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Chapter 17

Reloading Landscapes: Democratic and Autotrophic Landscape of Taranto



Francesca Rizzetto and Fransje Hooimeijer 

17.1 Introduction

Italian cities are characterized by their density of population and economic activities, an internal mobility system largely oriented around the private car, and many of them by high levels of pollution from the presence of industrial plants with a detrimental impact on the environment.

In 2012 Taranto, a coastal city in Southern Italy, known as an important commercial and military port, was declared the city “with the highest risk of environmental crisis” in Italy due to a wide industrial area developed in the proximity of a highly populated urban settlement. The cause of pollution, a steel production plant, directly employs approximately 12,000 people and another 8,000 contractors indirectly making it Taranto’s main economic driver (Pignatelli, 2013).

The conflict between economy and environment in the city of Taranto, make a peculiar case study when approached with the concept of the Democratic Landscape. This concept reads the territory beyond the natural environment, recognizing also the wellbeing of its inhabitants. Following the Greek words *demos* (people) and *kratos* (ruling), this term describes what potential each holds for the inclusion of civil society at different stages of a planning process, distinguishing between liberal, participatory, deliberative, and radical understandings of democracy (Knutdson, 2018).

At the same time, cities are like “heterotrophic organisms”, their economy is dependent on the environment, they cannot provide their own food, and are dependent on inflows of air, water, matter and energy. Unlike nature, they pollute their own habitat with the production of outflows of waste and emissions, extending over large areas beyond their own footprint. The data of the ecological footprint

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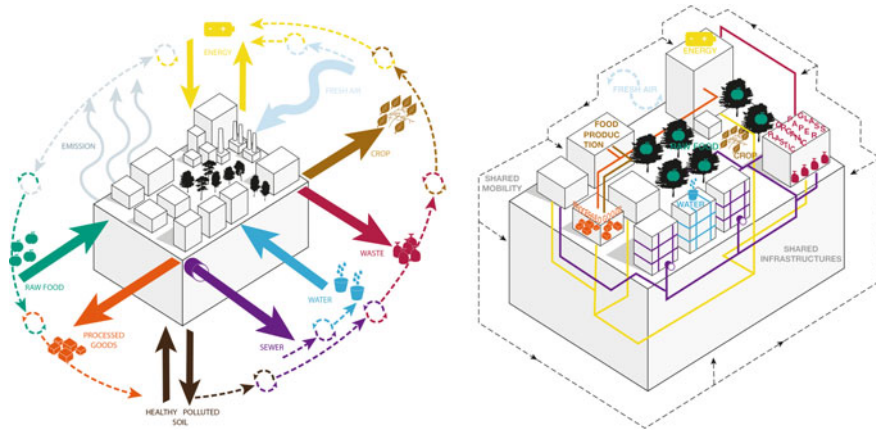


Fig. 17.1 Inflows and outflows in the “heterotrophic organism” and closed loops in “autotrophic organism”

of cities quantifies, emblematically, the imbalance between in- and outflows but also what remains: polluted air, water and soils. The rapid rate of urbanization is matter of serious concern, but as part of new developments it can be turned around with an approach in which cities become an “autotrophic organism”. This is a primary producer that does not need a living source of carbon or energy and is the producer in a food chain, such as plants on land or algae in water. Autotrophs can reduce carbon dioxide to make organic compounds for biosynthesis and as stored chemical fuel. Most autotrophs use water as the reducing agent, but some can use other hydrogen compounds such as hydrogen sulphide (Kim et al., 2020) (Fig. 17.1).

This contribution explores the democratic landscape in transformation from a heterotrophic to an autotrophic organism through the regeneration of the ecosystem and the economic regime.

The project “Reloading Landscapes: Democratic and Autotrophic landscape of Taranto” studied an area of about 400 km² of vacant territory, abandoned rural buildings, and heavily polluted soils (Rizzetto, 2013). Various categories of pollution have been distinguished: heavily and medium polluted soils, and polluted water. According to the level of pollution, the distribution of public spaces, land use, and accessibility of the areas are defined, providing aesthetic and economic sight in the landscape.

The research explains the transformation of the territory into a park made by different landscapes where a circular solution for remediating the landscape (soil and water) is connected with the production of energy. Meanwhile, on both clean and polluted territory, a network of *masseria*—former fortified farmhouses—becomes the new gravitational centre of a healthy metabolism. Production of fresh food in a polluted territory is done through greenhouses and processed in the requalified *masseria*, ready for exporting. *Masseria* are transformed into a cultural and short stay centre where all visitors, researchers and workers can share spaces and knowledge.

The project is used to explore the potential of democratic and anthropic landscapes to transform the production of the factory instead of closing it as part of a wider scenario in which the territory is remediated to improve the health and wellbeing of the population of Taranto. The theoretical starting point of democratic and autotrophic landscapes is presented in the next paragraph which is followed by the proposal and conclusions.

17.2 Democratic and Autotrophic Landscapes: Linking Open-Loop System Circularity

The internationalization of economy, the spread of Western values on a global scale, the acceleration of changes in products, the gap between society and the state and between delegation and decision-making power, society becoming individualistic and the fragmentation of the territory of memberships are defining aspects for the social relations and the forms of conflict, different from the past (Bird & Thomlinson, 2012).

In 2012, a declaration was made in Taranto for a progressive change in the spatial order of the city and a proposal to change the labour structure. It is an example of how the city does not recognize itself as industrial city anymore, but it needs to return to the historical relation with the natural environment: in a different project—for its “polis”.

For this reason, the conceptual background of this analysis is based on the concept of a “democratic landscape”. The importance of recognizing the landscape as common good, as part of a participatory process that Taranto’s citizens may take part in the decisions. It is based on the idea presented in 2009 by the Danish environmental and planning philosopher, Finn Arler, who notes that “landscape democracy” came on the Council of Europe agenda without defining democracy in relation to landscape (Arler, 2008, 2010; Arler & Mellqvist, 2014). He presents three sets of democratic values that influence decision-making in landscape issues: co-determination and participation; private self-determination; and impartiality and respect for arguments. Alongside participation, procedures contributing to democratic decision-making include elections, consultation, markets, and informed argument. Moreover, the landscape is not formed simply by landscape policy, but also by commodity markets, globalization, and political decisions not concerned with landscape (Jones, 2018).

Activating Taranto’s democratic landscape is necessary to build a knowledge of the territory and to promote a culture of localism, the identity of the territory in which it becomes possible to dissociate from the international industrial production. The concept of “identity” describes a person as a fixed and unchangeable unit, while also the empiric experience shows individual existences are made by contradictions, differences linked together, unexpected, and slow changes (Nistri, 2012). These aspects are useful to recognize as the social horizon in the city is a playing

field and, at the same time, they are limiting because they become constraints and homogenate forms.

In the case of Taranto, the steal culture has evolved while suffocating the fishing and farming industries, creating a lack of identity in both physical relation to the natural environment, and in terms of traditional production like horticulture and fishing.

The need to recognize our “identity” is a fundamental necessity that is near to the reassuring sphere: it consoles uncertainty. The limit of the identity process is visible in current global developments, even if global competition makes the construction of an identity that is possibly unique more prosperous. Creating an identity that has the aim to be different and so, to avoid the others in order to secure our possibilities and opportunity, is in that sense creating a negative image. Identity in the case of Taranto is based on the impossibility to use the public space, the incapacity of reusing the existing built environment, and a lost relation to the productive landscape (Pignatelli, 2013). The application of the concept of autotrophic organism instead can give a new purpose to a more democratic landscape.

In redeveloping a city like Taranto, changing the status from heterotrophic organism to autotroph organism, the concept of the so-called “open-loop” recycling method is fundamental. This concept makes the connection between different loops in which the recycling of one material can be used in the production of another material like proposed in the work by Ekvall (2000) and Holling (2001). The system approach thinking by Holling addresses the interdependence and co-evolution of human economies and natural ecosystems over time and space. The concept of “panarchy” supports an understanding of the evolving nature of complex adaptive systems and how they affect each other over time and scale (Holling, 2001). This work has been very influential in the field of Ecological Economics that studies the interdependence and co-evolution of human economies and natural ecosystems over time and space. Especially for this research, the fact that nature has a set of critical self-organized variables that keep returning is an important notion to steer the human system that, different from the ecosystem, is characterised by foresight, communication and technology and changing the rules of the ecosystem instead of including these self-organised variables.

In the work of the MacArthur Foundation (2012) Holling’s logic of panarchy is expanded with the biological and the technical cycle, to support better the concept of circularity. The biological cycles are the non-toxic materials that can return to the biosphere and the technical cycles are the products, components and materials that are brought back to the market through repair and maintenance, reuse, refurbishment, remanufacture, and ultimately recycling (McDonough & Braungart, 2002; The Ellen MacArthur Foundation, 2012). For public space, these two cycles should be intertwined and brought into synergy on a smaller scale.

Because of the complexity of urban systems, open-loop is not enough. For public space, the “linking open-loop system circularity” describes better the system necessary that is already introduced on the building scale of reduce, reuse, recycle of use of recourses and output of waste going through the urban system (Hooimeijer et al., 2020). This is done by including waste (of public space) and material efficiency (like

sand or paved surface in public space) in and hierarchy for cascading see Fig. 17.2 that describe the sequence of concepts.

The “linking open-loop system circularity” approach is about the development of a design personality, not specific design guidelines. Circularity is an attitude because it beholds many elements that can be considered generic for each project: it can be about recycling or reuse, about cutting costs or time and output of CO2 through reducing material inflow and the transport of materials. There are many choices and priorities that can be made or set, but it is crucial to have the right information on the table to be able to gain an understanding of all the possibilities. That is what is tested in the project “Reloading Landscapes: Democratic and Autotrophic landscape of Taranto”, on two scales: on the landscape level proposing a multiple reuse of

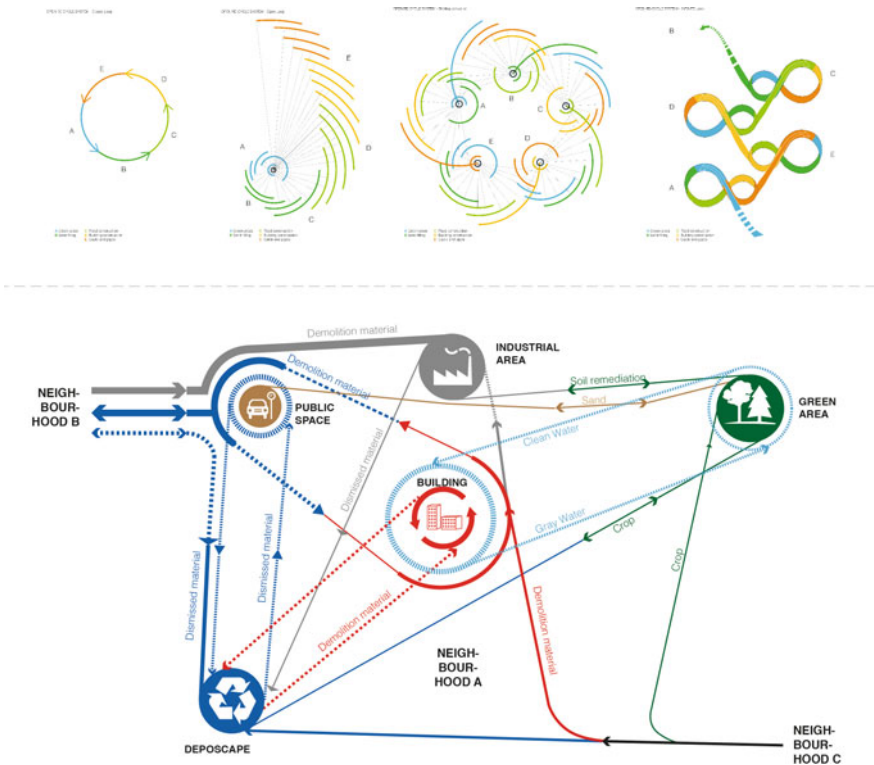


Fig. 17.2 Conceptual diagrams from left to right: **1** closed-loop recycling inside the neighbourhood, **2** open-loop with the 5 macro groups, **3** activation: each material can be stored in a deposit if not recycled immediately inside the transformed area and can be utilized in a different neighbourhood area when needed and **4** Infinite loop: the process will start a chain of reutilizing all the materials from the de-constructed side. The infinite loop, is meant to be a chain of decomposed material market, reutilized inside the area but also, giving to another area to start a requalification process. The bottom image is the Open System—Infinite Loops, which allows interchanges among under renovation areas (Hooimeijer et al., 2020)

agricultural crops after the remediation and, at the local level, in rebuilding a portion of the city by reusing demolished buildings materials.

17.3 Reloading Landscapes: A Correlated Scenario for the Case of Taranto

Taranto is the third-largest continental city of Southern Italy with a population of 195,882 people. Since 1946, Taranto began to establish itself as an important industrial and commercial centre due to its strategic location on the Mediterranean Sea, without abandoning the ancient seafaring and military vocation. Because of this new industrial reality, between 1961 and 1971, about 30,000 farmers abandoned their fields, planted with olive trees and grazed by sheep, moving to the city to become workers in the steel industry (Regione Puglia, Report, 2009).

Two assessment reports in 2012, one chemical and the other epidemiological, have reported heavy pollution all over the neighbourhoods near the steel factory. This particular contamination came from the 70 hectares of red ore in an open mineral park (spread through the wind into the public spaces and onto the building's facades), the coke ovens that emit benzo(a)pyrene, and the chimney E312 of the agglomeration plant spreading dioxin (Regione Puglia, Report, 2009). The investigations were done as part of a lawsuit against the owners and directors of ILVA, and showed that over a span of seven years, the increasing rate of death caused by cancer has increased dramatically in and around Taranto and demonstrated that the origin could be linked to the industrial area (Vagliasindi & Gerstetter, 2015).

In the same years, the Italian government wrestling with the severe economic crisis in Italy, did not intend to close the factory. The decree ordered to reduce its emissions and bring the plant up to code before 2016. Meanwhile, at the local level, an ordinance forbade children from playing in public outdoor areas and both pasture and farming production within 20 km of the steel plant was prohibited.

In order to tackle the problems in Taranto, democracy and a technical understanding of territory and its problems need to be brought together to be able to recreate the economy and identity in the city. The project, Reloading Landscapes, presents three transition goals that will allow for major changes, and six transition leaps that represent the major urgent transformations. Both spatially and socially, the transition leaps require major adjustments. Their impact and mutual relationship are often still difficult to imagine and are based on infinite growth, and thus usually in conflict with the economic model on which Taranto is founded.

Attempting to answer the question of how to cope better with the human attitude and the capacity of the territory, the challenge is divided into manageable parts, with clear objectives at different scales: the level of the district or neighbourhood, the urban region, and at the national level.

The six transition leaps are a renewable energy landscape, healthy agriculture, caring living environment, space for biodiversity and water, a new mobility system

and a (re)productive city. Designing these six leaps will explore the definition of a new socio-economic and political model.

There are numerous spatial exploration areas, initiatives and transformations that illustrate the fact that fundamental changes in our use and design of space must be combined with new laws and regulations, with alternative founding methods and with differently organized access to the control of knowledge, capital, raw materials, and production means.

This holistic system's perspective thinks beyond the current urban metabolism and circular economy trends. Like autotrophic organisms can produce their own food (using light, water, carbon dioxide, etc.), these three goals seek to explore solutions to transform the heterotrophic (consuming) city into an autotrophic (producing) one. Autotrophy is used here as a concept for cities to become primary producers for the survival of humankind, where all resources, processes, and structures are interlinked, interdependent and coevolving (creating long-term balance).

To accelerate the transition to a resilient and solidary living environment, the existing structures and pollutants in the territory are utilized and recycled. This is explored in three goals:

1. relocation, the new neighbourhood will relocate the inhabitant of Tamburi neighbourhood, this process will give people the ability to collaborate in the new district, and will propose different opportunities of living in a fragile territory;
2. territorial remediation, using Phytodepuration will provide a less intrusive method to reclaiming the polluted land. Phytodepuration in a large portion of territory is a valid opportunity both economically and feasibly;
3. economic alternative related to the territory in a new conscious landscape interaction.

The three goals are fundamentally related to building the main concept of the city and its territory as an autotrophic organism.

1. Relocation, Redesign with material flow

The area of Taranto was characterized by a strong agrarian structure, marked by the presence of a system of farms (*masseria*) and pastures strongly linked to natural features. It transformed into an industrial system with a high environmental burden, and the *masseria* were abandoned or became residual and embedded in a "red city factory".

The new suburbs, often marginal with low-performance levels, are the buffer between the city and the production areas. The countryside becomes the historical pasture in which a continuum of tourists visits the significant natural places such as wetlands, coastlines, and a network of channels.

The infinite fragmentation of the urban environment is seen as an opportunity to reorganize the territory in a sustainable way, where these portions may be considered self-sustainable entities disconnected from the grid.

The approach proposed is the "Redesign with material flow" (Hooimeijer et al., 2020). This approach uses material from the existing neighbourhood to create the new

one. Drawing on literature, the framework of this approach was based on the RRR principle (Reduce-Reuse-Recycle) for Construction and Demolition Waste (CDW) that has been discussed by Bouanini (2013); Beijia et al. (2018) and Thirimoorthy (2019) among others. The RRR concept describes a dedicated waste management approach that aims at reducing primary resources in manufacturing, distribution and the consumption of products with maximum reuse, recycling and recovery” (Bouanini, 2013).

The proposed framework adapts to the composition of the three urban typologies, 1950s, 1970s, and 1990s, presented in the study *Subsurface Equilibrium* (2020). The novel idea was to explore the flow of construction materials through the urban system and analyse the spatial context in different layers of material use (Hooimeijer et al., 2020).

In the framework of sustainability, the new urban environment will recycle as much as possible in terms of energy and water, while the typology of block buildings with a courtyard will be used as an active element to recycle the water throughout the Phytodepuration concept.

2. Territorial remediation

The landscape of Taranto is morphologically characterized by a flat or slightly sloping landscape towards the sea. The agricultural function of the territory of Taranto is marked by a regular mesh network of canals and drainage systems. North of the Mar Piccolo is characterized by a vast plateau sloping slightly towards the inner basin, marked by rolling blades. The project area lies on the north side of the Mare piccolo on the east side of the steel plant.

Various categories of pollution have been distinguished in the area: heavily polluted soils, which will take a long time to clean, superficial polluted soils which will take less time, polluted water and clean water. According to the level of pollution, the distribution of public spaces, land use, and accessibility of the areas are defined, providing aesthetic sight in the landscape.

Three types of remediation turned out to be appropriate:

- Phytoextraction, the process in which plants remove pollutants from soil or water, in this case most usually heavy metals, metals that have a high density and may be toxic to organisms even at relatively low concentrations.
- Rhizofiltration, the form that involves filtering contaminated groundwater, surface water, and wastewater through a mass of roots to remove toxic substances or excess nutrients.
- Phytostabilization, that involves the reduction of the mobility of heavy metals in soil. Immobilization of metals can be accomplished by decreasing wind-blown dust, minimizing soil erosion, and reducing contaminant solubility or bioavailability to the food chain.

Certain plants, called hyper-accumulators, absorb unusually large amounts of metals in comparison to other plants. This long-term inaccessible area will be cultivated with particular plants, such as sunflowers, wheat, and corns useful for biomass

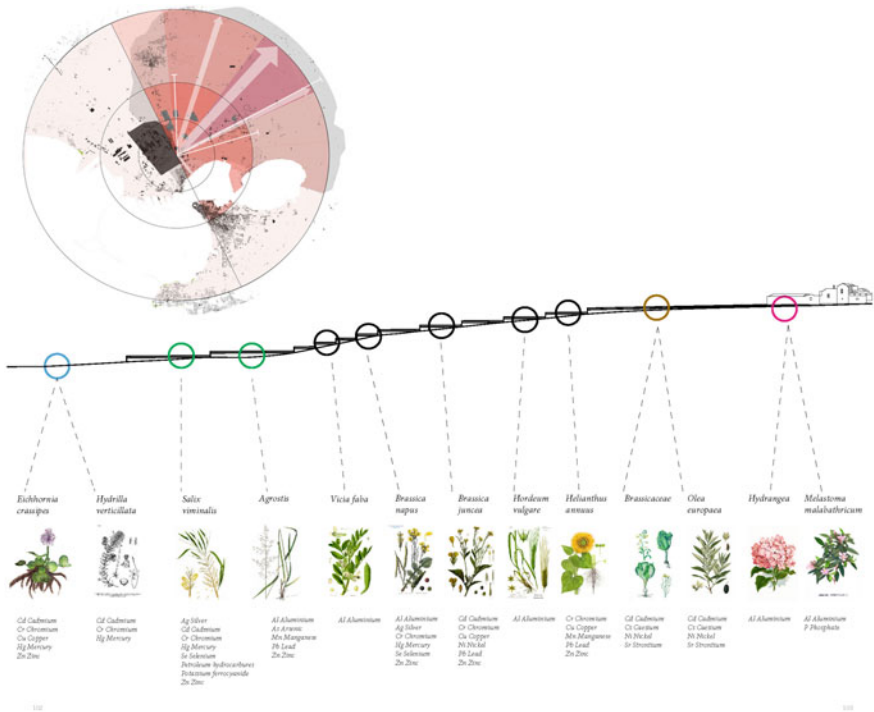


Fig. 17.3 Plan and section of the territory of Taranto with the polluted areas and the sequence of remediating plants

production as well, the process will contribute to the natural remediation as well as economic development (Fig. 17.3).

These three remediation types are brought together in the constructed wetlands in the area of Mare Piccolo. Constructed wetlands are natural systems in which the wastewater flows through a planted soil filter where the biological and physical treatment takes place. They combine most of the benefits of natural systems mentioned above: little use of energy, attractive landscape, wildlife habitat creation, low sludge generation, low cost, and recreational and educational uses (Pötzt & Bleuzé, 2016).

The constructed wetlands are positioned in a void between the highway and the urban area which is enough space to be able to make it an efficient system. Another important issue is the acceptance by the community, due to the common belief that wetlands are home for mosquitos and bad smells. If the risk is significant, it can however be prevented in subsurface flow wetlands, with an appropriate design (correct choice of filtering material and dimensions to avoid an above-ground water flow) which require more space but is possible in our study case. Besides, as mentioned above, a benefit of constructed wetlands is that they can be incorporated into urban amenities, in a park for example. In this configuration, serious attention

should be given to avoid direct contact between humans and the wastewater loaded with pathogens.

This follows the idea of constructing multifunctional urban landscape infrastructure which involves nature-based performance or performative assets, which becomes infrastructure in the sense that they contribute (generate and support) urban economies and urban life.

All around the Mare Piccolo a buffer area will be designed to purify water arriving from the canal and rivers. The water will be cleaned to restart the production of oysters and fish farming, implementing a traditional economy of the place.

In the proposal, the design process is seen as an opportunity to enforce the democratic landscape by involving the community, politicians, and designers. The aim is to build up a sustainable community where inhabitants use their resources to maintain current needs while ensuring and protecting resources for future generations. For example, the self-sufficient production of energy, a natural cleaning process for waters, and a different form of economic production. It will be the example of how parks in the future can be, not simply contained by the city, but as an open dialogue between ecologies, economies, and human life, where people can experience and learn from nature around them, within a new cultural landscape.

3. Economic alternative

The concept “Vita Activa” by Arent (Jansson & Wagman, 2017) is about promoting the strength of a creative and constructive path that induces ethical behaviour. In the case of Taranto, this concept is used to reformulate the relation between man and territory. It is necessary to consider the project in its physicality and subjectivity, the different dynamisms, but always as a set of interconnected dynamic actions. (Malavasi, 2007).

The Economic Alternative supports an interdisciplinary perspective that involves the ethical, political, economic, educational, techno-scientific, sociological, and anthropological horizon. This is in line with Magnaghi (2010): “Talking about sustainability requires a holistic and interdisciplinary approach that brings together unconventional institutions and disciplines while retaining their distinct identities”.

In fact, the Brundtland report (1987) highlights a fundamental ethical principle, i.e. the responsibility of today’s generations, towards future generations, touching two essential aspects of eco-sustainability: the first is the maintenance of resources and the second concerns the maintenance of the environmental balance of our planet. The concept of sustainability recalls the dimension of the future, the enhancement of everyone’s potential and increases the hope of the possibility of changing reality, by encouraging behaviours based on respect, on principles of competence and responsibility, considering that responsible and participatory behaviour can transform into business opportunities (Logotel, 2010).

The project proposes a strategy of acupuncture in which small scale interventions add up to a larger funding mechanism, gradually building up the park’s mass into a flexible patchwork of planted clusters (*Masseria*) mostly separated by open linear not designed areas. This will be staged in three phases:

1. Soil division (*Masseria* landscaping)
2. Pathway reconstruction or implemented
3. Programming plantation and activities.

The outcome of the project is a matrix of clusters covering 90% of the site, which is supplemented by playing fields and gardens. The park is meant to be a collaborative machine that has the daunting task of cleaning up the polluted soil, creating new job opportunities and initiating a new function for the abandoned landscape. The purpose is that capital generated from the park's appreciated land value could be spent to manage the park's infrastructure and to support future development in an evolving cycle of implantation.

Beyond cleaning, the park will be a source of green energy, creating space for windmills and, above all, the plants, used to clean up the soil in a natural way, will be recycled as biomass that can create biofuel.

The Land-Park is therefore an extensive bulk with a plan for adaptable growth. In the beginning it assumes the landscape's suburban context to be a virtue. Because of its central activity the park over time, its development will become the second type of industry in the area. The Land-Park landscaped clusters are programmed for various leisure activities like crossing paths to be used by cyclists, joggers, and pedestrians.

By continuing its landscape clusters and extensive pedestrian pathways into adjacent areas, the Land-Park can link up with the Creeks and Ravines, integrating the cleaning fields into a system of bushy river valleys, parks, and public paths so unique to the landscape of Puglia. The abandoned *masseria* will be recuperated for the new culture of the land farm. The *masseria* is the node of this system and the system of property that was born during feudal times should be elaborated and reused. The *masseria* is a fortified farm that is widespread in southern Italy and particularly in Puglia. The farm, years ago, was the expression of an organization linked to the geo-economic latifundia, the large estates that fuelled the revenues of the aristocratic classes and the bourgeoisie. The *masseria* were large and inhabited by the landowners, but the vast rural construction also included the homes of peasants, in some areas, even seasonal, stables, stores, forage, and crops.

The abandoned landscape will be reactivated by a plantation that can extract the polluted agents from the terrain, a classic reclamation of the land will be impossible in such a contaminated territory. Phyto-reclamation will be less incisive but will have the same results at the end of the cycle, and after 30/40 years the land could be renaturalized and transformed for a different use, agricultural or cultural. The biomass produced from collecting the plants could be utilized for the production of biofuel to create a new economy for the city and the people. A slow change of function in the factory would create mass unemployment, while this new land-production will create jobs.

This connects to the concept of the democratic landscape and shapes the proposed master plan. This regulates that the polluted area (20 km ray around the factory) will be approached as described above. Because this system is not only a cleaning system but also an economic proposal, it would be applied to the rest of the province of Taranto, in the land that is abandoned or uncultivated. The municipality will provide

the tools in the form of local laws, and people in form of private, families, associations, or company, should own a portion of land. They could buy, or rent the property, or borrow the land only.

17.4 Conclusions

The profound environmental crisis is increasingly affecting our planet: climate change, global warming, reduction of water resources, pollution of water and the atmosphere, and a loss of biodiversity, are increasingly worrying us about the livability of the planet. At the same time, this indicates the unsustainable exploitation of natural resources while we reach the ecological limits of the planet. The statistics on the state of the planet and the indicators that record the state of health of our common home question the common conscience in acting in an educational and ethical way and that must lead to reflect on the nature and values of human development.

To understand the ecological question of Taranto, it is necessary to read it as a problem of public ethics, which means to believe that the essential aspects of it are played in the analysis of the visions of human life: the democratic landscape.

The complex environmental situation that characterizes Taranto's area and the reflections on the health conditions of the local communities require a reflection on the economic model that is intended to be adopted. The dramatic economic crisis that grips the present day can, however, be an opportunity to change the economic paradigm focused on labour saving and the distribution of scarce resources to bring the environment to the centre of attention. Common actions among public and private subjects, are essential in the development of a new path for the city of Taranto, as much as thinking of the relation between city and landscape as a unique system, can formulate a new economy based on the autotrophic concept.

The concept is explored in the project by stressing the necessity to begin with circularity at a different scale, as a new approach for future development. This is applied in all the different elements of the project; landscape and new development are integrated into a unique element collaborating for creating a new economy for the city of Taranto based on a democratic autotrophic landscape.

The methodology to reach this landscape is a concatenate approach in which "linking open-loop system", reading of the territory, and design are fundamental for spatial guidelines. Circularity can be about recycling or reuse, about cutting costs or time and output of CO₂ through reducing material inflow and transport of materials. The need to rethink and redesign the flow of resources such as building materials, water, food, and energy is essential to the future sustainability of cities. It implies thinking about how to use existing resources rather than disposing of them in the linear model. It means also establishing new economic models to make a sustainable city, flows of intelligent growth, and creating an identity for a community sense of belonging. These together create a democratic, autotrophic landscape that sustains a future.

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