Urban Metabolism*, aims to overcome UM, trying to examine some crucial issues, elaborating, and combining tools and methods at a methodological, as well as operational level.

To cope with these challenges, the hybrid methodology of REPAiR is based on a collaborative decision-making process, stemming from the need of a formal cooperation when taking important decisions and the idea of building consensus group decisions (Wilson, 2003). Collaboration and cooperation are shared between the expert team and to the team with the different stakeholders involved in the decision process, where the diversity of perspectives is considered a valuable resource providing additional insights into possible opportunities or risks. At the same time, the cooperation strongly recommends a more supportive attitude among the people as the best way to create and achieve a common goal (Keeney & Raiffa, 1999; Hastie & Dawes, 2001; Raiffa et al., 2003).

Collaborative decision-making has evolved thanks to the introduction of information and communication technologies at the organizational and

cognitive levels (Zaraté, 2013; Cerreta & Panaro, 2017) underlining the need to work in a cooperative way. Cooperation, collaboration, and coordination define the framework of cooperative decision-support systems. According to these reflections and by taking into account the opportunities of focused partnerships, the Living Labs (LLs) approach has been proposed. LLs are physical and virtual environments, where public-private-people partnerships investigate and test innovations. Actors involved in a LLs are from diverse contexts for a good development of the activities, with the purpose of shaping the needs of the stakeholders in innovation.

LLs are instruments that can be used to improve the innovation capabilities and competitiveness of territories. They seem useful to lead political measures towards the socio-economic challenges of their territories, thus making social inclusion. LLs are especially useful for the interpretation of complex real-life scenarios and are recognised as instruments to promote open innovation and cooperation in several European regions, guided by researchers and experts. The goal of the project is to provide a hybrid decision support system to accelerate CE in spatial planning and identify possible opportunities to change. Peri-Urban Living Labs (PULLs), an interpretation of LLs implemented in peri-urban areas, have been crucial points of the project and have been the context to arrange some workshops which are useful to implement Geodesign process models (Steinitz, 2012; Campagna, 2014) at different steps.

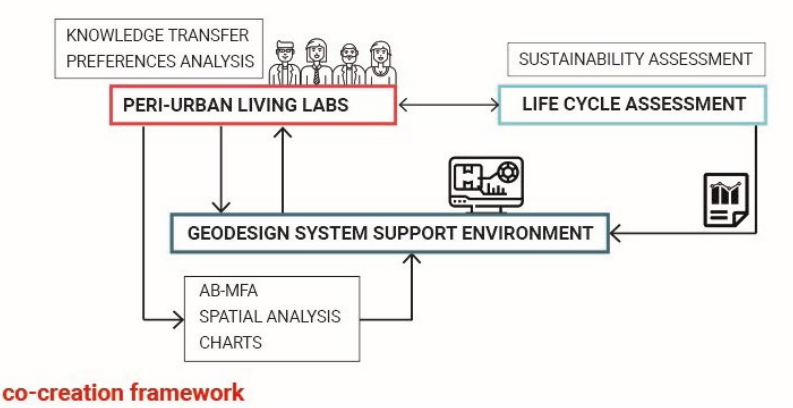
The purpose of this paper is to emphasise the role of the PULLs across the whole methodological process and to present some outcomes of the Naples case study, by exploring: (1) their function in the methodological framework; (2) the main results of REPAiR converged in GDSE platform, and (3) stakeholders' involvement carried out so far, to orient future PULLs.

2. The REPAiR methodology: a collaborative decision-making process

The broad framework of the methodological process is done in co-creation. Co-creation is an integrate and iterative process (Mauser at al., 2013) that support researchers, actors, stakeholders, and decision-makers, which together identify site-specific eco-innovative solutions. The three main columns of the co-creation interactive process are:

1. Peri-Urban Living Labs (PULLs): an open innovation approach that activates some workshops to enable real life contexts where researchers and institutions interact, and where different kinds of knowledge about waste and wastescapes develop, test, and implement place-specific Eco-Innovative Solutions (EISs) (Eriksson et al., 2005; Feurstein et al., 2008; De Bonis et al., 2014; ENoLL, 2016);
2. Geodesign System Support Environment (GDSE): a gis-based platform with a sequence of phases that support a geodesign process (Arciniegas et al., 2016; Arciniegas et al., 2019; Campagna, 2014);
3. Life Cycle Assessment (LCA): a sustainability assessment report on waste supply chains that measures socio-economic and environmental status quo indicators and the impacts produced by the EISs (Guineé et al., 2002; Taelman et al., 2018).

Figure 1. Co-creation framework: PULLs, GDSE and LCA interactions



The interaction between PULLs, GDSE, and LCA is iterative and recursive. The PULLs have been collective workshops where researchers, public institutions, stakeholders, and other actors involved have discussed about waste management and wastescapes. Hard and soft data have produced different outputs of knowledge that have been processed and have become part of GDSE and inputs for LCA (see Figure 1). PULLs allowed actors to express their preferences and they have been moment of knowledge transfer events have occurred.

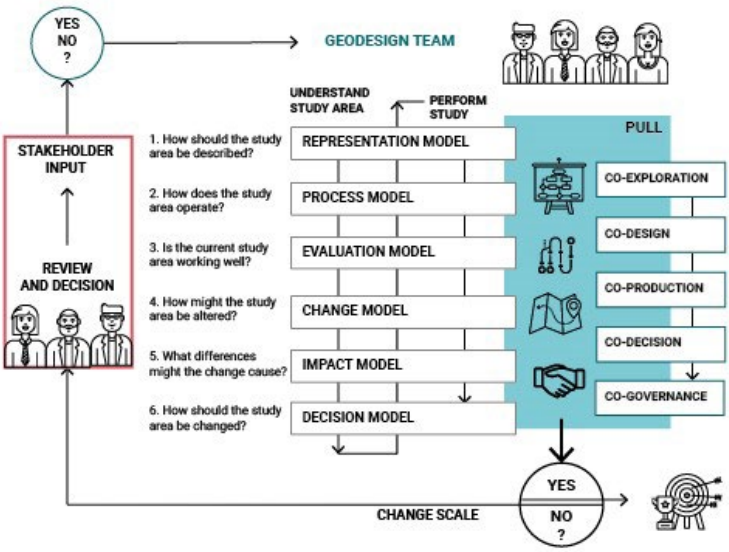
In the different phases of this research, the results from PULLs have been adapted to implement the GDSE platform, and GDSE has allowed to carry out PULLs. LCA has been done based on local data and sustainability assessment reports on each key flow supply chain, comparing the status quo and the impacts of some solutions. The LCA report is published in the GDSE platform to support stakeholders' knowledge in the decision-making system.

3. The role of Peri-Urban Living Labs and the interaction in the GDSE process

The co-creation process has been carried out by following the phases of the geodesign process. The five phases (Co-Exploring, Co-Design, Co-Production, Co-Decision, and Co-Governance) are performed in PULLs and lead by the geodesign team (see Figure 2).

1. Co-exploring phase: PULLs have been the scoping phase of the research, and aim at understanding the most relevant topics of waste management and wastescapes in the focus area mentioned below. Challenges and objectives are pointed out to accelerate circular economy and the regeneration of peri-urban areas. In this phase, geodesign *representation* and *process models* are studied.
2. Co-design phase: PULLs workshops are focused on state Eco-Innovative Solutions (EISs) and actors to involve key flows and spatial strategies. In this, phase *evaluation* and *change models* are considered.
3. Co-production phase: PULLs allow to create decision-maker groups and to point out targets and strategies per key flow. This is the phase where *change* and *decision models* make EISs operative.
4. Co-decision phase: Considering the sustainability assessment reports (LCA) and the flow assessment calculation elaborated in GDSE, decision-making groups can discuss on results collected and deal with *impact* and *decision models* to define a common strategy.
5. Co-governance phase: In this phase, Eco-Innovative Solutions become operative and are accepted by the local municipalities in order to implement through site-specific policies and programmes.

Figure 2. Geodesign system models and PULL phases
from co-exploration to co-governance



To organize a Living Lab (REPAiR, 2017), the following groups and roles must be defined:

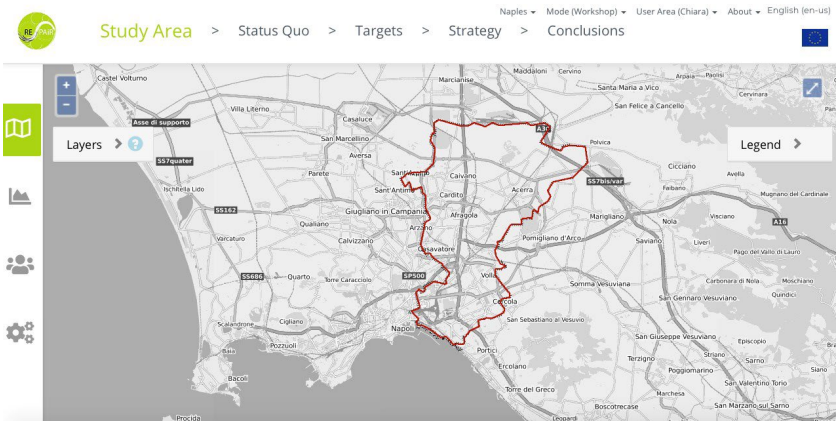
- Core Group (project coordinator, reporting responsible, logistics responsible, communication manager).
- Open Group (administrative entities, university and research centres, financial beneficiaries, public and private sector actors, third sector, NGOs, social enterprises).

They can deal with themes and sub-themes of interest that, in the case of REPAiR, are urban metabolism and waste management; planning and wastescapes.

4. Strategy Co-design for CDW in the Naples case study

The Naples focus area includes eleven Municipalities: Acerra, Afragola, Caivano, Cardito, Casalnuovo di Napoli, Casoria, Cercola, Crispano, Frattaminore, Napoli East districts, and Volla (see Figure 3).

Figure 3. Naples focus area in the frame of the GDSE first step



Starting from the study area, the GDSE process allows the Core Group to let the Open Group know the status quo of wastescapes and waste flows, to rank the main target, to develop solutions, to combine a Strategy and, in the end, to evaluate the results of the group in the Conclusions. In the next paragraphs, the collaborative decision-making process for CDW will be explained, focusing on some relevant aspects: activity-based material flow analysis, the involvement of actors in Naples PULLs to elaborate the EISs for such key flow.

4.1 Activity-Based Material Flow Analysis for CDW

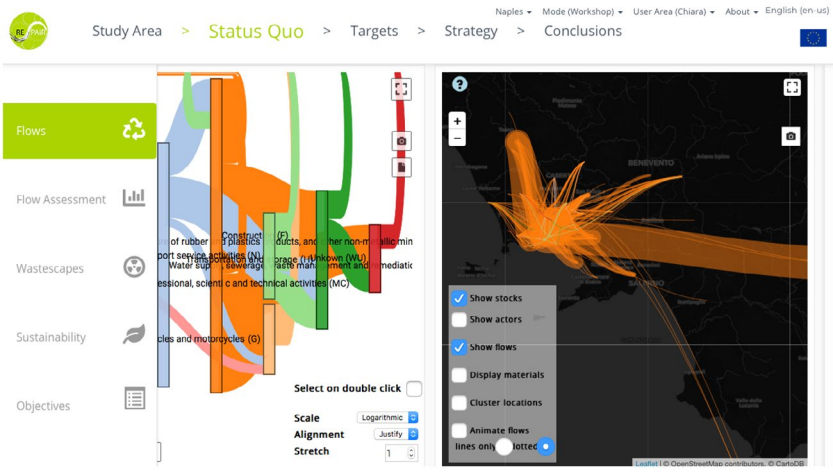
The waste flow maps are one of the innovations of the GDSE platform. In the status quo section, dynamic evaluation maps of waste flows allow to visualize the current scenario of the supply chains (Arciniegas et al., 2019). The platform allows the study of the metabolic scenario that shows spatial information of origin, destination, and the amount of each considered material flow. The Naples case study selected organic waste (OW) and construction and demolition waste (CDW) as key flows.

In the Activity-Based Material Flow Analysis (AB-MFA) data, we describe: origins and destinations of each stream (that correspond to companies in the case of CDW), and their quality and amount. The actors have been classified according to their Nomenclature of Economic Activities (NACE) code, which is the European statistical classification of economic activities (EUROSTAT). The NACE code generically classifies Activity Groups, Activities, and Actors. In this way, each company is clustered in its group of similar activities. These clusters can support analysis by layers. Regional solutions to improve local waste metabolism can be generically tested on cluster groups, and not only on some actors.

Waste flows are classified according to the European Waste Catalogue (EWC) codes (EC, 2000 Commission Decision 2000/532/EC). In Italy, the homologous classification of economic activities, ATECO (ECOnomical Activities), is a type of classification adopted by the Italian National Statistical Institute (ISTAT) for national economic statistical surveys. In the Naples case study, the data collection for the AB-MFA has been carried out with the support of the Campania Regional Environmental Protection Agency (ARPAC) and the Chamber of Commerce. Waste flows are tracked and checked by the waste register of ARPAC, from unique environmental model (MUD) declarations. Data have been elaborated and implemented for organic waste fraction produced by households and companies and for CDW flows (MUD, 2015). The maps produced with such data are in the Status Quo section of the GDSE process (see Figure 4).

Specific views are prepared before the GDSE/PULLs workshops, by organising the sub-fraction of each flow in layers, according to the suitable criteria to support the GDSE workshop session. Flow maps (Figure 5) and a Sankey diagram (Figure 6) offer multiple information: knowing the existing scenario of waste metabolism, analysing the main clusters of related activities, understanding at glance the main activities and actors involved in the management of a key flow from a first analysis. Some strategic actors can be involved in the decision-making process in a GDSE session to test regional policies or implementing ideas in new eco-innovative strategies.

Figure 4. Status quo section in GDSE platform.

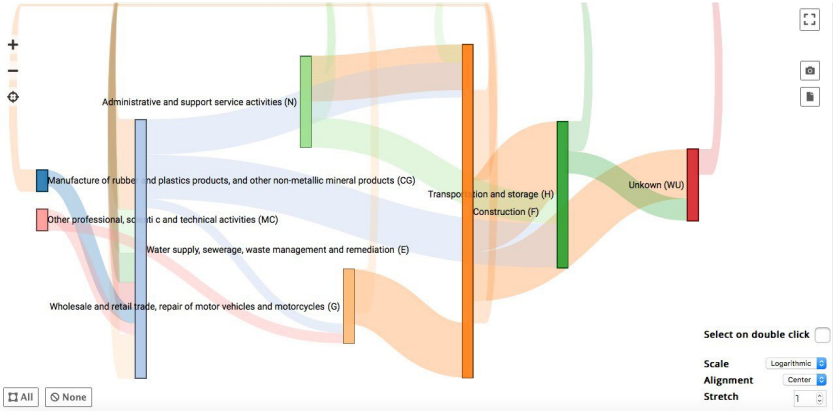


Note: The view shows mixed construction and demolition waste (EWC 170904) produced in the Naples focus area in 2015 (MUD data). Map elaborated in GDSE (prepared by the authors).

Figure 5. Activity based-material flow map of mixed construction and demolition waste (EWC 170904) produced in Naples focus area in 2015

Note: Map elaborated in GDSE (prepared by the authors).

Figure 6. Sankey diagram at Activity level of AB-MFA mixed construction and demolition waste (EWC 170904) produced in Naples focus area in 2015



Note: Map elaborated in GDSE (prepared by the authors).

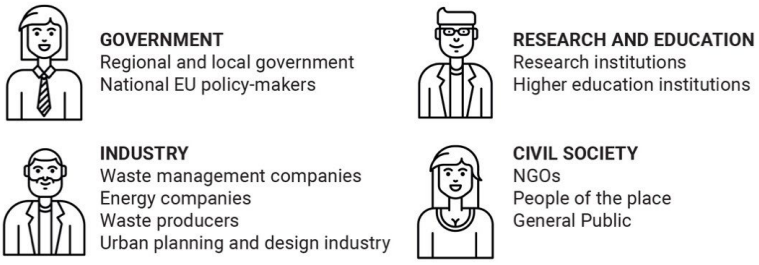
The waste stream of CDW (EWC 17) accounts for around 40 % of the total waste produced in Europe (Deloitte, 2017). In Italy, this amount corresponds to approximately 52 million tons of non-hazardous waste (ISPRA, 2015). According to official data, 75 % of these materials are officially recovered, but there are many complexities in the whole chain, mainly related to bureaucratic processes and regulatory ambiguities, which do not facilitate the reuse of such materials in the logic of circular economy. There are also several shadow flows in the construction sectors in Europe like in other countries (Hebel et al., 2014), that are not tracked and, thus, they are not considered in recycling rate statistics (Legambiente, 2019). A crucial challenge is to trigger the market of Recycled Aggregates (RA) that are produced from inert waste treatment plants, but regulatory conditions obstruct it and their reintroduction in metabolic processes. The Italian Nation Association of Building Constructors (*Associazione Nazionale costruttori Edili* – ANCE) with the Supra-Regional Waste Observatory (*Osservatorio Rifiuti Sovraregionale* - O.R.So) have developed a project to improve CDW management and RA market introducing a national open-source platform, *Borsino Inerti*, connected to O.R.So, that is a mandatory system used by companies in the waste management sector. Companies that are already required to fill forms in O.R.So will be able to interact with construction companies or freelance professionals interested in buying certified recycled materials. RA can generally be used in many landscape architecture works, road fills, or they can be recycled to make new building materials. The Campania Region production of special waste stands at around 6.8 million tons, 4.9 % of the national total. During the PULLs, citizens and local environmental associations highlighted the problem of abandoning of CDW as a widespread local problem in the Naples peri-urban area. This phenomenon produces a proliferation of wastescapes, and it has been considered in many PULLs. Anyway, abandoned CDW have not been considered in the Material Flow Analysis, because of the lack of necessary geolocalised hard data. From PULLs, it emerged that regulatory obstacles to the circular metabolism of CDW are also due to: the absence of specific actions for selective demolition in current regional regulations

(PRGRS, 2011), whose actualization is ongoing at the date of the present paper; the low cost and high availability of quarry materials; the distrust of construction companies toward recycled products; the absence of recycled aggregates in regional pricing, and poor separation at the source of waste and use of selective demolition practices (REPAiR, 2018). By starting from the global and local scenarios and considering the critical issues raised, a set of eco-innovative solutions (EISs) have been proposed, implemented in GDSE, and assessed in combined strategies to work synergically.

4.2 The involvement of actors in the decision-making process of the Naples case study

The main categories of actors involved in the whole process include the scientific community (higher education and research), industry, NGOs, civil society, public in general, political measures, media, and investors (see Figure 7).

Figure 7. Stakeholders categories in REPAiR



In the first co-exploring phase, the main difficulties and potentials on waste management and wastescapes have been identified through collective discussions, using decision trees and semi-structured interviews (elaborated by Berruti, Guida, & Palestino, 2017) with an open multidimensional and multiscale approach. Issues emerged in the

top four PULLs of the co-exploring phase and interviews concerning a wide range of issues about the legacy of waste crisis in Campania. The Municipalities of Naples Focus Area that took part in PULLs were: Frattaminore, Casalnuovo, Caivano, Afragola, Acerra, Casoria, the City of Naples, the Metropolitan City of Naples, and the Campania Regional Authority. The waste management companies were SAPNA, ASIA, CEA, and Epsilon 2000 Society. Some of the main outlined problems of the Campania Region are: waste balls disposal and relative infringement proceeding, lack of cooperation between institutions, popular distrust in local governance and in waste management system, NIMBY effect and difficulties in conducting waste treatment or recycling plants, waste abandonment, proliferation of wastescapes due to social behaviours and lack of control, underuse of waste facilities in function, and a lack of interaction between public and private bodies. Wastescapes proliferation emerged as deeply connected to the urban metabolism of waste, not only because of the illicit phenomena of waste management, but also due to the waste management activities in Campania Region. The big amount of waste daily transported in treatment plants outside Campania Region, or abroad, has a huge environmental and economic impact. It is evident that a distance reduction of waste treatment and recycling represents the common goal for both waste flows analysed (organic and construction and demolition waste), as it will consequently close the recycling circle at a regional scale. Bottlenecks in the recycling and waste supply chains are different according to the waste fraction considered. Regarding CDW, the emerged issues mentioned above were outlined in specific focus groups. A key role was played by the trade associations of Neapolitan builders (ACEN, or *Associazione Eostruttori Edili Napoletani*), where the fourth PULL took place, the cadastre of waste by ARPAC, and the section of General Management of the Integrated Water and Waste Cycle Office.

The second phase implemented the previous one with the co-design of the eco-innovative solutions or EISs. The four PULLs carried out in Afragola (Naples) in 2018 aimed at the regeneration and rethinking of wastescapes starting from both territorial problems and those related to

the dysfunctions of waste management. In this phase, some wastescapes have been mapped in collaboration with NGOs and citizens, who have played a central role in the knowledge of the territory and less evident issues. In the end of this phase, a set of EISs that proposed the *Beyond INERTia* strategy have been defined.

In the third phase of the PULLs, the verification of the solutions identified for both OW and CDW were analysed by experts of the waste management, public administration, and company sectors. Focus groups and interdisciplinary Knowledge Transfer events with other partners of the REPAiR consortium gave place to this phase. The relevance of some EISs has been confirmed, while other EISs considered by citizens and associations have been criticised because of their inconsistency with the Italian Law.

Table 1. PULLs carried out in the Naples case study from 2017 to 2019

PULL		PLACE	DATE	PARTICIPATION	CORE ISSUE
CO-EXPLORATION	1	NAPOLI	10/4/17	66%	Kick of PULL
	2	CASORIA	31/05/17	40%	Waste management
	3	CAIVANO	14/09/17	18%	OW
	4	NAPOLI	29/11/17	50%	CDW
CO-DESIGN	5	AFRAGOLA	14/02/18	76%	Wastescapes
	6	AFRAGOLA	07/03/18	96%	Wastescapes
	7	AFRAGOLA	28/03/18	60%	Wastescapes
	8	AFRAGOLA	23/04/18	73%	Wastescapes
CO-PRODUCTION	9	NAPOLI	16/07/18	70%	EISs and strategies
	10	NAPOLI	15/01/19	72%	EISs and strategies
	11	NAPOLI	13/02/19	60%	EISs and strategies
	12	NAPOLI	27/02/19	77%	EISs and strategies
	13	NAPOLI	18/04/19	67%	EISs and strategies
				63%	

Currently, the GDSE has been implemented starting from the work done so far by PULLs. The next steps aim at creating groups that focus on co-producing the strategies developed in the collaborative decision-making process.

It is an ongoing process, monitored in the research by REPAiR team and in different PULLs. In October of 2019, the REPAiR team of Naples took part in a technical table convening on CDW for the next regional plan for the management of special waste (PRGRS – *Piano Regionale per la Gestione dei Rifiuti Speciali in Campania*), for the Scoping phase, together with ACEN and other actors involved. GDSE has been proposed as a tool for co-exploring and co-designing plan strategies but using it on a regional scale results in some obstacles yet to be solved.

4.3 Stakeholders involved in the PULL workshops for CDW management

Stakeholders involved in CDW analysis and solutions include different actors from the scientific community, industry, trade associations, civil society/general public, policy makers (Campania Regional Authority, specifically, the section of General Management of the Integrated Water and Waste Cycle Office), and some private investors.

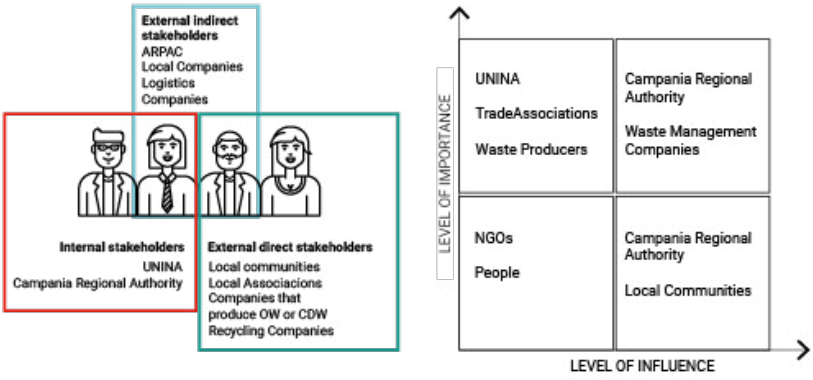
The *Beyond INERTia* strategy has been defined as set of site-specific EISs (REPAiR, 2018) to cope with the current challenges and bottlenecks of the recycling supply chain of CDW. As mentioned in the status quo analysis, the main part of this flow consists of inert waste, considering the identified dysfunctions in local supply chain. The single EISs of this strategy focused on the management of the mixed inert waste fraction. PULLs and scientific research identified the necessity of:

- free collection points for CDW disposed by little producers;
- a Regional Concession Fee on quarries of sand and gravel;

- incentives for companies that make selective demolition;
- a regional sustainability certification for recycled aggregates from inert waste;
- the item and price of recycled aggregates in tender specifications;
- recycled aggregates for landscape architecture operations.

These solutions have been technically implemented into the GDSE platform. Each one can have an impact on the reduction or modification of CDW flows. Using the GDSE, the actors involved in the geodesign process can combine solutions in strategies and select implementation areas. Internal and external stakeholders, who took part in this process, have a different influence and importance in the decision-making process (see Figure 8) to co-produce strategies. Considering a stakeholder analysis into the geodesign process is yet to be explored.

Figure 8. Venn diagram and influence matrix



5. Discussion and conclusions

This paper clarified the methodological structure of the collaborative decision-making process experienced in the REPAiR research project and the Naples case study, focusing on the work carried out on the management of waste streams by the construction and demolition sectors. The strategies developed so far within the PULLs and the GDSE session have not yet been adopted and implemented by the Naples region stakeholders, but Campania Region is interested in testing GDSE in new regional Waste Management Plans.

Furthermore, this paper did not address the issue of data adaptation to implement the GDSE. Raw data need precise and specific processing which, for now, constitute the main obstacle in the direct use of the software at a regional scale. The hybrid decision-making process (Cerreta & Poli, 2017) structured and implemented in the REPAiR project activated a continuous cooperation activity and makes it possible to categorize clear common and shared objectives to obtain ongoing feedbacks from the various stakeholders and to have an order of their preferences with respect to the eco-innovative solutions proposed, according to the combinations and implementation areas selected in the Geodesign process. Some difficulties have been encountered in involving the actors in an experimental research, as well as keeping them active in the process over time. According to the experience developed, the parts involved in the project have been selected with regards to specific criteria. The decision-making objectives can be of various kinds and be proposed by different stakeholders, according to the Geodesign session to be developed.

In the Campania Region, this methodology can be particularly useful in regional and municipal policies concerning waste management. Following the emergency condition from ten years ago, some of the territories —wastescapes— studied still carry open wounds. The population, therefore, experiences mixed moods and the accumulated mistrust of waste management has often been expressed in the PULL workshops. In

the Naples case study, the issue of illicit waste trafficking was considered tangentially, like in the mapping of wastescape as a product of non-legal actions. Shadow waste streams have not been traced due to the absence of structured data and the scarce relevance of this phenomenon in the proposed circular economy processes. Rather, the UNINA research team managed to highlight actions aimed at preventing waste, in line with some regional policies. The authors are aware that many system malfunctions do not depend on political decisions and planning of fragile territories only, but on the presence of criminal powers that influence both regional and local choices, at many steps of the waste management process chain.

At the same time, the authors stress the importance of activating a collaborative decision-making process to speed up the transition towards the CE in the region of Campania, as well as all the other regions of Italy. Today, this transition represents a path that many countries are taking up to improve the environmental and economic conditions of the production system. Using new tools to design territorial synergies on a local scale, integrating different competences, and even conflicting interests, is a step forward in the democratic process of spatial and environmental justice.

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Inner landscapes: Managing fragilities

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Abstract

The development model of the western world, marked by land consumption and useless expansive dynamics, has produced several episodes characterised by territorial fragility, marginality, depopulation, and abandonment. These territories (displaying "weaknesses" linked to the lack of facilities and accessibility), analysed through the application of traditional socio-economical evaluation parameters, have been included, at a national level, in the National Strategy of Internal Areas (*Strategia Nazionale delle Aree Interne*). However, if we are capable of amending ourselves from the logic of development and growth, we can see that these territories have not been interested by peaks of development and, therefore, are not subject to the fees of growth. These areas are almost completely intact, thus, the resources that surround them (air, water, forests, landscape, beauty) become the centre of new economies (sustainable, green, blue).

Gathering this untouched heritage can be a way to build a new vision, an interpretation, a narrative of the territory from which to trigger regeneration processes.

Landscape can be the key element to build this vision. According to its physiographic unity that does not have administrative limits, landscape can coherently guide the strengthening process of the territory as a common good, becoming the driving element for the evaluation of internal areas and weak and forgotten contexts. In fact, the landscape approach can define transformation scenarios (compensations, regenerations, reinventions, reinterpretations, new narrations) for those fragile territorial contexts, which is relevant to the "aspirations of the public with regard to the landscape features of their surroundings" (European Landscape Convention, 2000, art. 1 par c).

Keywords: natural capital, ecosystem services, landscape, inner areas, local development.

1. Introduction

The uncontrolled sprawl of conurbations along the costs, valleys, and plains of our planet led to the development of suffocating metropolitan areas, comfortable medium-sized cities, absurd tourist facilities, and polluting industrial areas; however, it also led to the creation of *Middle-earth* areas: wide useless territories that remain empty and abandoned among the lattice of urban poles and networks (De Matteis, 1995). These marginal areas, that are not affected by economic development, are useless from the economic statistics perspective, but these places are the reservoir of extraordinary cultural heterogeneity and rich biodiversity (Bonomi, 2018).[4]

Institutions generally assess the conditions of these areas by applying traditional social and economic parameters, which highlight conditions of fragility for these areas, mainly due to the lack of services and their limited accessibility; however, intervention policies are usually based on the results of these analyses (Barca et al., 2014).[5]

Nonetheless, if we set aside development and growth approaches, we can observe that these areas, which did not experience development peaks, did not face the challenges of growth either (pollution, soil erosion, and depletion of resources). Basically, these areas are almost completely intact and are characterised by a high quality of landscape and environment, where the resources of a marginalised place (air, water,

[4] In the XVI *Biennale di Architettura* in Venice in 2018 the Italian Pavilion, curated by Mario Cucinella, focused on these areas and named them Inner Territories; he used the metaphor of the archipelago to indicate "that space in our country where also in remote times, communities expressed themselves through a different relationship between urban dimension and territory" thus determining the creation of a "Territorial archipelago made up of urban/rural settlements and by the landscape that connects them".

[5] In Italy, the *Strategia Nazionale per le Aree Interne* (SNAI) was launched in September 2012 by the Minister for the Cohesion by means of the appointment of a Technical Committee for Inner Areas that, after negotiations with the representatives of the various Italian Regions, drafted the guideline document (see Bibliography) that merged with the Partnership Agreement. The underlying hypothesis of the National Strategy for Inner Areas, identifies "distance" from essential services as a key element. In this perspective, Inner Area, does not necessarily mean "weak area" in absolute terms.

and woods) become the central focus of new economies (sustainable, green, and blue, for example).

By glancing at these areas from the *developed* side of the world, we are only able to identify what is missing or not working properly; however, if we experience these places and praise their beauty, we are encouraged to defend them and save what is at risk. The threat of these limited approaches and ideas is the impossibility to develop new interpretative scenarios.

2. Landscape as a heritage that may trigger new development opportunities for marginal areas

It is important to focus on the development of a new paradigm of quality for marginal areas; only by shifting our gaze, we will be able to identify the positive effects of processes which would, otherwise, be considered negative for these areas. From this new perspective, we will be able to understand that depopulation dynamics are also a demographic trend that contributes to preserve small villages immersed in an almost intact environmental/landscape matrix. Population ageing causes circumstances where the elderly are perceived as a burden, however, they represent the soul of a community, and an element of identity and aggregation; the weakening of the provision of basic services also reinforces neighbourhood relationships; the difficulty of reaching a place or complex mobility issues leave the air uncontaminated; the lack of industrial or intensive agricultural activities makes local nutrition schemes healthy and organic.

The values upon which the quality paradigm is based (food, lifestyle, social relations, and natural environment) have almost nothing in common with the GDP, as well as with macro- and micro-economic indicators (employment, income, services, and infrastructure) based on which marginal areas obviously rank at the bottom of the list in classifications that assess quality of life.

Without necessarily having recourse to welfare economics (Sen, 1997) or to the theories of serene de-growth (Latouche, 2008), we could confirm the existence (at least potentially) of an alternative development model influenced by the often unaware lifestyles of the populations of marginal areas: serenity VS urge, slowness VS velocity, diffuse sociality VS élite aggregations, and quality production VS extensive economies.

The re-inclusion of these areas in their contexts requires not so much a Fordist approach (large infrastructures, intensive production, and mass tourism). It should rather focus on advanced innovation, made up of minimal and ad-hoc actions that aim to attract excellences and specialised professionals; a sort of *territorial acupuncture* that can intercept the lines of force of the territory and multiply beneficial effects, by spreading them in a pervasive (and non-invasive) way.

The heritage of marginal areas upon which this model should be developed is landscape; a Fragile Landscape that —thanks to its physiographic unit nature— does not rely on administrative boundaries. The landscape approach, in fact, can define transformation scenarios (reparation, regeneration, reinvention, reinterpretation, re-narration) that are in line with the reference context.

Based on this heritage, a new vision, an interpretation, and a narration of these marginal areas could be developed; these would activate regeneration processes based on models that are far from traditional schemes. A new metabolism of the territory, where the values are overturned and the affected communities are no longer the beneficiaries of an economic process; rather, they directly collaborate with the progress of their environment, putting into practice one of the key acquisitions of the European Landscape Convention.[6]

[6] "Landscape quality objective means, for a specific landscape, the formulation by the competent public authorities of the aspirations of the public with regard to the landscape features of their surroundings" (CAP.1 - Art.1, par. c – European Landscape Convention, 2000)

3. The narration of the territory as a tool for new economies for marginal areas

Internal areas, historical centres on hills and mountains, the villages of the agrarian reform, the cultural mosaics of the inner territories, productive landscapes, and agri-food excellence are the key elements for changes in marginal areas. These abandoned places could become the focus of new and proactive proposals that could transform them into innovative and identity centres. These areas are intrinsically resilient as their distance from the main urban areas has preserved some fundamental models of settlement, as well as identity, community, and landscape values that have been crucial for these places in facing their historical uncertainties and unexpected events (Carta, 2015).

A territory is the result of the complexities experienced across time and they find their expression through the anthropic actions on nature, culture and landscape. Territories are a complex structural system, whose components are the "non-varying features of the places, that characterise a community" (Carta, 2002, p. 120, our translation). A territory is an extremely complex entity that has defined its identity through the long-lasting co-evolutionary processes of human and environmental settlement (Dematteis & Magnaghi, 2018).

Communities reshape their territories across history by means of new information, stratifications, and substitutions; however, some elements of the territorial palimpsest (Corboz, 1998) remain unaltered, which form the basic identity and the recollections of a community: cultural roots and reference to past events that become the fundamental elements of a society.

Memory is not an objective and static truth; it changes over time and it is influenced by cultural models; it is both individual and collective. We can refer to Sigmund Freud's psychoanalytic studies to better understand the meaning of memory and expand it to territory. Freud's concept of stratified memory[7] suggests how to analyse the various layers of memory that could

[7] Sigmund Freud, *Briefe an Wilhelm Fließ 1887-1904 (Italian Translation)*, Turin: Bollati Boringhieri, 1986 (Letter 112, 6th December,1896)

be identified in a specific territory or landscape. The geomorphology of a site, its waterways, the natural vegetation and cultivated land, the thread of roads, the building typologies, and symbolic places all overlap among themselves and fuse together to give rise to a complex system. Here, we could seek the elements that introduce contradictions or breaches that pave the way towards a better future (Ceccarelli, 2012).

It is important to find these elements and to adapt them to contemporary contexts, to pivot a territorial innovation that can employ identity and collective memory as a tool to maximize opportunities in this heritage of specificities and values (Carta, 2002), considering territory as an encyclopaedia or a marketplace of the components of human life and of mutual relationships, of uses and meanings of spaces, and of achieved results (Harvey, 1992).

A multi-disciplinary knowledge of the territory and its processes allows to understand the rules of transformation and to enhance its heritage: territories accumulate memory like "springs loaded over centuries" (Becattini, 2015, p. 95, our translation).

The territorial heritage of Fragile Landscapes plays a more complex role. It includes the environmental heritage, the settlement heritage, the historical (rural and urban) landscape heritage, culture, and local knowledge. These values are the measure of the processes that generate new forms of local development (Dematteis & Magnaghi, 2018), where the employment of patrimonial resources should aim at the self-reproducibility of heritage and at the production of a "territorial value added" (Dematteis & Governa, 2005, pp. 26-29, our translation).

Territorial value should be combined with the complex system of the services and production chains located in an area; it should be a resource for local planning, and it should activate network policies. Therefore, the strategies to be implemented ought to integrate local heritage and different development sectors, such as tourism, marketing, scientific research, specialised school education and university education, vocational training, industrial production, and crafts. The integration of the different sectors and areas of a territory should take place through

territorial specialisation, for example, by identifying areas that could be suitable for the development of enhancement measures (Celani, 2006).

From this perspective, territory becomes a local milieu, an integrated system of physical, cultural, and economic resources that mould the identity of a place, thus becoming a resource for its development.

Creating an integrated system in a territory means:

- imagining the territory as a diffuse system of excellent offer, where development strategies can succeed only if they are interpreted and filtered based on the sustainability of the territory where they should be applied.
- fostering collaboration among the actors involved in projects of reinforcement of territorial identity and enhancement of excellences.

The chain that links agriculture, crafts, tourism, and culture marks the transition from a specific sectoral system to a multiple sectoral system; indeed, it is an example of an integrated system (agriculture – advanced tertiary). Through this approach, the self-reproduction of heritage resources (quality of the area, of waters and ecologic systems, hydro-geological balance, and landscape features) is the pre-requisite for the functioning of this chain.

A change of perspective is necessary; the new approaches to local development, should no longer include the need to apply policies of environmental, territorial, and landscape protection and enhancement, in which productive activities entail virtuous behaviours aiming at the self-reproduction of patrimonial and identity resources of a specific area (Dematteis & Magnaghi, 2018). Inner areas should make their territorial and social capital available for new forms of enterprises that employ innovative socioeconomic approaches, such as circular economy. This model of development redesigns the targets of production of material and non-material goods in a more responsible approach "that is able to re-develop the settlement model for the support of new economic relationships" (Carta, 2015, p.25, our translation).

The identification of new opportunities for economic development must incorporate the peculiar resources of a region that are unique and feature the identity of an area (Ceccarelli, 2005). Therefore, development strategies should be defined based on the sense of belonging and identity of a territory and a community. The crucial point is to deploy a vision focusing not so much on conservation but rather on evolution, linking the growth process to a dynamic vision of identity that could be the key for economic transformation (Gualerzi, 2008).

The essential idea is to enhance diversity from the traditional models of economic development typical of industrial areas, through a *back to the territory* approach (Dematteis & Magnaghi, 2018) characterised by the care for a place and its resources.

For the identity of an area to be perceived by its inhabitants, it is important to recognise its values, and its potential should be enhanced by coherently distributing goods and services, innovating institutions, and imagining an area as a project (Corboz, 1998).

The non-material heritage (values, knowledge, and techniques that created the identity of a territory) is made up of cultural processes as repertoires of ever changing and increasing creativity. Traditional crafts that are apparently the most concrete and tangible type of knowledge are, indeed, intangible heritage. What has characterised traditional craft is a bulk of skills and knowledge that are fundamental for production and, therefore, for transmission (Golino, 2016).

Local products are the elements that best contribute to the enhancement of an area, thanks to their ability to protect human and environmental resources, which are jeopardized by globalisation. By enhancing the know-how in traditional products, it is possible to launch a development process that includes other identity resources such as raw materials, landscape, and the quality of life. The products of the new circular territory should be organized based on productive cycles, supported by cooperative chains and production networks operating on the paradigm of planned recycling rather than on planned obsolescence (Carta, 2015).

This system should be dynamically developed, thanks to the contribution of new knowledge, and it should envisage policies that enhance, protect, and preserve the bulk of resources of the cultural heritage of a specific place. A territory can only continue to exist thanks to the close relationship between its physical features and the people who inhabit it, as "there is no territory without the imaginary of a territory" (Corboz, 1998, pp. 22-27, our translation).

A territory should differentiate and integrate the economic offer with new production forms that preserve the environment and traditions by supporting research for technological innovation, qualified training, and higher education. Being able to identify the emergency situations of an area by means of an endogenous process may help to highlight development schemes that need to be put into practice to limit their impact on the heritage and the values of an area.

The need to share local know-how, knowledge, and image of a territory is the necessary condition to create a development approach whose ingredients are: learning, strengthening of the social and institutional context, as well as the ability to generate a demand that goes beyond the limit of the local demand. The development of the awareness of a place can occur only though the involvement of the communities settled there; this implies greater attention to the historical identity of an area, as well as to other anthropological, social, cultural, environmental, and landscape features. These are the fundamental elements for the creation of unique products on the global market and the only approach that can guarantee the social welfare of local communities (Dematteis & Magnaghi, 2018).

4. Regenerating marginal areas by developing the natural capital and eco-systemic services

Fragile territories have a symbiotic relationship with their surrounding environment; the well-being of individuals is strongly affected by the conditions of the environment where they live. A traditional approach

to this topic implies that the quality of nature and the environment is assessed only in relation to the well-being or the damages that a context can generate for a community living in an area. Consequently, protection for the environment means protection for the individuals and local communities from the impact of pollution or the depletion of natural resources on their health. This approach highlights the importance that environment has for our lives by enhancing its relevance and our awareness. However, this is an excessively anthropocentric approach, as it justifies any intervention on the environment that is not immediately perceived as dangerous for human beings.

A shift in this perspective can be identified in the Constitutions of Ecuador and Bolivia[8] which, for the first time, regulate the rights of nature. In these countries, nature is subject for legal situations rather than an object (Baldin, 2014). The philosophical foundation of this legal novelty is based on the vision of the cosmos of Andean people on earth jurisprudence, a theory of the law that advocates the rights of the earth (Cullinan, 2012), as well as deep ecology; a philosophy that refuses a traditional, anthropocentric, and relational approach to the environment, based on which the ecosystem is such only with reference to a subject or a reference term (Cafagno, 2007).

The rights to nature protected by the Constitution of Ecuador are of two kinds: those relating to existence of nature (Article 71) and those regarding its restoration (Art. 72). In the case of Bolivia, Law 71 of 2010 of the Plurinational State of Bolivia (*Ley de derechos de la Madre Tierra*) sets forth in Article 5 that Mother Earth is a collective subject of public interest; Art. 7 of the same Law envisages the right to life, to the diversity of life, to water, to clean air, to equilibrium, to restauration, and to pollution-free living.

The rights to the existence of nature and the rights focusing on the perpetration of life cycles do not raise any issue, in that the simple fact of non-interference and non-threatening of these rights bestows the right to water, and the prohibition of its privatization; the right to food

[8] In force since 20th October 2008 and 7th February 2009, respectively.

sovereignty in the sense of access to healthy and culturally-suitable food; the right to live in a healthy and ecologically balanced environment that could guarantee sustainability; the promotion of clean energies and of low-environmental impact alternative energies (Chapter II of Title II of the Constitution of the Republic of Ecuador).

As for the rights aiming at the restoration of nature and its jeopardized balance (in the case of damage), the two Andean legal systems found a solution: nature, just like any incapacitated subject or legal persons, cannot provide for the protection of its own interests; for this reason, a mechanism of representation was implemented. Therefore, human beings will act for the protection of the rights of nature or of Mother Earth. In this perspective, Art. 71 of the Constitution of the Republic of Ecuador states that "All persons, communities, peoples and nations can call upon public authorities to enforce the rights of nature". Art. 34 of the Constitution of Bolivia sets forth that any person, in their own right or on behalf of a collective, is authorised to take legal action in defence of environmental rights. This possibility is given to individuals without prejudice to the obligation of public institutions to act on their own in the face of attacks on the environment.

If we look at a European perspective, the approach is different, in that there is a shift from the Andean vision of the cosmos to the economic pragmatism of the European Commission. In fact, the introduction of the concepts of *natural capital* and of *ecosystem services* allow to bypass the issue that the protection of the environment and economic development are contrasting and competing interests.

In particular, the "Natural Capital refers to the elements of nature that produce value or benefits to people (directly and indirectly), such as the stock of forests, rivers, land, minerals and oceans, as well as the natural processes and functions that underpin their operation".[9]

[9] *The State of Natural Capital: Towards a framework for measurement and valuation*. A report from UK Natural Capital Committee (April 2013), p. 10. Available at: https://www.gov.uk/government/publications/natural-capital-committees-first-state-of-natural-capital-report

Interaction processes between the assets of the Natural Capital in ecosystems generate the flows of Ecosystem Services, classified in 2005 by the Millennium Ecosystem Assessment[10] into four functional groups:

- Provisioning services (products obtained from ecosystems such as food, water, fibre, fuel, and medicine).
- Regulating services, where the benefits are obtained from the regulation of ecosystem processes related to climate, water, and disease control.
- Cultural, as the bulk of non-material benefits obtained by ecosystems from the spiritual, ethic, recreational, aesthetic, and recreational sphere.
- Supporting services, including all the services that are necessary to produce other ecosystem services such as soil formation, nutrient cycling, and primary biomass production.

The development of these two closely related concepts generated two main reflections. Initially, the focus of attention was concentrated on the importance to carry out biophysical and monetary evaluations to assess the environmental costs associated to the exploitation of biodiversity on one side, and the benefits for the wellbeing of a community (Wunder, 2005) on the other.

The second step was to explore how the Natural Capital is integrated in Territorial Planning by strengthening the promotion of actions for environmental requalification to reduce land consumption and fragmentation of ecosystems. When dealing with Territorial Planning and the assessment of programs and projects, special importance was paid to options in harmony with nature (Nature-Based Solutions and Green Infrastructures) vis-à-vis traditional infrastructural solution (Grey Infrastructures). The aim was to achieve greater territorial resilience, better quality of environment, landscape, and living conditions of communities, and to contrast the trend to densification that gets rid

[10] MA - Millennium Ecosystem Assessment (2005). Ecosystems and Human Well-being: Synthesis. Island Press, Washington, DC. Available at: http://millenniumassessment.org/documents/document.356.aspx.pdf

of precious areas in the urban fabric that could instead play different ecologic and production roles.

In the light of the reasons above, landscape is an extraordinarily efficient tool for inner areas, marginal territories, and fragile contexts that are in a constant and unstable balance between the will to preserve, transmit, and enhance a heritage made of traditions, customs, experiences, and knowledge and the need for identifying new activities, initiatives, and economies that could ensure their survival.

Landscape should be considered as a natural, critical capital; for example, a criterion to define a limit to the exploitation of natural resources and also a complex and synthetic representation of cultural eco-system services. In this perspective, landscape is a common ground that fosters virtuous interactions among the various forms of capital available, for example: natural, cultural, human, and social capital (Costanza et. al, 2017).

Moreover, reasoning in terms of landscape is necessary to bypass the typically western coolness of the economic approach that bestows a traditionally passive role to those communities affected by public policies. On the contrary, the involvement of local communities in the care for their environment (for example, the protection of the rights of the environment based on the vision of the Andean people) is an embedded concept in the notion of landscape that highlights the responsibility of the actors in the implementation (effectiveness) of the sense of belonging and its necessary reinforcement.

Starting from these premises allows us to define a process of regeneration of these fragile areas/landscapes that, moving from some shared values (a virtually intact environmental/landscape matrix, fresh air, healthy products, contact with nature, as well as social and neighbourhood relationships), could leverage on the increase of eco-system services by devoting special attention to cultural-recreational services.

Such a specific type of ecosystem services affects values linked to the cultural, aesthetic, religious, and spiritual sphere, as well as education, research, and knowledge and the benefits deriving from recreational activities, sports, tourism, and social relationships. A

conscious action of regeneration of ecosystems that could foster the provision of these services, would determine a beneficial effect in terms of aesthetic quality of landscapes, reduction of social marginalization, and strengthening of identity values.

5. Collaborative Urbanism

Considering landscape as the main social, economic, and ecologic resource from which a new metabolism of fragile areas can be conceived, this introduces a new governance model, based on local communities.

In fact, policies that focus on the values of landscape and on wellbeing should be developed; landscape would become an indicator of the quality of life of communities and a shared heritage, acknowledged by them. Such policies should be implemented by means of new local democracy tools aiming at the collaboration between citizens and institutions. These tools should be able to identify values, interests, and stakeholders of transformation, thus triggering a collaborative governance approach. The term indicates a territorial government approach that could make stakeholders aware of their implementation and generate a citizens' sense of belonging that is necessary to start the transition from a mere consultative participation to a strongly managerial collaboration (Chirulli & Iaione, 2018).

Local actors must be the main characters of this development process in a virtuous model where success experiences trigger mechanisms of collective learning. The diffusion and sharing of these experiences can determine emulation phenomena that can reinforce the sense of belonging, willingness of commitment, and a sense of accountability towards the common good. Marginal areas, more than other areas, too often suffer from the imposition of products and services that, under the shed of innovation or the use of complex marketing techniques, invade the spaces of everyday life, not being able to generate the wellbeing that stems from the satisfaction of needs.

This is valid both for the small scale (objects) and for the large scale (services and infrastructures) and changes occur too often without considering the needs and expectations of local communities. Instead, an anthropocentric project of objects and space generates wellbeing and high quality of life.

The collaborative approach to the development of new products, services or processes, of urban spaces and economic activities, is probably the correct approach for putting into practice useful and sustainable innovations.

A new transformation for marginal areas should be proposed and it should be based on the landscape heritage of these areas; it is necessary to develop policies of re-integration of Fragile Landscapes in the global development dynamics that are based on a collaboration between local actors (private citizens, institutions, social innovators, enlightened entrepreneurs, and administrators) in the perspective of shared interest of the common good (Ostrom, 1990) and, thus, of the landscape conceived and adapted to local services and infrastructures (Iaione, 2008; Foster, 2013). To be able to plan such a model, new legal and legislative tools should be developed, to manage the relationships between the collective and the local administrators, as well as among citizens, within the framework of the common interest for a healthy, safe, and shared territory.

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Integrated System for the resilience Enhancement of European Cultural Assets. A multidisciplinary approach to a sustainable model

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Abstract

The advent of globalisation has led men to think of nature as something separate from society, disregarding themselves as an integral part of the environment and perceiving themselves above it. Therefore, a holistic approach is needed, one that places interrelations between environment and human activities in the foreground, without excluding men from the environment, or even the environment from social systems. We need to study and interpret the complex adaptive Socio-Ecological Systems based on the continuous interaction of ecological, economic and social phenomena, which evolve according to resilient cycles.

All this requires a multidisciplinary approach, aiming at conserving biodiversity, managing ecosystems, encouraging interculturality, and promoting advanced sustainable development policies. In this context, a broad and multidisciplinary international partnership, coordinated by the University of Calabria, presents the project *SENECA - Integrated System for the Resilience Enhancement of European Cultural Assets*, which promotes a new multidisciplinary approach for the protection of cultural heritage and European historical areas from the effects of climate change and natural disasters, as well as their sustainable reconstruction.

This approach is based on the development of a smart integrated platform, which will allow the connection between researchers, experts, and decision makers who interact in the different fields of assessment, prevention and risk management, urban planning, and sustainable reconstruction of cultural heritage.

To support the platform, the proposal also foresees the implementation of Heritage Living Labs in pilot sites, which are user-centred and multidisciplinary research tools.

Keywords: cultural heritage, resilience, sustainable reconstruction, decision support system, living lab

1. Introduction

At a European level, the presence of intrinsically vulnerable historical sites has amplified the consequences of the multiple risks associated to climate change and natural disasters. The recent seismic events that hit Italy have been characterised by significant damage to cultural heritage. For example, in the historical centre of Amatrice, the level of damage caused by the earthquake from August 24 in 2016 was remarkably high, with over 60 % of the buildings inspected showing partial or total collapse; the elevated level of destruction was mainly caused by the high vulnerability of the buildings (Fiorentino et al., 2018).

Events of similar magnitude have affected other European countries; the Dodecanese earthquake in 2008 in Greece; the Kraljevo earthquake in 2010 in Serbia; the Lorca earthquake in 2011 in Spain; and the Aegean earthquake in 2017 in Greece. All of which highlight the need for increasing the resilience capacity of the territorial systems and the communities that live in them. In central and northern Europe, the impact of alluvial phenomena is even more significant, considering the frequency and extent of the areas concerned, both due to the long periods of rain and extreme precipitous events. Between 1998 and 2002, the average annual cost of flood damage as a percentage of GDP (gross domestic product) for the most affected European countries (1998-2002) varied from 0.1 % to 0.76 %.[3]

The *Sendai Framework for Disaster Risk Reduction 2015-2030*[4] explicitly mentions, among the expected results, the reduction of damage from natural disasters to cultural heritage along with those pertaining to material goods, the economy, society, and the environment; it also identifies two particular priorities. On the one hand, the need *ex-ante* of assessing vulnerability of cultural heritage in the context of specific exposures to risk, and *ex-post* of surveying and giving information on the damage suffered.

[3] APAT-EEA General Training Workshops – Advanced Seminar 2008 Environmental and Soil Management Systems.

[4] https://www.wcdrr.org/preparatory/post2015

On the other hand, it describes the need for public and private investments to improve the resilience of cultural assets (Virgili, 2017).

In this context, the *SENECA - Integrated System for the resilience ENhancement of European Cultural Assets* proposal[5], intends to promote a new multidisciplinary approach for the protection of European cultural heritage and historical areas from the effects of climate change and natural disasters, as well as new strategies for their sustainable reconstruction.

The SENECA project is based on a new integrated platform, called *SENECA Smart Integrated Platform*; a toolkit designed to support decision-making processes at all levels of governance at each stage of the event: prevention, protection, and reconstruction. The platform integrates a series of distinct but complementary tools, for example: monitoring and modelling of risk scenarios, acquiring crowd data from citizens and providing support for the recovery process in the post-disaster phase through a new adaptive decision-making system (SENECA-DSS).

The Smart Integrated Platform integrates skills among professionals in the sector, public decision makers, and stakeholders, thus improving the definition of intervention priorities on cultural heritage and post-disaster reconstruction through sustainable solutions.

2. SENECA Smart Integrated Platform

The impacts that the SENECA project produces are expressed on different scales: a micro-scale, which covers damage assessment and mitigation and adaptation strategies, and a macro-scale, which involves methods for assessing hazards and impact on heritage. Consequently, the DSS implemented through the Smart Integrated Platform will be a dynamic

[5] The "SENECA - Integrated System for the resilience ENhancement of European Cultural Assets" proposal was presented under the Horizon 2020 program on topic *"LC-CLA-04-2018 - Resilience and sustainable reconstruction of historic areas to cope with climate change and hazard events"*. The proposal coordinated by the University of Calabria has received a final evaluation of 13 out of 15 and is currently on the reserve list. The consortium is made up of 23 partners of 11 nationalities, including ten universities, ten SMEs, 2 public bodies and a large company.

and adaptive system within a cyclical process in real time, based on the information provided at the micro and macro levels.

The central node of the platform is SENECA-HIA, which represents an evolution of the HIA (Heritage Impact Assessment) proposed by ICOMOS (International Council on Monuments and Sites)[6]. In support of the platform, Heritage Living Labs will be implemented, opening innovation ecosystems that are useful for developing shared solutions with communities. To improve resilience towards natural disasters, in fact, the community and cultural aspects must also be considered, as they are connected to the social structure and characteristics of specific social groups (Miller, 2007). The increase in the resilience of heritage is a key factor for European historical areas, which necessarily requires an understanding of both interdependencies and vulnerability factors.

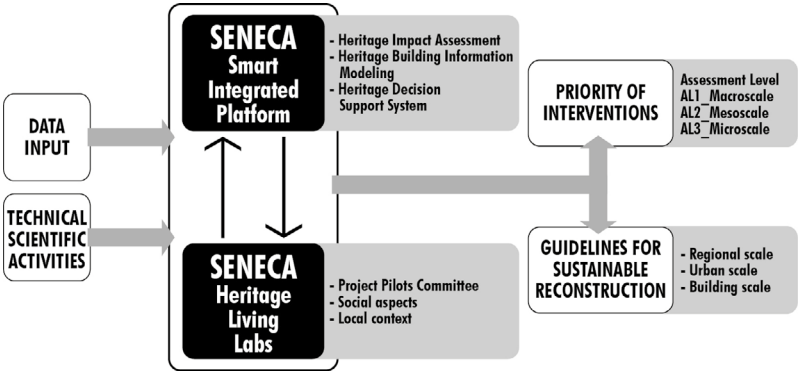
The platform is interactive so that each specific user can access to any information on the exposure, vulnerability, and ability of a specific historical area to face the different natural hazards, together with the relative specific guidelines for its sustainable reconstruction and effective measures to improve resilience. The integrated platform collects information from different domains: risk maps and meteorological data; GIS based information; data deriving from continuous monitoring; data from surveys and remote sensing operations on cultural heritage; destructive and non-destructive diagnostic test results on materials and structures; specific building information models for cultural heritage (BIM); data from public stakeholders; simulation results of new models for the description of damage on multi-scale cultural heritage and other multi-physical interactions with the surrounding environment; information on social media relating to the inhabitants of the sites; results of economic and environmental impact assessments; regulatory and organisational procedures for cultural heritage; new maintenance strategies, etc.

The platform is adaptive, which means that all accessible data is continuously updated and dynamically displayed. In detail, all data deriving from continuous monitoring, remote sensing, and access to open-

[6] www.icomos.org

source resources of existing databases (for seismic, hydrogeological and meteorological events, such as earthquakes, floods, hurricanes, etc.) are automatically synchronised using cloud and data-storage technologies implemented within the platform, to allow decision-makers to increase their ability to anticipate, recognise, adapt, and learn directly from past events. The platform is also a connecting tool for the scientific community working on different aspects of natural risk assessment and prevention.

Figure 1. Concept of SENECA project



The other aspect of the platform, in line with the technological one, concerns the involvement of the community in all phases of the project. This is possible by using an intersectional methodology already successfully tested within the ENTRUST H2020 project[7], which focuses on gender, cultural specificities, socio-economic privilege, and age. This approach is used to develop and provide an inclusive participatory process involving the communities associated with each of the pilot sites. In this logic, living labs are used as containers to organise and coordinate all community-based activities, including deliberative methods (for example, city juries) and co-design methods (for example, community

[7] http://www.entrust-h2020.eu

design charrettes), among others (Schaffers et al., 2011). The integrated platform is, therefore, a unifying tool for the activities of the Heritage Living Labs implemented in each pilot site.

3. The Heritage Living Labs

Public and social involvement in the SENECA project takes place thanks to an inclusive and articulated participatory process made by the Heritage Living Labs. A living lab, generally, is configured as an open and user-driven innovation ecosystem based on the continuous development of partnerships between institutions, companies, and researchers. The key aspects of a living lab are open innovation, the experimental approach in a real-life context, the involvement of end users, and user-driven innovation.

Specifically, the Heritage Living Lab is a place where stakeholders interested in cultural heritage can interact with each other to discuss best practices in the field of protection and prevention strategies. In detail, it allows local communities and other parties involved to transfer knowledge and skills, share experiences and results, have access to shared data, be informed of needs and decisions, and to understand best practices for improving resilience and/or reconstruction sustainability of historic areas (Cossetta & Palumbo, 2014). In addition, these tools can be adopted by institutions and researchers to calibrate, based on the environmental and social characteristics of the historical area, the different models and methodologies to be adopted for risk assessment and for integrated and sustainable reconstruction. It is how the envisaged inclusive participatory processes can be developed and implemented within specific communities.

The Living Lab offers an opportunity to implement cooperation between the different actors involved, who are often ignored by academic research and classic governance structures. In this way, it is possible to collect more accurate data, deeper knowledge, and a better assessment

of the local meaning of cultural heritage and an improvement of community resilience.

To identify the societal needs and the elements of the project which require the study of the socio-technical interactions, we have applied a preliminary Theory of change (Rogers, 2014). It is a methodology, commonly used in the non-profit sector, to articulate processes and connections through which the elements of the project (resources and activities) are transformed into outputs that lead to the general objective of the project. Two main groups are involved in the Living Labs; a technical group (architects, engineers, etc.) and the communities of the historical areas, who will be included in the decisions and actions aiming to increase the resilience of the community. The resources will be used in a form of knowledge and process co-production, which progresses through the different work phases up to the project results.

The Heritage Living Lab methodology is applied, together with SENECA-HIA, to the nine pilot cases, to test the validity of the techniques, tools, and information models used. The pilot historical sites, of a heterogeneous nature, have been chosen to cover a wide range of geographical and meteorological areas, landscapes, urban or rural characteristics, specific risks, cultural and historical aspects, and social and economic characteristics.

The nine pilot sites cover the following categories:

- Large historical urban centres (Barcelona, Spain; Naples, Italy).
- Small rural or urban historical centres (Cesky Krumlov, Czech Republic; Nysa, Poland; Camposanto, Italy).
- Self-contained/detached cultural heritage (Hohenzollern, Germany; Cork, Ireland).
- Distributed sites or cultural heritage (Shetland, UK; Cultural Heritage Buildings, Norway).

The project identified six main natural risks: storms, sea level rise, flooding, overheating and extreme heat, seismic and hydrogeological risks; the pilot sites are at risk of at least one of these hazards, with some sites being exposed to multiple risks. Through research on these pilot sites, the related guidelines for sustainable reconstruction and improvement of resilience will be accompanied by specific examples and application cases for natural risk and cultural heritage, grouped into homogeneous categories (by materials, construction technology, structural typology, morphology, age, cultural influences, climatic zone).

Figure 2. Pilot sites of SENECA project

Note: Locations are (1) Historical centre of Naples, Italy; (2) Historical centre of Camposanto, Italy; (3) Jarlshof and Old Scatness, Shetland Islands, UK; (4) Corporation Buildings, Cork, Ireland; (5) Historical centre of Barcelona, Spain; (6) Cultural Heritage Buildings in Halden, Fredrikstad, and Sarpsborg, Norway; (7) Hohenzollern Castle, Germany; Historical centre of Nysa, Poland; Historical centre of Český Krumlov, Czech Republic.

4. The SENECA HIA methodology

As it was mentioned above, one of the main concerns in this project is the need for making methodologies for assessing impacts on cultural heritage more effective. The inspiration for the main idea of the SENECA-

HIA project was the *Guidance on Heritage Impact Assessment for Cultural World Heritage Properties*[8] published by ICOMOS (International Council on Monuments and Sites) in 2011. The HIA Guidelines have been developed to guarantee the protection of the Outstanding Universal Value (OUV) of World Heritage sites[9], especially in the face of the negative impacts of human-planned development, such as large infrastructure projects (ICOMOS, 2011). In fact, the Directive 85/337/EEC[10] would require Environmental Impact Assessments (EIA) to consider the specific impact on cultural heritage. However, the practice shows several shortcomings in the analysis of cultural heritage within the EIA (Patiwael, Groote & Vanclay, 2019). The substantial ineffectiveness of the EIA in correctly determining the impacts on the heritage caused, for example, the delisting of the Dresden Elbe Valley from the World Heritage List, which occurred in 2009 because of the construction of the new Waldschlösschen Bridge (Ringbeck & Rössler, 2011). Precisely, to avoid delisting other sites, ICOMOS has developed a specific evaluation methodology (HIA) focused on the attributes that identify the OVU. Consequently, potential impacts must be assessed, starting from the values certified by UNESCO when the site was included in the World Heritage List (Patiwael et al., 2019). The HIA must therefore ensure the protection and maintenance of these values over time.

The approach proposed by SENECA-HIA differs from the traditional one promoted by ICOMOS in many aspects: it focuses on the potential impacts deriving from natural disasters rather than those from human action; it does not only apply to sites on the World Heritage List, but also to general historical areas; it does not make exclusive reference to the attributes of the OVU, but incorporates the social, legal, political, economic, and organisational aspects, in addition to the physical (environmental, ecological, and technical) aspects, specific to the area examined, so that the risk and resilience levels can be properly estimated.

8 https://www.icomos.org/world_heritage/HIA_20110201.pdf

9 The World Heritage Convention describes the OUV as "cultural and/or natural significance that is so exceptional that it transcends national boundaries and is of common importance for the present and future generations of all humanity" (UNESCO 2015, 11).

10 https://eur-lex.europa.eu/eli/dir/1985/337/oj

It follows that the assessment of potential damage is not limited to the material heritage only. It also considers the effects of natural events on the intangible cultural heritage, as well as the mutual influence between tangible and intangible cultural heritage in the event of natural disasters.

The application of SENECA-HIA takes place in three distinct but synergistic phases: (a) evaluation and classification of the degree of significance of cultural heritage assets; (b) assessment of the risk level for the different types of cultural heritage located in historical areas (compared to the classic criteria: danger, vulnerability, and exposure); (c) assessment and strengthening of the resilience of local communities in historical areas.

The first phase of SENECA-HIA is based on the concept that cultural heritage belongs to the group of resources whose price, understood as monetary value, is unable to take into consideration the intangible aspects and, therefore, has limited efficacy if used for comparison purposes. For these assets, by applying multi-criteria assessment methods (Nijkamp, Rietveld & Voogd, 1990), it is possible to identify a set of characteristics, attributes, and technical criteria (intangible value of the punctual and widespread cultural heritage, concentration of the population, spatial distribution of cultural heritage, form and contextual value of historical areas, etc.), which determine their overall meaning within a holistic framework (Saaty, 2005). The procedure attributes a certain weight to each identified criterion, specifying its relative importance and, therefore, the order of priority or the measure of the individual contribution to the final estimate judgment. The application of multi-criteria evaluation methods implies the identification of the different characteristics that the resource possesses, of the evaluation criteria and of the weights assigned to these criteria, allowing to estimate the value of a resource not exclusively in a monetary sense. With this methodology, it is also possible to obtain a synthetic estimate of the importance of complex goods (historical centres and sites) different from the single elements. This procedure allows to hierarchically order the cultural heritage, according to their significance, to select the intervention priorities for decision makers.

The second phase defines the correlation between natural risks and specific categories of cultural heritage, whose responses to the same external risk factor are inevitably different due to their intrinsic peculiarities. Different types of analyses (territorial, cultural, morphological, etc.) are needed to identify the factors that exert the greatest influence and to obtain an estimate of the specific risk on the area considered. For example, the environmental context and physical characteristics of a cultural asset, as well as the origin of building materials, are crucial aspects for assessing specific vulnerability and risk levels. By analytically assessing the impacts of any natural risks, specific criteria can be developed for the determination of a multi-factor risk index associated to specific risk maps for cultural heritage. These criteria will consider multi-risk aspects; defined both as different dangerous events that threaten the same elements with or without time coincidence, and as dangerous events that occur at the same time or that follow one another, the so-called cascading effect; multi-vulnerability aspects (referring to the variety of sensitive objectives exposed, such as population, infrastructure, cultural heritage, with possible degrees of vulnerability different to the various risks), and, finally, aspects that consider the possible dangers and vulnerable interactions, involving both a multi-risk and multi-vulnerability perspective.

The third phase of SENECA-HIA concerns the resilience of communities in historical areas, which exerts a direct influence on the ability to manage natural disasters proactively and positively and, therefore, to recover functions related to cultural heritage in the shortest possible time. Community resilience is based on three characteristics: tendency to resistance, which refers to the ability of the community to absorb the impact; recovery tendency, which refers to the speed and ability to recover from stress; and tendency to creativity, which refers to the potential to improve one's functioning because of adversity (Kimhi & Shamai, 2004). The existing Community Resilience Assessment methodologies do not focus on cultural heritage, which instead represents a fundamental resource for historical areas and one of the assets on which to act to

improve their resilience. This phase must be carried out through an intense involvement of the community, working specifically on prevention with respect to recovery, through risk reduction and event preparation activities. This methodology will find application within the Heritage Living Labs, through the involvement of local communities and the construction of a series of indicators of resilience capable of considering the physical, social, and economic aspects.

SENECA-HIA allows to emphasize all the aspects that play a role in the protection and management of cultural heritage in historical areas, including those related to their surrounding environmental context. This ensures that any impacts of any natural disaster on a given historical area are correctly assessed to safeguard both heritage and cultural assets by integrating a decision support system that promotes sustainable recovery interventions through correctly applied management and monitoring procedures, involving the contribution of local communities in all phases of the evaluation process.

The SENECA-HIA methodology is intrinsically dynamic and adaptive. It considers the possible variations of risk factors related to climate change and other natural events, and, moreover, it can be used as a verification protocol for retrofit and reconstruction strategies obtaining specific guidelines to support the decision-making processes of the various levels of the local government.

5. SENECA Decision Support System

The outputs of the phases previously described will be implemented and managed automatically through the SENECA Decision Support System (SENECA-DSS). The SENECA-DSS helps to elaborate a complete and detailed reference framework through a holistic approach to characterize a faster and safer decision-making system and to implement effective heritage protection actions in the historical areas under consideration.

Due to the extreme complexity of the analysed elements, the DSS plans to organise the data examined in specific clusters:

- Socio-cultural: factors related to the involvement of local communities and to opportunities of cultural interest.
- Ecological: aspects related to the landscape, natural resources, and the overall environmental system.
- Physical characteristics: physical and territorial ones of the area.
- Organisational: intangible elements of the system, with specific reference to the organisation and management of the network of relationships between stakeholders.

The outcome of this categorisation is expressed by a synthetic numerical index (CHSI - Cultural Heritage Significance Index), defined by metadata implemented within a significance matrix related to the single element being analysed, based on which it is possible to construct maps of significance of cultural heritage.

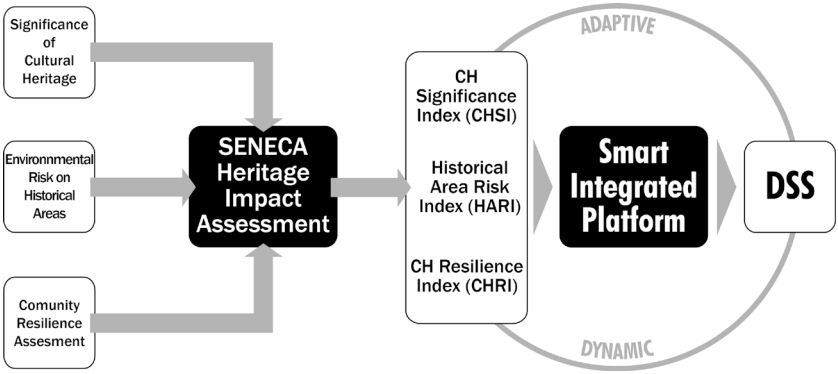
By superimposing the hazard, specific vulnerability, and significance maps, new risk maps can be created, based on the definition of a historic area risk index (HARI - Historic Area Risk Index).

The Cultural Heritage Resilience Index (CHRI) will be defined through the application, within the Heritage Living Labs, of a modified Community Resilience Assessment methodology (according to which local communities will quantitatively evaluate their ability to recover over time based on a series of indicators of resilience). This index is intended as an objective measure of the ability to resist, adapt, and transform against events of climate change and other natural hazards. The conceived indicator will help to identify intervention priorities (by determining weakness factors), innovative actions, and retrofit measures to mitigate the impacts of extreme natural events. The general and adaptive nature of CHRI allows for a broader understanding than that of existing approaches, generally based on national or regional standards and non-unified methodologies.

The task of the DSS, therefore, will be to collect and organise all the interactions, which occur at different spatial scales, between the indexes previously described. To this end, methodologies will be implemented, based on qualitative, semi-quantitative or quantitative approaches for the aggregation of data collected in the intermediate stages (multi-hazard, exposure, and vulnerability).

Multi-hazard and multi-risk methodologies require the aggregation of hazard, exposure and vulnerability information to provide results (maps, key performance indicators, statistics, and indexes, for example) that can be easily consulted and used by different end users; the goal will be to provide useful tools to stakeholders and decision-makers in risk management, focusing the data on the development of a composite view of the various hazards affecting the same area under consideration.

Figure 3. Concept of SENECA Decision Support System



6. Conclusions

The existence of many cultural assets subject to natural risks requires the need to develop simplified tools to quickly determine a priority list of interventions to guide the entire decision-making process, including

the choice of strategies and approaches for increasing the resilience of historical areas and the management of available economic resources.

It is essential to proceed with a clear understanding of the potentials and weaknesses of a holistic, non-fragmented approach to disasters. In proposing solutions, it is crucial to proceed both from the engineering and technical areas (like construction), and from the socio-economic ones (like studies on the implications for the population) (Pagliacci, Russo & Sartori, 2017).

The process previously described allows to:

- Obtain complete and detailed data for correct planning and management of Cultural Heritage.
- Determine the critical risk factors for different categories of goods (structures, artifacts, sites).
- Create innovative systems for data management (integrated platform, DSS).
- Develop and consolidate forms of community-based approaches for disaster risk reduction.

The proposed conceptual methodology is flexible and applicable to different case studies and spatial scales (for example, from a single building to large areas) and for different risks.

The ambition of SENECA is to operate at a European level, and this cannot be achieved without addressing cultural diversity and traditions, as well as natural environments and dangers across Europe. Furthermore, an important component for the effectiveness of actions aimed at improving the resilience level of historical areas is the involvement of local communities, which should be encouraged to develop a sense of belonging, since it can provide valuable input on the situation in their life environment. These aspects were addressed by considering a wide selection of pilot sites to be used as a testing laboratory for interventions to improve resilience and creating Heritage Living Labs to increase social awareness

in local communities. The application on different pilot sites will prepare the ground for a model that can be exported to other historical areas.

One of the aims of the project is to align the cultural heritage sector with the technological evolution that is gaining ground in other productive sectors; for which the introduction of advanced information technology, including Building Information Model (BIM) and Internet of Things (IoT), will lead to greater transparency and timeliness of processes, while facilitating dialogue and stakeholder participation. The potential for similar gains in the cultural heritage sector is enormous, as better informed and prepared communities, equipped with reliable tools and sustainable approaches, will be able to reduce the impact of natural risks on cultural heritage resources and activate sound recovery plans.

The development of platforms for the knowledge, management, restoration, requalification, safety, and enhancement of cultural heritage and the development of IoT technology for monitoring and controlling resilient interventions proposed in SENECA, will establish the framework for a new and more competitive environment. Companies will have to demonstrate high competence and quality in the supply of traditional processes and, at the same time, new advanced skills to make these processes sustainable and resilient. The principle is that the involvement of the private sector in the methodological development phases of new technologies, for the protection of historical and artistic heritage, should promote a faster transfer of knowledge and tools acquired (and duly validated) in practice, which in turn should contribute significantly to providing the sector with better, sound, and effective capacities to face even more urgent risks (Proença & Revez, 2017).

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Housing design with sustainable criteria for the town of La Danta, Colombia

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Abstract

This text is an academic research project that develops integral economic housing proposals with social impact, where interdisciplinarity is articulated to propose a building model with sustainable principles. It is based on the use of local materials, the correspondence between spatial needs, and the life conditions of people residing in La Danta, as well as autonomy in energy production.

The Sustainable Habitat Integrative Workshop is an exercise with a bet to empower social transformation through research by using its methodology as the axis for this work. The workshop is executed in one year, and thus structured in two phases. The first provides a solution to a design problem identified by students, based on fieldwork. Then, the second includes an analysis and the project synthesis process, considering not only sociocultural, political, and economic criteria, but also as a response to the population inhabiting the area. This, with the purpose of developing community workshops and self-construction processes with the inhabitants that contribute to the students, who have the capacity to develop critical thinking and to produce realities in a context that has been the target of paramilitary and guerrilla violence.

Keywords: Housing design, basic needs, integrated planning, education for sustainable development, interdisciplinary design

Introduction

This research project proposes, under sustainable criteria, some alternatives to develop a prototype for housing and furniture, that grant progress and productivity, with the intention of generating a socioeconomic impact on the population of the town of La Danta. The developed project proposals, as well as the social integration workshops, are based on the recognition of the inhabiting conditions of the diverse actors involved in such location, related in one way or another to the history of a population that has been strongly affected by the Colombian guerrilla conflicts in past decades (Gallego, 2013).

The research was developed by an interdisciplinary group of students and professors, engineers, architects, and industrial designers, who wanted to work on the construction of a complex programme that evaluated not only sociocultural, political, and economic criteria, but also those that responded to constructive and formal issues of the urban space and the housing unit. All this with the purpose of developing critical

thinking and create new realities, especially in a context of people being hurt by violence throughout history.

After recognising the context, the project articulates different components that intend to solve problems through interdisciplinary actions. Starting from the development of an experimental housing unit, this research is about the search for complements of social, cultural, economic, technological, and political innovation under a view of sustainability throughout time. This view contributes to the debate about the production of priority interest housing in the country, since it is well known that the current norms for the construction of this type of housing units standardize housing results, materializing solutions that do not respond to particular living situations (Carvajal, G. 2015).

This research, in favour of the Colombian juridical regulation that promotes and enables the access to housing (based on Law 1537 of 2012), intends to discuss about the formulations approved in the Peace Agreement between the National Government and FARC-EP, which presented proposals for mechanisms for an integral access to housing, with adequate spatial and technological solutions, adapted to each community in particular (Republic of Colombia & FARC-EP, 2016). This is an opportunity to contribute to this issue, mainly about the measures with normative character, since these restrain, affect, and alter the ways of life and expressions of people in La Danta.

Particularly, we pretend to board those issues that allow to recognise the complex system of physical, biotic, social, and cultural relations that act on the habitat, mainly the domestic environment and the public space of the community of La Danta; which, due to the particular context conditions, require a detailed sustainability criterion in order to produce an adequate housing model.

To achieve this purpose, this text is articulated in four sections. The first addresses the research methodological process, while the second describes the context framework in which the general work was developed. The third section highlights the conceptual elements of greater interest

that market the guidelines of the empirical work, and finally, the fourth discusses the results.

Methodological process of the project

This is a research project with mixed focus on the fields of design, architecture, and engineering that questions the residential space of the inhabitants of La Danta, Colombia.

The project execution was defined in two phases, each one of them determined in a temporary frame of one semester. The first phase was structured in two parts: there was a document review through diverse sources, mainly examining scientific articles and books regarding the issues of the habitat; with this information, the main categories to board the empirical work were determined. In the work on-site, besides reviewing the historical component of the town (Gallego, 2013), the housing needs regarding climate, constructive aspects, access, and considerations regarding the budget managed for each housing unit were identified (Díaz et al., 2011). Then, the second part is a contextual analysis about the social, cultural, economic, and environmental conditions of the general community of La Danta, focused on the special issues of the housing unit. The collection of information was done mainly through observation, validation, and verification techniques of the issues being researched. From this, five factors were verified: technical-productive, functional-operative, aesthetical-communicative, economic-administrative, and historical-political; all of which were considered both in the design project of the housing unit, and in its integrated furniture (Barrera, 2004; Rivera-Crespo, 2016).

In the first on-field contact, we detected the main needs of the community in everyday life, in terms of space and basic furniture. The initial result proposes, for each interdisciplinary work team, three architectonical project drafts for the housing units with a series of integrated furniture, as well as the design to address diverse technical

issues. In this stage, the design process is presented as the axis, as a procedure, and as a project; which, in its different stages, articulates formative research, theory, and the practice of projections for the formation of its students.

The second stage (in the second semester) was also structured in two parts: the first one synthetises the previous architectonical project drafts in one architectonical idea to consolidate a single proposal; the second one contemplated the detailed tracing of a housing unit and its integration with the context, the constructive systems, the engineering applied to the housing systems and urbanisation, the equipment or the domestic habitat, furniture, and supplies that are including, sustainable, and feasible, as well as the management of information between the work teams, the proposal, and the execution of community workshops and use of furniture.

Context framework: The town of La Danta

The town of La Danta belongs to the municipality of Sonsón (Antioquia-Colombia), located in the south-east of the department, at the Central Mountain Range, in a zone named as Magdalena Medio; this one is considered as a "...historical zone of colonization in Colombia, where six departments are gathered around the Magdalena River ...Bolívar, Boyacá, Cundinamarca, Santander, Caldas, and Antioquia"[1] (Gallego, 2013). Our intervention was specifically done in the neighbourhood of La Esperanza.

The first colonizers of this area arrived in 1938 from Aquitania and the municipality of San Luis, baptising this land as La Danta due to the abundant presence of tapir[2]. In 1961, a large part of the prominent land of La Danta was acquired by two men: Eloy Arbeláez and Siveriano González, from the city of Bogotá, who started to open the mountain and uncovered the great marble rocks (Restrepo, 2001); a resource that later became the

1 Our translation

2 ..."due to the abundant presence of these animals"... annotation: did not mean tapir.

main economic activity for the inhabitants of this place (Gallego, 2013). In 1977, there was presence of political and armed groups throughout the zone, which entered the territory with the purpose of supplying the basic needs of the population such as education, health, employment, and housing. The Colombian Revolutionary Armed Forces (FARC) took over La Danta in 1982, which generated fear in the population, to the point that almost 40 years later, this fear is still present. Because of the guerrilla take over, Autodefensas Unidas de Colombia (AUC), commanded by McGyver, settled as the armed group in the zone to defend the territory, which was well received by the population due to their permanent fear (Gallego, 2013). 2002 was the start for the demobilisation process of AUC throughout the national territory; MacGyver turned himself in by 2006 and as of this moment, there is a new beginning for the town.

Together with the peace agreements signed with FARC, different companies and organisations have been interested in being part of the integral improvement processes through management and social development, to contribute to the current peace and reconciliation process implemented in the country (Mi Oriente, 2016).

Considering the *Antioquia Piensa en Grande 2016-2019* Development Plan, which aims at improving the territory in regards to education, economy, infrastructure, and connectivity among municipalities, the execution of this project required us to consider diverse social, technical (rehabilitation), and cultural processes; all supported from the concept of sustainability. Also, there is the valuable assistance of the Berta Martínez de Jaramillo Foundation, which has the objective of generating inclusion and development opportunities in socially vulnerable communities, through the implementation of management and development models that contemplate investment in housing and social infrastructure, education, and economic and labour promotion.

According to the guidelines of the conceptual framework, one of the key fundamentals for the execution of the architectonical proposal was the environment build in the territory. These differences offer

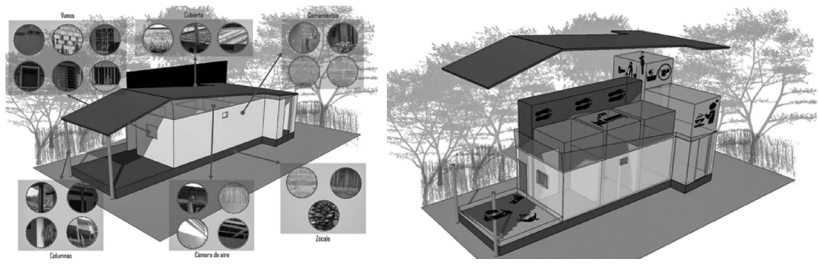
the possibility to talk about systemic sustainability, involving not only environmental but also socioeconomic aspects, by doing an integral intervention in the communities, supported by Decree 1285 and Resolution 0549 (Ministry of Housing, City, and Territory, 2015) that teach about sustainable construction.

Having the construction of a sustainable housing unit as a base required the identification of both urban and residential aspects. Regarding the infrastructure in La Esperanza neighbourhood, there is a lack of public space for recreation and access, a lack of public lighting, and a high percentage of houses without sewerage or basic utilities because they are in an environmental risk zone.

After analysing the dynamics of the houses and their constructive types (Figure 1), we identified the following aspects: the need to implement strategies for crossed ventilation and controlled natural light, as many houses lack an adequate ventilation system; the use of concrete, metal, and wood is identified in the constructive processes, mainly for the structure of the houses; and the use of roofs with leaves, clay tiles, and zinc sheets.

We also identified that the space distribution in the existing houses have common aspects: the front of the house is associated to socialisation and food consumption practices; the kitchen is located at the back, sometimes in open air and equipped with wood combustion stoves; the bathrooms are also in the backyard, and the rooms inside are used for resting and storage (see Figure 1).

Figure 1. (Left) spatial and material synthesis of houses in La Danta. (Right) Spatial distribution in houses



Source: Camila Hernández; Mariana Guzmán

Conceptual framework. The sustainable habitat as field of study for Architecture and Design

Considering conceptual development of sustainable habitat as field of knowledge that moves in a shared space (Follari, 1982) implied to put each one of the disciplines participating in this project in contact with one another, enabling a better positioning of their knowledge based on such interdisciplinary dialogue. For Architecture and Design, conceiving a sustainable habitat in conjunction with other fields could have been considered as an extremely complex issue both in its conceptualisation and in practice, since its research and topic dimension covered a great platform of possibilities and associations (Ardila et al., 2016).

The inclusion of architecture and design with sustainable habitat has transcended the usual relation with the natural system (biological) (Echeverría, 2009), in words of Leroi Gourhan (1971, 42), it is a habitat that "...is not exclusively or essentially referenced to the natural system, but to the culture-nature relation, and is located in the field that studies

human life from the particularities of the human being"[3]; nevertheless, there are few conceptual and theoretical elaborations from the discipline without a deep problematisation, even though multiple studies introduce the term sustainable habitat in the construction of their discourses (Echeverría, 2009).

For this project, we understood *sustainable habitat* as the construction of networks and weaves that subjects establish in a determined environment under certain conditions in cultural, political, social, economic, and spatial (not just physical) terms, and through which it was possible to establish diverse forms of inhabiting, where the human being configures and transforms the types of organisation, of the production of habitats and habits. In such construction, the relations of the subject with the habitat are modified and are in constant evolution, offering the possibility for multiple readings and interpretations that are based on a specific knowledge. Here is where we talk about sustainable habitat as an interdisciplinary event, where each researcher, in a particular manner, structures theories, knowledge, methods, methodologies, and instruments that configure this specific field of knowledge (Echeverría, 2007).

According to Echeverría (2009), the study of the urban and territory in relation to the habitat is mainly connected to three factors: "the processes inherent to politics and the territorial ordering, the inter and intra national territorial conflicts, and the transformation in the senses of the space in the age of globalization and urbanization" (pp. 32-33). The territory, viewed from the habitat, also focuses on the interpretation of this one as the material support for human beings and as base for social, political, economic, and cultural development, derived from its own activity and transformation. In this sense, it is important to clarify that studying a territory is not the same as studying the habitat:

[3] Our translation

> based on considering that territorializing is different than inhabiting [...] Even though every habitat is configured as territory, not every territory gets the sense of habitat; and even though by inhabiting you territorialize, not necessarily when territorializing do you inhabit (...) "The habitat, support of life, place where the verb inhabiting sits, is the space where the productive, cultural, aesthetical and affective activities of mankind are developed". (Leff, 2002, p. 243) [4]

This enables us to do a fundamental relation between the concepts of habitat and inhabiting, thus the importance it had on fieldwork; the recognition of the domestic and urban practices, as well as the ways to inhabit La Danta in general. Leff (2002), in that sense, contributes that such relation:

> will imply to grow from the habitat as a support territory, to the habitat as a productive potential, support for cultural significations and aesthetical values. This would mean to think about the habitat as a project that transforms the environment, as a social appropriation process of the habitability conditions. (Leff, 2002, p. 250)

Thus, the effort to recognise the social and cultural practices of the area. The habitat, as support and condition of inhabitation:

> generates habits and defines existential senses that have led to the coevolution of cultures with their environment through the means of appropriation of their environment. To inhabit the habitat is to locate a nature reconstruction process of nature from differenced cultural identities. (Leff, 2002, p. 250)

[4] Esta es la cita original en español. ""si bien todo hábitat se configura como territorio, no todo territorio cobra el sentido de un hábitat; y si bien al habitar se territorializa, no necesariamente al territorializar se habita...". (...) "El hábitat, soporte de la vida, lugar donde se asienta el verbo habitar, es el espacio donde se desarrollan las actividades productivas, culturales, estéticas y afectivas del hombre.

The habitat of our interest, therefore, is the one where human beings unravel their sense of inhabitation, this is, where they complex their existence and define their territoriality. (Leff, 2002). This is to detect the distinctive characteristics of inhabiting in the different groups or individuals involved, which implies a critical thought about a globalising conception of the housing unit referring to the ways to build, in relation to the social, economic, spatial, and cultural impact.

The social and economic reality of many people, especially of the least favoured ones, is distant from the discourses that promote the quality of the human habitat and better life conditions. Our current society forgets the purposes of human beings and their realisation in space. Many governors have also lost their social and political commitment, denying the construction of life interactions (Echeverría, 2000) and the weave of spatial-temporary relations that are built every day (Noguera, 2006); an issue that develops socioeconomic networks and territory cohesion from inhabiting in each individual and/or collective subject "situations that are inherent to human dignity" (Echeverría, 2009, p. 24).

Results and results discussion

This section evidences the results of the empirical and projection process developed during one year of academic work. The information is presented in three stages: the first one describes the housing proposals developed in the first semester of work; the second one exposes the identification of the architectonical elements of greater impact in the community of La Danta, through the integration of the design proposals that the general population considered most suitable for their needs; the third stage presents the sensitization process of the project through a basic furniture workshop for the housing unit that brought the community close to the design project in general.

First stage

The initial stage of the project was carried out with the formation of interdisciplinary groups, with the intention of developing three proposals in response to the result of a previous analysis done in the location of the intervention.

The first project, EspaciaDos (see Figure 3), is developed through the design of two mirroring houses, with the intention of generating an urban connection between them through productive activities recognised in the previous analysis of the location that, in response to the climate and cultural conditions, adopt the exterior zone of the house as a space for resting and socialisation in people's daily life.

There is also a proposal for a green wall as an element for architectonical closure that works as a filter for dust particles and as an instrument of identity through vegetation. Based on a real scale model of the closure with concrete block, there is an experiment to confront its efficiency in the field, considering thermal, technical, and aesthetical needs required because of the environment, besides the use of a constructive system and vegetable species that are appropriate for residential use. In addition to this, it is presented as a feasible strategy to improve the inhabitation conditions within the spaces, regarding temperature, lighting, ventilation, and aesthetics (Arboleda, 2018).

Regarding the spatiality of the house, the proposal for the bedroom area and socialisation-productive area is to compose the spaces through storage surfaces, done by self-constructions that offer the possibility to modulate such spaces according to the needs of each family; this as a personalisation tool in a serially constructed project.

The second prototype, GÚA (see Figure 3), poses a particularity, since this prototype is rooted in the solution of an uneven level between two modules; one is flexible and the other is not, considering the access conditions necessary for the house. It uses self-construction elements with local materials, mainly *guadua* (a variety of bamboo); a material used for

inside walls and urban gardens as part of the closure component. These strategies were developed based on the initial premises, mainly contributing to the bioclimatic component. They offer a high degree of thermal comfort and, at the same time, supply large entrances of light and provide durability in terms of space appropriation due to the flexibility available.

The third prototype, Link (see Figure 3), is named as such to express the intention to board the housing unit as a possibility for connection between space and users, and at the same time, among users, their neighbourhood, and the ways to inhabit it. The housing unit is initially made up of two bedrooms, a kitchen, a double purpose area, a bathroom, and a patio (for a garden or as an extension).

The replicability in this project (one of the objectives of the academic exercise) obeys to a previous analysis that identifies the materials, strategies, and constructive techniques existing in the community; aspects which are adopted by the work team and reoriented towards project specifications. The flexibility of this project enables the possibility of expansion towards the backyard area in three different ways: enlarging the built area, small-scale gardens controlled by the user, and area for outdoor relaxation.

Figure 2. EspaciaDos (top), GÚA (middle), and Eslabón (bottom) prototypes

Source: Camila Hernández and Mariana Guzmán (GÚA); Andrés Pacheco and Anna Parra (Eslabón); Claudia Vallejo and Maryelín Botero (EspaciaDos).

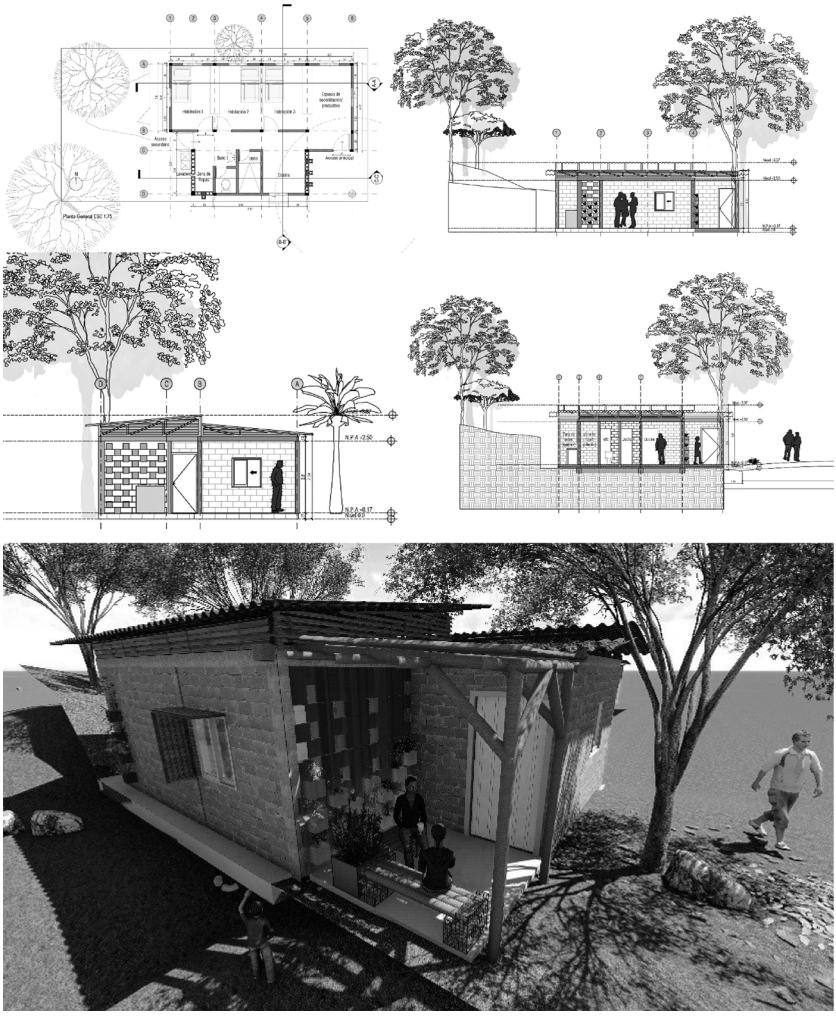
Second stage

After a rigorous analysis of each one of the three projects presented in the previous stage, one of them is selected along with the community to focus all the remaining project process on such idea. According to the selection process, the EspaciaDOS project presents an advantage regarding closure strategies, flexibility in the distribution of indoor spaces, and positioning regarding the collective creation and socialisation area by proposing an interaction mechanism among groups of housing units; a fundamental aspect for the community in general.

After this, the interdisciplinary work teams created in the first stage are restructured as committees: (a) a management committee, to achieve a normative and budget consolidation of the project, under the expected standards with the certification of the Casa Colombia Reference for social interest housing (CCCS, 2016); (b) a committee for entrepreneurship and self-construction of the basic furniture for the housing unit, with various workshops that empowered skills in the production of furniture with local materials; these highlighted the cultural and aesthetical values, considering their local resources as a fundamental factor. Throughout the process, the transforming character and the tools developed were evidenced as part of the social appropriation process; and (c) a Building Information Modeling (BIM) committee, in charge of creating digital design, architectonical, industrial, and engineering simulations, enabling the coordination of all the information developed during the project stage.

There was also an adjustment, verification, and integration process for the chosen design, with the purpose of contributing pertinent strategies adopted from the other prototypes, recognised as valuable in the focus groups with La Esperanza community (Figure 4).

Figure 3. General drawings and imaginaries of the EspaciaDos project



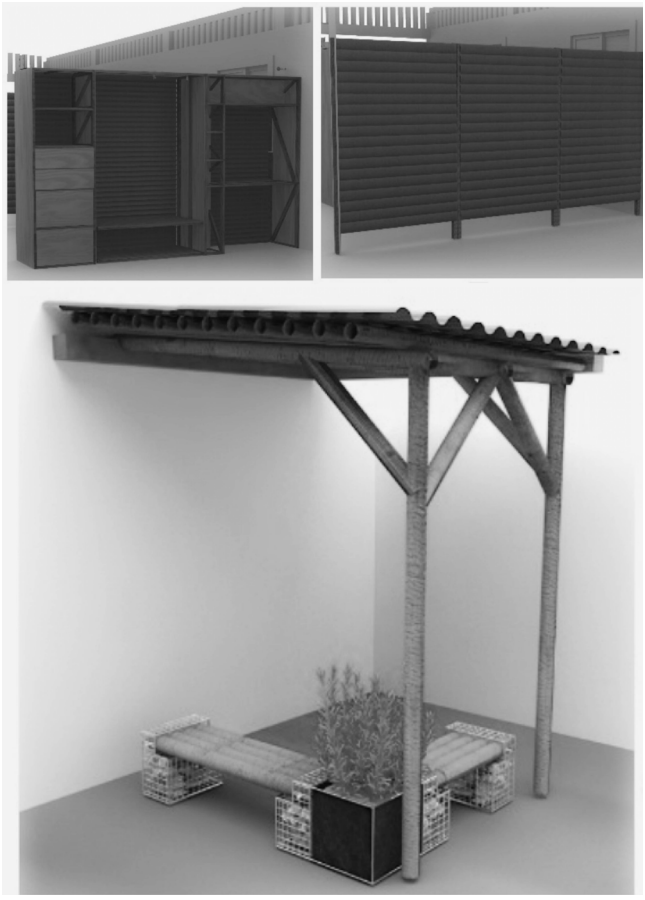
Source: BIM Committee students

Third stage: The self-construction process

Among the design ranges for an economic housing unit with sustainable criteria, there is a proposal for the development of equipment for the domestic habitat, inclusive, sustainable, and cultural, environmental, and economic furniture; based on the information detected in the observation, validation, and verification processes that recognised aspects such as object storage, the need for an outdoor space for the development of socialisation activities, and deficient inhabitation conditions. According to these findings, a series of housing-integrated furniture is proposed:

- Multi-purpose division. It is the first one of the two division proposals for the flexible area of the housing unit; it can be arranged according to the user's requirements (see Figure 5). The idea of this division element results from the need to generate storage spaces, without sacrificing the areas intended for bedrooms, living room, and the productive zone; this is, a proposal to change the conventional concrete block dividing walls for this type of division.
- Simple division. It consists of a 1.20m long x 1.80m high module, made of *guadua* (see Figure 5). The reason for these measurements is the existence of a 1.20m x 1.20m grid of the housing unit design; respecting these measures enables the users to put the modules together to close a space completely.
- A pergola with outdoor bench. It is a cover element made of *guadua*, developed with the purpose of improving the conditions of the socialisation space in the outdoor area of the houses to strengthen collective social bonds. The chair was made of electrically welded screen, *guadua*, and marble (see Figure 5)

Figure 4. Models of the multi-purpose division in context (top), the simple division (middle), and of the Pergola and outdoor bench (bottom)



Source: María Fernanda Castaño, Vanesa Lopera, Manuela Zuluaga, and the self-construction committee.

Once the entrepreneurship and self-construction committee determined the constructive strategies for the elaboration of each prototype, there was a presentation before an interdisciplinary collective to build some real scale prototypes (1:1) through community workshops (see Figure 6), to carry out the necessary modifications for the optimum functioning of the models, and to design the corresponding construction manuals.

Figure 5. Community workshop for the construction of domestic furniture based on the exercise of the students of Industrial Design

Source: material provided by the authors.

Conclusions

This applied research exercise resulted in the development of experimental projects of technological and social innovation with a strong focus on sustainability. We can state that, with this experience, we explored new fields of action for the design, architecture, and engineering practice, by recognising the direct contributions of each discipline, as well as the integration of knowledge solved in the same housing project that responded to the posed questions.

To strengthen and think about housing in key with a sustainable habitat was one of the main objectives of this work; to study the way in which a determined social group weaves its network for the connection of its living space as a proper fact of everyday human life, supported on the social, political, economic, cultural, and spatial dimensions, trying to surpass the material sense that is regularly attributed to the housing unit.

Working for a community in a multidisciplinary manner, in this case for the location of La Danta, enabled a broad understanding of the housing concept and changed the restricted notion that is generally assigned to it. This also enabled us to recognise that the urban, political, and economic standards of the country are unsustainable for the most vulnerable communities, with a low inhabitability as a consequence.

The project achieved to pose an inhabiting solution for the issue on the use of the housing units delivered by the government in an integral and sustainable manner, and in this case, for a zone that was strongly hurt by the Colombian armed conflict (Valdes, 2016). This would suppose a methodological model to discuss the housing residential planning in the post-conflict.

This collective work showed that it is possible to change conceived ideas about the quality of the housing unit that are currently being offered to people, and to be able to offer opportunities for growth of social and urban development of the least favoured communities of the country. Enabling a family to grow along with their house is to contribute to the

sense of belonging implicit in their identity. Therefore, this is a bet for the development of the housing units to form an integrative axis.

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Abbreviations

A.U.C.: Autodefensas Unidas de Colombia, Colombian United Autodefense Group (AUC)

FARC-EP: Fuerzas Armadas Revolucionarias de Colombia, Colombian Armed Revolutionary Forces

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