Studi urbani e regionali

# RECONNECTING THE CITY WITH NATURE AND HISTORY

## TOWARDS CIRCULAR REGENERATION STRATEGIES

edited by
Luigi Fusco Girard, Peter Nijkamp, Francesca Nocca

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Edizioni La passione per le conoscenze

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*Collana diretta da* Francesco Indovina

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# *Planning for regenerative, circular and smart cities. Editorial introduction*

by *Luigi Fusco Girard*, Peter Nijkamp*** and *Francesca Nocca****

## 1. Cities today

Urbanisation is, in the history of our world, a long process covering already several centuries. Admittedly, cities have always been there in the geography of our planet, but in the past few decades we observe a structural rise of people living in cities or urban agglomerations. The drivers of this megatrend are diverse, while the socio-economic, environmental and demographic consequences are far-reaching. It is noteworthy that in the age of the "*urban century*", cities and metropolitan areas manifest themselves as multifaceted arenas, with conflicting forces, in particular a high wealth production accompanied with low liveability and environmental quality conditions from a long-run climatological perspective. This book is about the sustainable development of cities and their role in meeting the challenges facing humanity today. It addresses a wide array of important contemporary urban issues, from a regenerative, circular and smart perspective.

What future is there for cities in a world that is becoming increasingly urbanised and in which many shocks are coming together in a context of growing uncertainty? And many other questions arise. What is our vision of the city in the light of the challenges of climate change, or of the increasing disconnection between the city and nature networks? And how can the growing poverty in cities or the rising ageing of both city structures and the urban population be addressed? How can health and quality of life be integrated into strategic urban development choices? And what is the role of digital technology? And, more specifically, which urban strategy should be adopted to improve the transformative capacity of cities (European Parliament, 2007; 2020).

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The New Urban Agenda of UN-Habitat offers a set of guidelines to realise the strategic objective of the SDG No. 11 of Agenda 2030 (United Nations, 2015) along with a set of bold new Global Goals, which Secretary-General Ban Ki-moon hailed as a universal, integrated and transformative vision for a better world. "The new agenda is a promise by leaders to all people everywhere. It is an agenda for people, to end poverty in all its forms – an agenda for the planet, our common home", declared Mr. Ban as he opened the UN Sustainable Development Summit which kicked off today and wraps up Sunday. The UN chief's address came ahead of the Assembly's formal adoption of the new framework, Transforming Our World: the 2030 Agenda for Sustainable Development, which is composed of 17 goals and 169 targets to wipe out poverty, fight inequality and tackle climate change over the next 15 years. The Goals aim to build on the work of the historic Millennium Development Goals (MDGs), viz. "*safe resident, inclusive, and sustainable cities*". The question is then: How can the New Urban Agenda actually be made operational? And, how is it possible to reduce agglomeration diseconomies, excessive consumption of natural resources (land consumption, water etc.), and at the same time improve living conditions?

The last World City Report of UN-Habitat (UN-Habitat, 2022b) suggests that first it is necessary to improve urban resilience in all dimensions, from the economic to the social to the environmental dimension, because "*building resilience* must be at the heart of the future of cities". This means to "foster productive and inclusive urban economies and actions, to mitigate and to adapt to climate change, promote clean energy, protect ecosystems and integrate public health into urban development" (UN-Habitat, 2022b).

The New Urban Agenda has introduced (in paragraphs 71 to 74) the circular economy model, evoking SDG No. 12 of Agenda 2030. The WCR (UN-Habitat, 2022b) recognises the need to embrace the circular economy "as a frontier for a resilient urban future". The thesis proposed in the Agenda is that a circular economy model can better improve resilience, guaranteeing both natural and human health and thus sustainability. We also note that the role of urban planning and of local governance is critical to ensure the city's resilience and thus its sustainable development in order to concretely realise this circular model based on saving, reuse, and recycling.

The circular economy model addresses a multiplicity of urban dilemma's by promoting a dynamic co-evolution (or symbiosis) between manmade activities and ecological processes (see e.g. Fusco Girard and Nocca, 2019)identifying and implementing new urban development models and strategies is necessary to face sustainable development challenges. To this end, the circular economy model can be implemented in cities in order to operationalize and achieve human sustainable development managing simultaneously, in a systemic perspective, the social inequalities issue and the ecological and economic crisis. Today there are many cities that are defining themselves as a "circular city" but, to date, a clear definition of this does not exist. In the transition towards the circular city, analytical tools (such as evaluation, governance, financial, business

tools are needed). It favours a sustainable metabolism based on paradigmatic notions like self-organisation, evolution, autopoiesis, entropy, complexity, and so forth. It is based on the principle of self-sustainability by climate-neutrality, zero-emission systems, materials recycling and zero-waste mechanisms. In this conceptualization a circular city is basically a continuous value-creating human spatial system. Clearly, creative, cultural, knowledge and service assets may offer promising endeavours for such circular places, but also materials sectors (e.g. construction, food, textiles) may be able to adopt such novel urban production constellations. We note here that circular cities are characterized by re-usable, recyclable, recovering, regenerative and sharing modes of living and producing, and hence will need an adjusted organization of the complex urban space: This calls also for effective digital tools in the context of smart cities.

Several contributions to solving to current problems are offered in the present book, starting from the recognition of the central role of ecology and of natural ecosystems to support the life and the development of cities. This support starts from the regenerative capacity of natural resources and is thus based on their generative and symbiotic capacity (see also HORIZON 2020 CLIC project – Circular models Leveraging Investments in Cultural heritage adaptive reuse, 2020). They are to be valorised by planning and urban design. Planning has to conserve biodiversity which is recognized as the main source of people's well-being and well-living. Nature-led solutions have become one of the fundamental components of the new urban planning aimed at realizing what we can call the "human dimension" of development in this context, where neo-humanism is sometimes interpreted as a return to the solidarity or compatibility of activities with nature. The many symbioses that we can recognized in nature may inspire the principles necessary for the organisation, planning, and management of cities.

## 2. Scope

Cities are increasingly at the centre of public policies which aim to realise the strategic objectives of the 2030 Agenda that comprises 17 goals and 169 targets. These goals are to be realised in urban areas (from small towns to metropolitan cities) and in different sectorial policies, e.g. in public policies for mobility/transport, housing, and social policy, while for the regeneration of historic centres and suburbs specific approaches and principles are required.

The European Union has transposed the New Habitat Agenda starting with the Amsterdam Pact. Subsequently, specific Urban Agendas were developed at the national level in different countries, the implementation of which was recently accelerated thanks to the Next Generation EU. A unifying relationship characterises the different proposals; in particular, we need a new economy. We may need to see the economy as the means and not as the end of development strategies; and as the means for the improvement of people's well-being and good living. This depends first and foremost on the health of both ecosystems and the people themselves.

An integrated and systemic approach to urban planning considers the interdependent relationship between city and land, and is therefore focused on re-establishing a connection between city and country, knowing that the past interrelationship will no longer be the same and that the future can no longer be predicted. We therefore need a new design for our cities, based not primarily on the commercial real estate economy and on uncontrolled market principles, but foremost on respecting **ecology**, inter alia, based on natural open, public, green areas and spaces. In short, the development of cities may increasingly find its centre of gravity in the ecological economy of sustainable spaces (besides the social economy).

As mentioned above, the **circular economy** offers a model assumed by nature, that is grounded on a better metabolism which avoids waste and underuse of all forms of capital (from natural to man-made, to human, and to social). Towns, cities and metropolitan agglomerations will be able to reduce their economic, environmental and social diseconomies, if they adopt a "circular" model of organisation and management, grounded on synergy economies: on systemic organisation and on valorisation of socioeconomic and environmental complementarities.

The **circular city** may be seen as the realisation of the new model of the circular economy capable of not only improving the economic productivity of investments, but also promoting employment and reducing climate change and pollutant impacts. The circular city model – on the basis of industrial ecology experiences – is now widely spread supported in different parts of the world; it also promotes collaboration and cooperation capacities between different actors, i.e. it produces social capital. It also proposes a different mindset, a way of making choices different from those proposed by the past. It suggests a paradigm shift that is attentive to quality of life, and to development characterised by the human dimension.

With this circular model, cities can better face the climate change impacts and promote a better urban future, more inclusive and more ecologically sustainable, grounded on the implementation of human rights, and on modern ecology principles. The access to natural resources (green areas, parks, open spaces etc.) and to places such as "public spaces of relationships", is needed for meeting, participation, creating a community, and developing a high quality environment enhancing social inclusion. Clearly, the right to health/well-being is achieved first of all through the availability of appropriate housing; access to adequate housing and services for all (from health to employment, etc.) is a prerequisite for any liveable city.

The adoption of a circular model is necessary today to face the impact of climate change that superadds all other crises, from pollution to poverty etc. It improves the promotion of a better urban future, which is more inclusive (and human) and more ecologically sustainable. Cities, and in particular metropolitan cities, may become more resilient by adopting the circular model organisation by introducing first of all **nature-based solutions**. Nature-based solutions conserve and regenerate biodiversity, thus becoming one of the

fundamental components of the new urban planning because of their multi-dimensional benefits, including economic ones (Roe *et al.*, 2021). Nature-based solutions are able to integrate conservation with local development, contributing to mitigation and adaptation measures. In particular, nature-based solutions stimulate the use of natural capital in an effective way. This means satisfying human needs by being able to contribute to: people's health and well-being; energy security; water conservation/management; employment; waste management; and risk reduction of extreme events.

New planning approaches and processes have in recent years been suggested for sustainable development from the perspective of the circular economy and the circular city model. The starting point is: (i) to formulate objectives/criteria emerging from the strategies of the Agenda 2030, the New Urban Agenda and the European Green Deal, and (ii) to focus on the integration of the proposal of the World Health Organisation (WHO) about avoiding the environmental, economic and social impacts produced by climate change (WHO, 2020). New planning, designing and managing city choices have become necessary to make nature a most prominent city infrastructure, both for moving towards a more sustainable and desirable city (Costanza *et al.*, 1997), and also for improving the resilience of the socio-cultural basis of a city.

In the modern digital age, cities should also employ the fruits of digital technology in the execution of many sustainability tasks. This implies that **smart cities** may be seen as necessary vehicles for achieving the goals of regenerative, sustainable and circular cities. This has of course far reaching implications for city governance.

## 3. A new governance model

An important feature of the new city governance is to implement the required ecological transition by adopting the circular economy model, based on regenerative principles. Another feature is to make the circular economy more inclusive, fair and just, avoiding the underestimation of the social dimension. The circular model has a high transformative potential, considering the future benefits in terms of well-being, economic priority, employment, ecological health, conservation of biodiversity, improving resilience, and so forth. Another characteristic of the new governance is its openness to participative processes. In order to promote citizens' protagonism, i.e. to foster their capacity for self-organisation, it is appropriate to refer to the care and management of what are called common goods. Specific *cooperation pacts* for the shared management of the commons may allow to regenerate vitality for unused, abandoned and even disused areas/cultural assets (see also HORIZON 2020 CLIC project – Circular models Leveraging Investments in Cultural heritage adaptive reuse, 2020). Individual or associated citizens are increasingly encouraged to participate in this perspective.

It is mainly the new generations that are being incorporated into these processes of co-programming, co-design and co-management, starting with small public spaces, urban voids, green areas, and planted areas. All this is through processes of push experimentations that in Italy were triggered by Law 117 of 2017. These forms of co-planning and co-management are aimed, above all, at the younger generations, who thus become the protagonists of change, starting with the transformation of urban spaces as entry points for the realisation of circular cities, leading ultimately to sustainable cities.

## 4. Capacity assessment

Another characteristic of the new governance and of urban planning, linked to public participation, is the capacity for ex-ante, on-going, and ex-post capacity evaluation. This evaluation is being given an absolutely relevant role in achieving the objectives of sustainable development and thus in improving the effectiveness of public policies toward sustainability, in order to transform a vision into a concrete change. Evaluation tools are needed in the regeneration processes grounded in the circular model, that is, on the knowledge of city metabolism, and in order to organise complementarities and possible symbioses that imitate those existing in nature. New evaluation approaches and tools are useful to implement the circular model that operates between the natural ecosystems that sustain the city and the city that contributes – in turn – to the regeneration of natural ecosystems/biodiversity.

More satisfying solutions can be thus identified, in terms of the effectiveness and distribution of outcomes. A multidimensional and multicriteria approach may be needed for integrating the ecological paradigm with the human-oriented one, in order to support the planning processes from the perspective of the circular economy and the circular city model. Different evaluation methods make it possible to understand how the costs and benefits of transformations/transition are distributed among different social actors. In these evaluation processes, it is increasingly necessary to involve the inhabitants, starting with the youngest and marginalised, and poor residents. Also elderly citizens who are generally excluded from choices concerning the future of the city should be better involved in new participation mechanisms.

The system of existing indicators for achieving increasingly safe, resilient, inclusive and sustainable cities should be refined and adapted at different scales in order to better monitor the achievement of results. This allows new spaces to be opened up for the participation of all stakeholders, so that local communities, civil society associations, the third sector, and private persons can feel that a transformation project (which is thus supported by a bottom-up perspective) is their own.

## 5. Climate change

The challenge of climate change is the most important issue of our time because of its environmental, economic and social impacts. They multiply difficulties and all other city problems. In this general context, the circular economy model was proposed as a generic model for cities during a Conference held in the UN-Habitat World Cities Day celebration (UN-Habitat, 2022a). The goal was to harvest new ideas and proposals for improving urban regeneration in the European Union. The "territorialised" model of the circular economy has been assumed as the "circular city" model. New perspectives were also suggested because of the crisis due to Covid-19.

The circular city model on the basis of industrial ecology experiences – now widespread in different parts of the world – has been proposed in the Conference co-sponsored by UN-Habitat World Urban Campaign, Laboratory on Creative and Sustainable City, Association Emeritus Professors University of Naples Federico II in 2020[1]. The starting points were the outcomes of a national research project, financed by the Italian Ministry of Research about the circular economic model in the development of metropolitan areas (PRIN Project[2]). The President of the European Parliament, Davide Maria Sassoli, stressed in his introduction that the emphasis ought to be on the challenges of the ecological and digital transition that will have the effect of bringing about profound changes in lifestyles, in production and consumption processes, in the way of working and living, and in organising the city. New governance at all levels, national, regional and local, ensures that the ecological and digital transition can take place through processes that improve resilience for cities in all of its different dimensions.

## 6. Structure of the book

The book has the ambition to contribute to the Science of City, introduced by Patrick Geddes (Geddes, 1915). more than a century ago. It is organised in three parts. The first part concerns *theoretical* aspects: from cities as devouring assets of fossil energy, destabilising climate equilibria and improving pollution, to sustainable cities as self-sustainable evolutive complex systems. The second part is about *tools*, in particular evaluation tools that can improve governance, planning and management. The third part is about *practices* in a number of different cities.

1. "Cities for all: the ecological and human-centred development strategy of metropolitan cities. The circular city model in the COVID19 context", Naples (Italy), 31 October 2020. Event within the "World Cities Day" promoted by UN-Habitat, United Nations.

2. Research Project of National Relevance (PRIN 2015) funded by the Ministry of Education, University and Research (MIUR). Title of the project: "Metropolitan cities: economic-territorial strategies, financial constraints and circular regeneration".

The first part opens with a contribution by **Robert Costanza and Ida Kubiszewski**. His text emphasises the need for a new approach in economics that goes beyond mainstream economics. He underlines the need for a systemic redesign of cities and of our societies, starting from the urban economy focused on the goals of well-being and sustainable quality of life, by reducing waste. The reason is that we live in a growing world full of people and of man-made capital, but which is decreasing in terms of nature and relational capital. We need a new conceptual framework very far from conventional economics, in an evolutionary redesign. Ecological economics is the transdisciplinary ground from which we can develop a new integrated urban planning and design.

The evaluation of well-being and health of ecosystems and of people is a critical step for improving design and planning. We need qualitative and quantitative indicators for non-market impacts on our well-being, coming from nature and from social relationships, linked to education and health. The ecological transition cannot be implemented without a cultural transition, i.e. without a change in the way we see the world.

The chapter of **Luigi Fusco Girard** emphasizes the role of regenerative and adaptive urbanism to face the double challenge of our century: the social challenge of growing poverty and social inequality, and the ecological challenge of the loss of biodiversity, primarily due to climate change. There is a need to go beyond traditional urban planning whose rationality has been much influenced by the rationality of orthodox economics, by introducing other principles and values: inclusion, resilience, social equity, sustainability. In this perspective, he highlights that a new interpretation of economics that "learns" from nature and incorporates nature itself is emerging and necessary to face the aforementioned challenges towards combining the circular economy with nature and history.

**Gonçalo Canto Moniz, Beatriz Caitana da Silva, Isabel Ferreira, Marco Acri, Américo Mateus, Susana Leonor** explore the contribution of the healthy corridor concept as a cluster of nature-based solutions (NBS) and of the co-creation methodology as a process that generates commitment to the circular city debate. They discuss the URBiNAT project funded under HORIZON 2020, that proposes the co-creation of healthy corridors to respond to the challenges of the social housing neighbourhoods of seven European cities. A thorough investigation into the URBiNAT pillars, namely NBS, citizen engagement, inclusive public space, and social and solidarity economy, highlight the factual circularity of its processes and the final urban plans proposed, making a de facto contribution to the debate on the model of the circular city, which re-connects city with nature.

**Cristina Garzillo** then explores how the concept of circular governance is central to adaptive reuse projects and what impacts this has on cultural heritage safeguard and promotion, linking the circular model with the cultural memory and local history. This chapter highlights the importance of circular governance

in shaping and enhancing social regeneration, skills and trust development. Even if traditional expert-based management of the adaptive reuse of cultural heritage and public support continues to be essential, a critical approach needs to be applied to examine and deeply understand cultural heritage in a circular governance perspective in order to strengthen outcomes, sharpen the focus, and specify where improvements in the process of adaptive reuse can be made.

The chapter by **Giulia Marziani and Simona Tondelli** is about the circular economy, widely recognised as a possible paradigm to achieve sustainability; it has also been applied at the territorial scale. However, a holistic perspective is needed to consider circular cities not only as the total of circular businesses settled in the city, but also to embrace all the other dimensions like urban-rural linkages and social, natural and governmental aspects. Spatial planning can play a significant role in this perspective, as in fostering the adaptive reuse of buildings and cultural heritage instead of just consuming virgin soil. Examples from the EU funded project RURITAGE show how this practice has contributed to enhance the inhabitants' quality of life, the place's attractivity, environmental preservation, and social inclusion in rural areas.

**Esmeralda Willemsen, Karima Kourtit and Sanne Hettinga** investigate sustainability initiatives related to citizen participation in urban energy transition. They analyse the use of "digital twins" for informing citizens of the performance and potential of their city, so that they understand the strengths and weaknesses of their local space. They focus on a pilot case in the city of Rotterdam, the Netherlands, where they assess citizen participation, using "digital twin" tools to allow this co-creation of different energy strategies for local citizens. Based on the pilot case, they highlight that the inclusion of citizen participation can speed-up the subsequent phases of the energy transition to a gas-free city or, in general, an energy-neutral city.

The chapter by **Cristiana Parisi** opens the part next of this book, focusing the attention on Social Impact Assessment in circular cities and the Social Return on Investment (SROI) for assessing the social, environmental, and economic impact of an initiative or new project. She analyses the possible implementation of SROI in the context of circular cities and presents the possible benefits and hurdles linked to the use of that methodology within the urban context.

**Marta Bottero, Giulio Cavana and Federico Dell'Anna** provide next a chapter about cities' transition toward circularity. This transition must be supported by methodological frameworks able to evaluate transformative alternatives, considering the different dimensions involved and the complexity of the decision arena. This chapter reviews four case studies in the context of evaluation methods and urban regeneration projects, highlighting potential and critical elements of the available approaches in the context of circular cities.

**Marilena Vecco, Marta Meleddu and Luigi Fusco Girard** in their chapter underline that over the last decade, waste management has become an important activity. The study aims to identify how environmental policy decisions made at the territorial level contribute to a green transition from the perspective of the EC. In this respect, this study considers general and region-specific trends in waste management and environmental certifications in Italy and compares the performance of 20 regions from 2014 to 2019. Data Envelopment Analysis (DEA) is used to analyse waste management issues, and to show how strict regulations have stimulated greater efficiency in waste recycling. A further investigation, exploiting the panel characteristics of the data, a involves Malmquist analysis to evaluate the efficiency of all decision-making units (DMUs) in terms of productivity growth. The DEA results show an overall rising trend of efficiency among Italian regions. This trend is confirmed by the Malmquist analyses, which show that the regions performed well during the period under consideration.

**Tracy Pickerill** provides next a chapter about circular finance. The transition to equitable capital allocation, procurement and wealth creation is central to achieving regenerative investment circles. Circular finance recycles capital by blending financial (grant, debt, equity, tax) and non-financial (risk sharing; capacity building) instruments, in parallel with intentional socio-cultural and environmental impact metrics. Understanding the diverse motivations of public and private investment leverage enablers, including local communities, to engage in collaborative partnership structures is essential to achieving implementation of regenerative activities. Complementary real estate instruments, such as master planning and land value capture tools, can further negate market risk in cultural landscapes. Despite the steep learning curve to achieve evolving EU taxonomy compliance, breaking away from capital market benchmark dominance will ultimately reinforce capital re-allocation towards virtuous investment flows.

**Ana Balan, Alexandrina Rata, Sînică Alboaie, Karima Kourtit and Peter Nijkamp** propose a novel perspective on urban sustainability, by emphasising the great potential offered to modern cities by adopting a digital orientation, e.g. blockchain systems. Starting from a broad sustainability and citizen-oriented perspective, they highlight the issue of decentralised brands in digital urban platforms as a new way for solving data ownership problems in a digitalised urban network system by including its stakeholders in the emerging social technology in cities.

The third part about concrete experiences opens with the chapter by **Marc Weiss** that provides a detailed case study of how and why Global Urban Development (GUD) organised the Porto Alegre Sustainable Innovation Zone in Brazil starting in 2015. GUD's commitment to promoting the Metropolitan Economic Strategy, Sustainable Innovation, and Inclusive Prosperity as a

global movement to build support for participatory transformation has evolved over five decades. The foundation of this approach is understanding that generating greater prosperity and quality of life is vital for enabling widespread collaborative action to solve the climate crisis and other global challenges.

**Giampaolo D'Andrea** presents the experience of the conservation and valorisation of a very particular historical centre: the city of Matera (the city of "Sassi") in Italy. He traces the journey that led this city to become European Capital of Culture in 2019, describing its tangible and intangible values. This experience has presented an extraordinary opportunity to regenerate the valuable cultural heritage and reorganise urban spaces and functions of the city of Matera.

Then, the chapter by **Gennaro D'Amato, Luigi Fusco Girard, Fabio Murena, and Francesca Nocca** present a multidisciplinary study including air quality monitoring, health effects studies and new urban development models to propose some possible sustainable development actions for cities, with particular attention for the city of Naples (Italy). They analyse the relationships between urbanization, air pollution and its impact on human health focusing in particular the attention on the operational tools, such as urban planning and evaluation tools.

**Serena Viola, Maria Rita Pinto, Giovanna Pacifico** investigate the capacity of design to encourage the closure of loops, activating regenerative processes by contagion, similar to those affecting natural systems. They examine cities that have initiated interesting waterfront regeneration processes, achieving the European Green Capital Award for outlining key issues to promote the circular economy paradigms through design. Furthermore, past solutions adopted for Genoa's waterfront (in Italy) are observed and described to suggest appropriate regenerative answers based on the circular economy commitments.

**Fusco Girard and Nocca** highlight then the need to sew up human-nature relationship, with particular reference to the role of urban planning and nature-based solutions. In this perspective, they investigate the circular city model and the new regenerative urban planning. They examine the Italian experience of Prato and Milan that are implementing in different ways (and with very different results) this new urban development model.

**Regalbuto and Cerreta** propose a Decision Support System as part of the planning process for defining a program of actions to foster Est Naples City-Port's sustainable transition towards a livable city (in Italy). More in-depth, leveraging on stakeholder consultation, the decision-making problem has been structured, particularizing the Sustainable Development Goals with respect to the main issues at the local scope.

## References


Costanza, R., D'Arge, R., De Groot, R., Farber, S., Grasso, M., Hannon, B., Limburg, K., Naeem, S., O'Neill, R.V., Paruelo, J., Raskin, R.G., Sutton, P., and Van Den Belt, M. (1997). *The value of the world's ecosystem services and natural capital. Nature*, 387, pp. 253-260. https://doi.org/10.1038/387253a0.

European Parliament (2007). *The New Leipzig Charter.* www.europarl.europa.eu.

European Parliament (2020). *The New Leipzig Charter.* www.europarl.europa.eu.

Fusco Girard, L., and Nocca, F. (2019). Moving towards the circular economy/city model: Which tools for operationalizing this model? *Sustainability*, *11*(22), 6253. https://doi.org/10.3390/su11226253.

Geddes, P. (1915). *Cities in evolution: an introduction to the town planning movement and to the study of civics*. Williams & Norgate, London.

HORIZON 2020 CLIC project – Circular models Leveraging Investments in Cultural heritage adaptive reuse (2020). www.clicproject.eu.

Roe, D., Turner, B., Chausson, A., Hemmerle, E., and Seddon, N. (2021). *Investing in nature for development: do nature-based interventions deliver local development,outcomes?* IIED, London. www.iied.org/20206iied.

UN-Habitat (2022a). *World Cities Day: Better City, Better life. Act Local to Go Global*. https://urbanoctober.unhabitat.org/sites/default/files/2022-08/urban-october-concept-note-2022.pdf.

UN-Habitat (2022b). *World Cities Report 2022: envisaging the future of cities*. https://unhabitat.org/sites/default/files/2022/06/wcr_2022.pdf.

United Nations (2015). Transforming our world: The 2030 agenda for sustainable development. Resolution adopted by the General Assembly on 25 September 2015. Unied Nations: New York, NY, USA.

WHO (2020). *WHO Global Strategy on Health, Environment and Climate Change. The transformation needed to improve lives and wellbeing sustainably through healthy environments*. Geneva: World Health Organization. Available online: https://apps.searo.who.int/WSH/FrontlearnAboutIssue/WHO_global_strategy_on_health_environment_and_climate_change813997152.pdf.

# *Section 1*

## *Enlarging the traditional economic approach in urban planning*

# 1. *Urban and regional planning using the four capital framework of ecological economics*

by *Robert Costanza* and *Ida Kubiszewski**

## 1. Introduction

A fundamental law of ecology is that everything is connected. We know that this is the case, but putting it into practice is hindered by the disciplinary structure of academia and the sectorial divisions of planning and management agencies. How do we move beyond these divisions to achieve the needed transdisciplinary, approach to urban and regional planning?

In the past we were living in a relatively "empty world" – a world where humans and their artefacts were a relatively minor part of the system and human activities had only local or regional impacts. However, the world has changed dramatically. We now live in a "full world", even according to some, in a new geologic epoch – the Anthropocene (Crutzen, 2002). We have moved away from an early successional world empty of people and their artefacts (but full of natural capital) where the emphasis and rewards were on rapid growth and expansion, cutthroat competition, and open waste cycles. We have moved towards a maturing world full of people and their artefacts (but decreasing in natural and social capital) where the needs, whether perceived by decision-makers or not, are for qualitative improvement of the linkages between components (development), cooperative alliances, and recycled "closed loop" waste flows.

Can we recognize these fundamental changes and redesign our societies and cities rapidly enough to avoid a catastrophic overshoot? Can we be humble enough to acknowledge the huge uncertainties involved and build resilience to their most dire consequences? Can we effectively develop policies to deal with the tricky issues of wealth and income distribution, population prudence, international trade, and energy supply in a world where the simple palliative of "more growth" is no longer a solution? Can we modify our systems of governance at international, national, and local levels to be

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better adapted to these new and more difficult challenges? Can we design and build urban areas, regions, countries, and an integrated global society that can provide a sustainable, equitable, and prosperous future for all?

To do this requires a transdisciplinary, nexus approach that recognizes the interconnectedness and interdependence of humans with each other and with the rest of nature. The transdiscipline of *Ecological Economics* (Costanza *et al*., 2014) is based on an interconnected, whole systems view of the world and humans place in it. *Ecological Economics* can be a basis for developing a nexus approach to urban and regional planning and design. It incorporates a "four capital" model of the assets we have to manage in order to achieve this.

### *1.1. Four basic types of capital assets*

These assets, which overlap and interact in complex ways to produce all human benefits, are defined as:

- **Natural capital**: The natural environment and its biodiversity, which, in combination with the other three types of capital, provide ecosystem goods and services: the benefits humans derive from ecosystems. These goods and services are essential to basic needs such as survival, climate regulation, habitat for other species, water supply, food, fibre, fuel, recreation, cultural amenities, and the raw materials required for all economic production.
- **Social and cultural capital**: The web of interpersonal connections, social networks, cultural heritage, traditional knowledge, trust, and the institutional arrangements, rules, norms, and values that facilitate human interactions and cooperation between people. These contribute to social cohesion to strong, vibrant, and secure communities, and to good governance, and help fulfil basic human needs such as participation, affection, and a sense of belonging.
- **Human capital**: Human beings and their attributes, including physical and mental health, knowledge, and other capacities that enable people to be productive members of society. This involves the balanced use of time to meet basic human needs such as fulfilling employment, spirituality, understanding, skills development, creativity, and freedom.
- **Built capital**: Buildings, machinery, transportation infrastructure, and all other human artefacts and services that fulfil basic human needs such as shelter, subsistence, mobility, and communications.

So, to implement a nexus approach to urban and regional planning, in addition to the built infrastructure of our urban systems and individual people, we must also recognize and design with our social and natural capital assets in an integrated and comprehensive way. In particular, dealing with the major issues of climate change, urbanization, and population growth in an integrated way will be key to designing sustainable and desirable urban systems.

## 2. Dealing with climate change, urbanization, and population growth in an integrated way

Another way of characterizing ecological economics is by the basic problems and questions it addresses: allocation, distribution, and scale.

Allocation refers to the relative division of the resource flow among alternative product uses – how much goes to production of cars, shoes, plows, teapots, and so on. A good allocation is one that is efficient, that is, that allocates resources among product end-uses in conformity with individual preferences as weighted by the ability of the individual to pay. The policy instrument that brings about an efficient allocation is relative prices determined by supply and demand in competitive markets.

Distribution refers to the relative division of the resource flow, as embodied in final goods and services, among alternative people. How much goes to you, to me, to others, to future generations. A good distribution is one that is just or fair, or at least one in which the degree of inequality is limited within some acceptable range. The policy instrument for bringing about a more just distribution is transfers, such as taxes and welfare payments.

Scale refers to the physical volume of the throughput, the flow of matter – energy from the environment as low-entropy raw materials and back to the environment as high-entropy wastes[1]. It may be thought of as the product of population times per capita resource use. It is measured in absolute physical units, but its significance is relative to the natural capacities of the ecosystem to regenerate the inputs and absorb the waste outputs on a sustainable basis. Perhaps the best index of scale of throughput is real GDP. Although measured in value units ($P \times Q$, where P is price and Q is quantity), real GDP is an index of change in Q. National income accountants go to great lengths to remove the influence of changes in price, both relative prices and the price level. For some purposes the scale of throughput might better be measured in terms of embodied energy (Costanza, 1980; Cleveland *et al.*, 1984). The economy is viewed as an open subsystem of the larger, but finite, closed, and non-growing ecosystem. Its scale is significant relative to the fixed size of the ecosystem. A good scale is one that is at least sustainable, that does not erode environmental carrying capacity over time. In other words, future environmental carrying capacity should not be discounted as done in present value calculations. A sustainable scale is one that stays within planetary boundaries (Rockström *et al.*, 2009). An optimal scale is at least sustainable (i.e. it lasts), but beyond that it is a scale at which we have not yet sacrificed ecosystem services that are at present worth more at the margin than the production benefits derived from the growth in the scale of resource use.

1. Scale in this context is not to be confused with the concept of "economies of scale", which refers to the way efficiency changes with the scale or size of production within a firm or industry, or to geographic scale. Here we are using scale to refer to the overall scale or size of the total macroeconomy and throughput.

**Priority of Problems**. The problems of efficient allocation, fair distribution, and sustainable scale are highly interrelated but distinct; they are most effectively solved in a particular priority order, and they are best solved with independent policy instruments (Daly, 1992). There are an infinite number of efficient allocations, but only one for each distribution and scale. Allocative efficiency does not guarantee sustainability (Bishop, 1993). It is clear that scale should not be determined by prices, but by a social decision reflecting ecological limits. Distribution should not be determined by prices, but by a social decision reflecting a just distribution of assets. Subject to these social decisions, individualistic trading in the market is then able to allocate the scarce rights efficiently.

Climate change, population growth, and urbanization are all interconnected problems of scale, distribution, and allocation, but the scale problem now looms very large because it has been ignored by mainstream economics and urban planning for so long. Dealing with climate change, urbanization, and population growth in an integrated way means first determining an optimal scale that does not damage the climate system, and that is sustainable in terms of human population and its urban component. The idea of "growth boundaries" that has been used successfully in Oregon to control urban sprawl is one example at the urban scale. Then we must design a fair distribution system and an efficient allocation system within the "safe operating space" that adequately recognize the value of social and natural capital.

## *2.1. Population and carrying capacity*

A primary question is: Are there limits to the carrying capacity of the earth system for human populations? Ecological economics gives an unequivocal *yes*. Where doubt sets in is on the precise number of people that can be supported, standard of living of the population, and the way in which food production will reach the limit imposed by the carrying capacity.

Various estimates of global carrying capacity of the earth for people have appeared in the literature ranging from 7.5 billion (Demeny, 1988) to 12 billion (Clark, 1958), 40 billion (Revelle, 1976), and 50 billion (Brown, 1954). However, many authors are sceptical about the criteria – amount of food, or kilocalories – used as a basis for these estimates. "For humans, a physical definition of needs may be irrelevant. Human needs and aspirations are culturally determined: they can and do grow to encompass an increasing amount of "goods", well beyond what is necessary for mere survival" (Demeny, 1988). For a long and careful if somewhat inconclusive discussion of the population issue see Cohen (Cohen, 1995).

Cultural evolution has a profound effect on human impacts on the environment, and on notions of well-being and quality of life. By changing the learned behaviour of humans and incorporating tools and artefacts, it allows individual human resource requirements and their impacts on their resident

ecosystems to vary over several orders of magnitude. Thus it does not make sense to talk about the "carrying capacity" of humans in the same way as the "carrying capacity" of other species (Blaikie and Brookfield, 1987) since, in terms of their carrying capacity, humans are many subspecies. Each subspecies would have to be culturally defined to determine levels of resource use and carrying capacity. For example, the global carrying capacity for *Homo americanus* would be much lower than the carrying capacity for *Homo indus*, because each average American consumes much more than each average Indian does. And the speed of cultural adaptation makes thinking of species (which are inherently slow changing) misleading anyway. *Homo americanus* could potentially change its resource consumption patterns drastically in only a few years, while *Homo sapiens* remains relatively unchanged. We think it best to follow the lead of Daly (Daly, 1977) in this and speak of the product of population and per capita resource use as the total impact of the human population. It is this total impact that the earth has a capacity to carry, and it is up to society to decide how to divide it between numbers of people and per capita resource use. This complicates population policy enormously, since one cannot simply state a maximum population, but rather must state a maximum number of impact units. How many impact units the earth can sustain and how to distribute these impact units over the population is a dicey problem indeed, but one that must be the focus of research in this area.

Many case studies indicate that "there is no linear relation between growing population and density, and such pressures towards land degradation and desertification" (Caldwell, 1984). In fact, one study found that land degradation can occur under rising pressure of population on resources (PPR), under declining PPR, and without PPR (Blaikie and Brookfield, 1987). Therefore, the scientific agenda must look toward more complex, systemic models where the effects of population pressures can be analysed in their relationships with other factors. The form, structure, and metabolism of cities are design variables that can be reoriented toward more comprehensive nexus goals. This would allow us to differentiate population as a "proximate" cause of environmental degradation from the concatenation of effects of population with other factors as the "ultimate" cause of such degradation.

Research can begin by exploring methods for more precisely estimating the total impact of population times per capita resource use. For example, the "Ehrlich identity":

$$\text{Pollution/Area} = \text{People/Area} \times \text{Economic Production/Person} \times \text{Pollution/Economic Production}$$

can be operationalized as

$$CO_2\ \text{Emissions/km}^2 = \text{Population/km}^2 \times \text{GDP/Population} \times CO_2\ \text{Emissions/GDP}$$

Thus no single factor dominates the changing patterns of total impact across time. This points to the need for local studies of causal relations among

specific combinations of populations, consumption, and production, noting that these local studies need to aim for a general theory that will account for the great variety of local experience. Work on the "ecological footprint" (Wackernagel and Rees, 1996) has taken this approach furthest.

Another research priority is to look at the effect adding a new person has on resources, according to consumption levels and the effect that efficiency has on rising levels of consumption. Decreasing energy consumption in developed countries could dramatically decrease $CO_2$ emissions globally. It is only under a scenario of severe constraints on emissions in the developed countries that population growth in less developed ones plays a major global role in emissions growth. If energy efficiency could be improved in the latter as well as the former, then population increase would play a much smaller role.

Research priority should also look at situations where demand (either subsistence or commercial) becomes large relative to the maximum sustainable yield of the resource, or where the regenerative capacity of the resource is relatively low, or where the incentives and restraints facing the exploiters of the resource are such as to induce them to value present gains much more highly than future gains.

Some authors single out a high rate of population growth as a root cause of environmental degradation and overload of the planet's carrying capacity. Consequently, the policy instrument is obviously population control. Ehrlich and his colleagues maintain "There is no time to be lost in moving toward population shrinkage as rapidly as is humanly possible" (Ehrlich *et al.*, 1989). But, as Ehrlich himself fully recognizes, the policy of focusing solely on population control is known to be insufficient. It has repeatedly been shown that it is not easily achieved in and of itself, and that in addition important social and economic transformations must accompany it, such as the reduction of poverty. Even in those cases where population growth has been relatively successfully controlled, as in China, the welfare of the people has not necessarily improved and the environment is not necessarily exposed to lower rates of hazard.

The opposite position is taken by those who see high rates of population growth as stimulating economic development through inducing technological and organizational changes (Boserup, 1965), or as a phenomenon that can be solved through technological change (Simon, 1990).

Such positions, however, ignore the dangers of environmental depletion implicit in unchecked economic growth: consumption increases and rapidly growing populations can put a very real burden upon the resources of the earth, and bring about social and political strife for control of such resources. This position also assumes that technological creativity will have the same outcomes in the future as in the past, and in the South as in the North, a questionable assumption. In particular, it assumes that new technology solves old problems without creating new ones that may be even worse. Finally, it heavily discounts the importance of the loss of biodiversity – a loss that is irreversible and whose human consequences are, as yet, unknown.

According to a World Bank study of 64 countries, when the income of the poor rises by 1%, general fertility rates drop by 3% (Lappé and Schurman, 1988). In contrast, other authors state that "population is not a relevant variable" in terms of resource depletion and stress that resource consumption, particularly overconsumption by the affluent, is the key factor (Durning, 1992). OECD countries represent only 18% of the world's population and 24% of land area, but their economies account for about 59% of the world gross product, 78% of road vehicles, and over 50% of global energy use. They generate about 76% of world trade, 73% of chemical products exports, and 73% of forest product imports and account for 1/3 of global GHG emissions (OECD, 2011). The main policy instrument in this case, in the short term, is reducing consumption, and this can be most easily achieved in those areas where consumption per capita is highest.

With a world population that is surpassing 7 billion, increasing in food and energy prices due to lack of resources (Brown, 2011), slowing of development in already underdeveloped countries due to overpopulation (Birdsall *et al.*, 2003; Bloom and Canning, 2004), and a lack of jobs (Cincotta *et al.*, 2003), there has been a refocusing on population stability, often in the form of family-planning policies. Family-planning has been proven to be very cost effective (Singh *et al.*, 2010): for every dollar spent on family planning, the United Nations has found that two to six dollars can be saved in the future on other development goals (UNDESA, 2009). Recently the United States and the United Kingdom once again increased their foreign aid funding towards international family planning (UNDESA, 2009).

An estimated one-third of global births are the result of unintended pregnancy (Bongaarts, 2009). More than 200 million women in developing countries would prefer to delay their next pregnancy or not have any more children at all (Singh *et al.*, 2003). However, several barriers prevent many of these women from making a conscious choice: lack of access to contraceptives, risk of side effects, cultural values, or opposition from family members (Carr and Khan, 2004; Sedgh *et al.*, 2007).

One of the major impacts of such population growth is the negative impact it is having on the earth's life-supporting ecosystem services (Ehrlich and Ehrlich, 1991; Wilson, 2003; Speidel *et al.*, 2009). It has been estimated that about half of the productivity of the earth's biosystems has been diverted to human use (Brown, 2008; Jackson, 2009). As population continues to increase, especially in cities, competition for these increasingly scarce resources will intensify globally. The disconnect between the "haves" and the "have nots" will also become more visible.

Thus a new framework should expand the definitions of issues: focus not only on population size, density, rate of increase, age distribution, and sex ratios, but also on access to resources, livelihoods, social dimensions of gender, and structures of power. New models have to be explored in which population control is not simply a question of family planning but of economic, ecological, social, and political planning; in which the wasteful

use of resources is not simply a question of finding new substitutes but of reshaping affluent lifestyles; and in which sustainability is seen not only as a global aggregate process but also as one having to do with sustainable livelihoods for a majority of local peoples.

To address these issues in an integrated way, we have to first better define the overall goal of the enterprise. Next we discuss sustainable human well-being as the ultimate goal, and emerging research on what this means and how to achieve it.

## 3. Sustainable well-being as the goal

Getting a better handle on how to measure the well-being and health of both ecological and economic systems, and the welfare of humans within them, is critical. This section starts with a broader definition of human well-being and how to measure it. It then looks at the conventional macroeconomic measures of welfare (gross domestic product (GDP) and related measures) and their problems as measures of well-being. It then looks at how to move beyond GDP.

### *3.1. Quality of life, happiness, well-being, and welfare*

There is a substantial body of new research on what contributes to human well-being and quality of life. While there is still much on-going debate, this new science clearly demonstrates the limits of conventional economic income and consumption in contributing to well-being. For example, psychologist Tim Kasser, in his 2002 book *The High Price of Materialism* (Kasser, 2002), points out that people who focus on material consumption as a path to well-being are actually less satisfied with their lives and even suffer higher rates of both physical and mental illness than those who do not focus so much on material consumption. Material consumption beyond real need is a form of psychological "junk food" that only satisfies for the moment and ultimately leads to depression, Kasser says.

Economist Richard Easterlin has shown that well-being tends to correlate well with health, level of education, and marital status and shows sharply diminishing returns to income beyond a fairly low threshold. He concludes (Easterlin, 2003) that

> people make decisions assuming that more income, comfort, and positional goods will make them happier, failing to recognize that hedonic adaptation and social comparison will come into play, raise their aspirations to about the same extent as their actual gains, and leave them feeling no happier than before. As a result, most individuals spend a disproportionate amount of their lives working to make money, and sacrifice family life and health, domains in which aspirations remain fairly constant as actual circumstances change, and where the attainment of one's goals has a more lasting

impact on happiness. Hence, a reallocation of time in favour of family life and health would, on average, increase individual happiness.

British economist Richard Layard synthesizes many of these ideas and concludes that current economic policies are not improving well-being and happiness and that "happiness should become the goal of policy, and the progress of national happiness should be measured and analysed as closely as the growth of GDP [gross domestic product]" (Layard, 2005).

Economist Robert Frank, in his book *Luxury Fever* (Frank, 1999), also concludes that some nations would be better off – that is, overall national well-being would be higher – if we actually consumed less and spent more time with family and friends, working for our communities, maintaining our physical and mental health, and enjoying nature.

On this last point, there is substantial and growing evidence that natural systems contribute heavily to human well-being. In a paper published in the journal *Nature* (Costanza *et al.*, 1997), the annual, nonmarket value of the earth's ecosystem services was estimated to be substantially larger than global GDP. This estimate was admittedly a rough first cut, but the goal of this paper was to stimulate interest and research on the topic of natural capital and ecosystem services.

So, if we want to assess the "real" economy – all the things that contribute to real, sustainable, human well-being – as opposed to only the "market" economy, we have to measure and include the non-marketed contributions to human well-being from nature; from family, friends, and other social relationships at many scales; and from health and education. What does such a more comprehensive, integrative definition of well-being and quality of life look like?

### *3.2. The index of sustainable economic welfare and the genuine progress indicator*

Domestic product, whether gross or net, is not identical with true national income and that subtracting indirect business taxes from Net National Product (NNP), as is done in the National Income Accounts to arrive at "national income", still does not give us a true measure of national income. True income is sustainable, and to calculate this Hicksian income would require a quite different approach.

We have also shown that there is a marked difference between what GDP measures and economic welfare, and that the latter has been growing much more slowly than the former as measured by the two proposals that have been made for judging the U.S. economy. A defender of the continuing use of GDP as a guide to policy could argue that, even so, economic welfare *has* advanced along with GDP. If *any* advance in the welfare measure is truly a gain, it is still desirable to increase GDP. The recognition that it takes a great deal of increase in GDP to achieve a small improvement in

real economic welfare could be used to argue that ever greater efforts are needed for the increase of GDP.

To counter such a claim two points need to be made. First, there are social and ecological indicators that are being adversely affected by growth of GDP. Not all of these are dealt with in any of the welfare measures. This is especially true of many of the pervasive externalities like the depletion of natural capital and ecosystem services (Costanza *et al.*, 2014).

Second, GDP interprets every expense as positive and does not distinguish welfare-enhancing activity from welfare-reducing activity (Cobb *et al.*, 1995; Talberth *et al.*, 2007). For example, an oil spill increases GDP because of the associated cost of clean-up and remediation, but it obviously detracts from overall well-being (Costanza *et al.*, 2004). GDP also leaves out many components that enhance welfare but do not involve monetary transactions and therefore fall outside the market. For example, the act of picking vegetables from a garden and cooking them for family or friends is not included in GDP. Yet buying a similar meal in the frozen food aisle of the grocery store involves an exchange of money and a subsequent GDP increase. GDP also does not account for the distribution of income among individuals, which has considerable effect on individual and social well-being (Wilkinson and Pickett, 2009).

A more comprehensive indicator would consolidate economic, environmental, and social elements into a common framework to show net progress in well-being and quality of life (Costanza *et al.*, 2004). A number of researchers have proposed alternatives to GDP that make one or more of these adjustments with varying components and metrics (Smith *et al.*, 2013). Some have also noted the dangers of relying on a single indicator and have proposed a "dashboard" approach with multiple indicators.

In an effort to address these issues (while remaining mindful of the pitfalls) Daly and Cobb (Daly and Cobb 1989) developed an Index of Sustainable Economic Welfare (ISEW). The ISEW takes the Measure of Economic Welfare (MEW) of Nordhaus and Tobin and the Economic Aspects of Welfare (EAW) of Zolotas (Zolotas, 1981) as starting points, but incorporates the sustainability issues that EAW ignores and the environmental issues that MEW ignores. Rather than revising and bringing up to date the existing measures, they decided to create a new one that includes some of the elements not dealt with by any of the three indices already discussed, as well as fresh ways of treating topics that were included in them. To summarize these changes, ISEW:

1. Factors in income distribution on the assumption that an additional dollar's worth of income adds more to the welfare of a poor family than a rich one.
2. Considerably alters what Nordhaus and Tobin (Nordhaus and Tobin, 1972) did in the calculation of changes in net capital stock. Specifically, it includes only changes in the stock of fixed reproducible capital and excludes natural and human capital in this calculation.
3. Updates Zoltas's (Zolotas, 1981) estimates using more recent data for air and water pollution and adds an estimate of noise pollution.