CultNature: Transformation of Brownfields to Sustainable Urban Landscapes

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Abstract

In many cities and agglomerations, industrial production has left a lot of industrial wasteland (brownfields). Brownfields create strong obstacles to urban development, quality of life and regional attractivity. Recultivation of industrial wasteland is usually expensive. The CultNature concept offers a solution to this problem. The solution is to restore brownfields as bio-energy landscapes. Bio-energy landscapes will be designed as green spaces with an aesthetical quality of parks. A high aesthetical quality can be reached by the use of the wide variety of different plants for bio-energy. In contrast to a traditional park, bio-energy-landscapes will be used for cultural, social and economic activities. Bio-energy landscapes will form green axes of urban development and industrial transformation. They will serve as locations for different social, cultural and economic activities. Play grounds, walking and jogging trails, wellness installations, stages for small concerts and cabaret, and other infrastructures for social and cultural activities may be combined with gastronomic facilities, housing and commercial or industrial buildings. Development of bio-energy landscapes will be used as a stimulus for innovation and new industrial growth. Existing competencies in industry and research will be organized in minicluster or clusters whose task is to advance and diffuse innovative, but widely applicable solutions for agroindustry and bio-energy.

Keywords: Sustainable City, Brownfields, Bio-energy, City Mining, Green Industry

1 Introduction

This paper suggests an environmentally, economically and sustainable solution to a problem which frequents many old industrial cities and agglomerations: the existence of vast industrial wasteland (brownfields). The same holds for many old harbour or port cities. If the concerned cities or agglomerations still are economically dynamical, brownfields may be profitably redeveloped. But many old industrial areas suffer from structural change and associated economic decline or stagnation. In such areas, brownfields hardly could be recycled profitable so far. In fact, restoration, as a rule, took only place if it was more or less heavily subsidised or has been enforced by regulation. As a result, large brownfields remain in many old industrial areas.

In most cities which have been former industrial cities, we may find brownfields here and there. This does not usually create any significant problems to urban quality. If there are, however, many brownfields in a city or agglomeration and if these brownfields are either dispersed all over the city or concentrated in a central location, they are likely to become a significant problem. They create unattractive neighbourhoods and damage cityscape. Unattractive neighbourhoods usually decline both economically as well as socially. Bad cityscape negatively affects both locational quality and quality of life. The latter is particularly true with

respect to well-educated and skilled people (Florida, 2002). As a result, cities with many brownfields and damaged cityscapes usually loose when it comes to the exigency to attract companies which would need a lot of skilled employees. To cut a long story short, vast brownfields create a considerable obstacle to urban development.

A good example for this situation is the Ruhr, Germany's largest old industrial region. The decline of coal mining and steel industry in the second half of the last century has left large wasteland. A considerable part of it has been recycled. Yet, there is still much wasteland left which is not concentrated in a few places, but dispersed all over the region. As a consequence, not only few places, but the region as a whole suffers from the negative effects of large industrial wasteland. In particular, the region generally has the image of a place which is not attractive for living. One consequence of these facts is that skilled people and middle class families move out of the region or cannot be attracted to the region. So, the region's locational attractivity is low in comparison to other large cities or agglomerations in Germany and neighbouring countries. Given the financial situation of both cities in the Ruhr region and the state of Northrhine-Westfalia to which the Ruhr belongs, there is no chance to change this situation with public money soon. In order to change the situation within a short time, solutions for profitable or at least economically very reasonable transformation are needed. In response to this need, we have developed the CultNature concept. (cf. Bogumil, Heinze, Lehner, Strohmeier, 2011)

2 CultNature: The concept

2.1 General principles

In a nutshell, CultNature offers a financially feasible approach to brownfield restoration in industrial cities and agglomerations, an innovative concept of a green city and an economically productive strategy for sustainable urban and industrial development.

The basic idea of CultNature is to develop an environmentally sustainable and aesthetical form of urban agriculture on former wasteland and to create an urban landscape which can be used for various social, cultural and economic activities. The idea to use wasteland for the production of energy plants is not a new one, neither is the idea, to transform brownfields into a kind of parks. What is new in the CultNature concept is the combination of the two ideas and to use the transformed land as green axis of urban development. Wasteland will be transformed into agricultural space by using plants which can be used as raw-material for the production of bio-energy. This will be designed as a landscape with high aesthetical value. CultNature, thus, reflects a new concept of green in the city. Unlike a traditional park, which is primarily beautiful, bio-energy landscapes can be used for a wide range of social, cultural and economic activities. They will become important elements of the city's architectural, social, cultural and economic structure and serve as green axis of city development.

CultNature may be an important step to a lasting increase of resource efficiency. Some years ago, Friedrich Schmidt-Bleek (1993) has demonstrated that global sustainability can only be reached if resources productivity in the advanced economies is increased by a factor of ten within a few decades. In our view, this equally important and ambitious goal can only be reached if the resource efficiency of modern cities can be strongly increased. Currently, cities are responsible for a large part of resource consumption for housing, mobility, infrastructures and production of goods and services. They also produce a lot of waste. In the future, a sustainable city will produce a large part of the resources it needs from its "waste" and its space. Moreover, the sustainable city will create strong attempts for sustainability and strong impulses for innovation and growth out of itself. This is the principle of problem-solving growth

(Lehner, 1997) which is, as we will explain below, an important component of the CultNature concept.

2.2 Urban agriculture and bio-energy

In our times, urban agriculture is an environmental must-have, particularly in the industrialized countries. Agricultural land becomes increasingly scarce worldwide, because it is used for both energy and food. The problems resulting from this situation are well known – in many developing countries food becomes scarce and increasingly expensive and environmentally valuable land (e.g. rain forests) is transformed into agricultural acreage. At the same time, in cities and agglomerations a lot of land which could be agriculturally used for energy production is wasted. Apart from wasteland in the narrow sense, there are many spaces which could be agriculturally used, for example such as ugly grassland between ugly buildings,– and become more beautiful at the same time. Agricultural use of all this space helps cities and agglomerations to produce some of the energy they consume themselves. Together with other methods of renewable energy and energy efficiency, it may lead to cities that are largely self-sustaining.

Urban agriculture for energy production may use a wide variety of plants ranging from grasses and flowers to bushes and trees. There are also different methods to produce oil and gas from these plants. For CultNature, the existence of various suitable plants and different methods for bio-energy production is important. A wide variety of plants enables a wide range of different designs for bio-energy landscapes and a high aesthetical quality of the landscapes. The different methods offer possibilities to adjust plantation and energy production to specific designs and local conditions. Bio-energy from urban agriculture may be produced at different scales. It may be on one side integrated into the production schemes of large energy companies which nowadays dominate the energy sector in Germany and many other countries. On the other side, it could become an important element of a highly decentralized and localized energy production which is favored by many environmentalists. The latter certainly fits the philosophy of CultNature better then the first because it enhances development of largely self-sustainable cities and reduces the necessity of large infrastructures for production and transportation of energy.

Urban agriculture is associated with some technical and economic challenge. The established methods of harvesting large acreages often cannot be applied in cities, because wasteland and other relevant spaces are too small. Urban agriculture, therefore, needs efficient methods for harvesting small spaces economically profitable. This is particularly true in relation to the CultNature concept, because this concept foresees the use of a variety of different plants on small space in order to reach the desired aesthetical effects. Moreover, harvesting many smaller spaces easily may result in a great deal of transportation which is environmentally undesirable. Urban agriculture although needs methods for decentralized compilation of the harvested plants and even for decentralized energy production. These methods must be capable of copying with a large variety of different plants. Although there are technologies and methods for harvesting smaller spaces and compiling smaller amounts of plants, the economic success of urban agriculture depends on continuous and significant increases of productivity, and on technical and organizational progress. Therefore, CultNature includes a concept for advancing technical and organizational innovation, particularly by small and medium enterprises.

2.3 Green axes of urban development

CultNature is strongly influenced by the definition of sustainability of the World Commission on Environment and Development (the so-called Brundtland Commission), established in the early 1980's. In their view, city development is sustainable if it on one hand minimizes environmental damage and risk and on the other hand enhances satisfaction of social and economic needs in cities and agglomerations. That is the reason why bio-energy acreages will be developed to landscapes. These landscapes shall serve as green axes of urban development which connect built areas not only physically, but also socially, culturally and economically. Green axes, hence, take over functions which in the traditional city haven been performed by streets and squares. In traditional cities, streets and squares serve mobility and they are locations of important social, cultural and economic activities. In a green city, many of these functions can be served by green axes. Electro carts and bicycles may fulfill some of the cities' mobility needs. Green axes are the location of typical outdoor activities, such as sports, playing or outdoor cultural events. They will also be a location for in- and outdoor gastronomy. Moreover, a range of activities in wellness and health may also be located alongside and in green axes. Last but not least, housing, business and industry should be placed alongside and even in the axes.

Urban wasteland reflects, for the most part, the industrial past of cities and agglomerations. If it is adequately restored, it may, however, serve as a bridge to an industrial future. In the modern knowledge-based economy, most of industrial plants are no longer "dirty", but rather neat and clean. This does not only reflect technical and structural change, but also changes values of people. A proportion part of the workforce of modern industry, particularly of the well-educated and highly skilled workforce, places strong weight on environmental quality not only at home, but also at the workplace. As a result, environmental quality at the workplace and the wider location is becoming an important factor of companies' ability to attract skilled people. The green axes of CultNature may be attractive locations for companies which need many skilled people. They also may be attractive locations for companies aiming at high resource efficiency, because part of their energy needs may be served de-centrally by bio-energy based generation stations located on or alongside the axis.

2.4 Problem-solving growth

Urban economic development strategies usually rely on expertise and competence of enterprises, universities and other organizations, and on skills of the workforce as major assets of a city or region. Problems are usually considered as liabilities and obstacles to growth. In contrast to the latter, CultNature advances a strategy which considers problems as a potential source of growth. We call this strategy "problem-solving growth". The assumption behind this strategy is that, firstly, many cities and agglomerations share a number of problems in traffic and transportation, environment, education and human resource development, health, ageing and other areas, and, secondly, that innovative technical and organizational solutions to these problems may constitute a strong impetus to growth for the local and regional economy. They also may gain a considerable comparative advantage over other cities and agglomerations. This is the case if the concerned solutions are developed by companies and other organizations in the city or agglomeration and also first introduced in the city or agglomeration. In this case, cities and agglomerations may become national or international lead-markets for these solutions. (Lehner, Schmidt-Bleek, 1998)

CultNature may stimulate innovative technical and organizational solutions in agriculture, logistics, compiling of plants, production of bio-energy, landscape architecture, city develop-

ment and planning and steering systems for design, building and management of bio-energy, landscapes and production of bio-energy. In order to advance development of innovative solutions in these areas and a corresponding problem-solving growth, the CultNature concepts suggests developments of related minicluster or even cluster. A cluster is a network of enterprises, R&D-facilities, schools, service providers and other organizations with strong competencies in certain markets or production-chains. They provide mutual benefits in terms of competitive advantage to firms and the local or regional economy. Strategies of cluster development often aim at gaining global leadership or at least excellence. Therefore, we are speaking of miniclusters. These are clusters whose target is more modestly defined as securing competitiveness of the involved firms in their usual geographic space of activities.

2.5 The case of the Ruhr

An illustrative case for CultNature is the Ruhr, where we are preparing a pilot project. The Ruhr is Germany's largest industrial agglomeration. In its industrial past, it was strongly dominated by coal mining, steel industry and related industries. In the second half of last century, the traditional industries, coal mining in particular, declined and left a lot of wasteland. The region suffered and still suffers from high unemployment and economic stagnation. As a result, only a small proportion of the brownfields could be economically restored so far, many of them still remain. The remaining brownfields form a pattern with canals, rivers and former railroad tracks, which is very favourable for CultNature. The pattern resembles honey combs. (See figure 1)

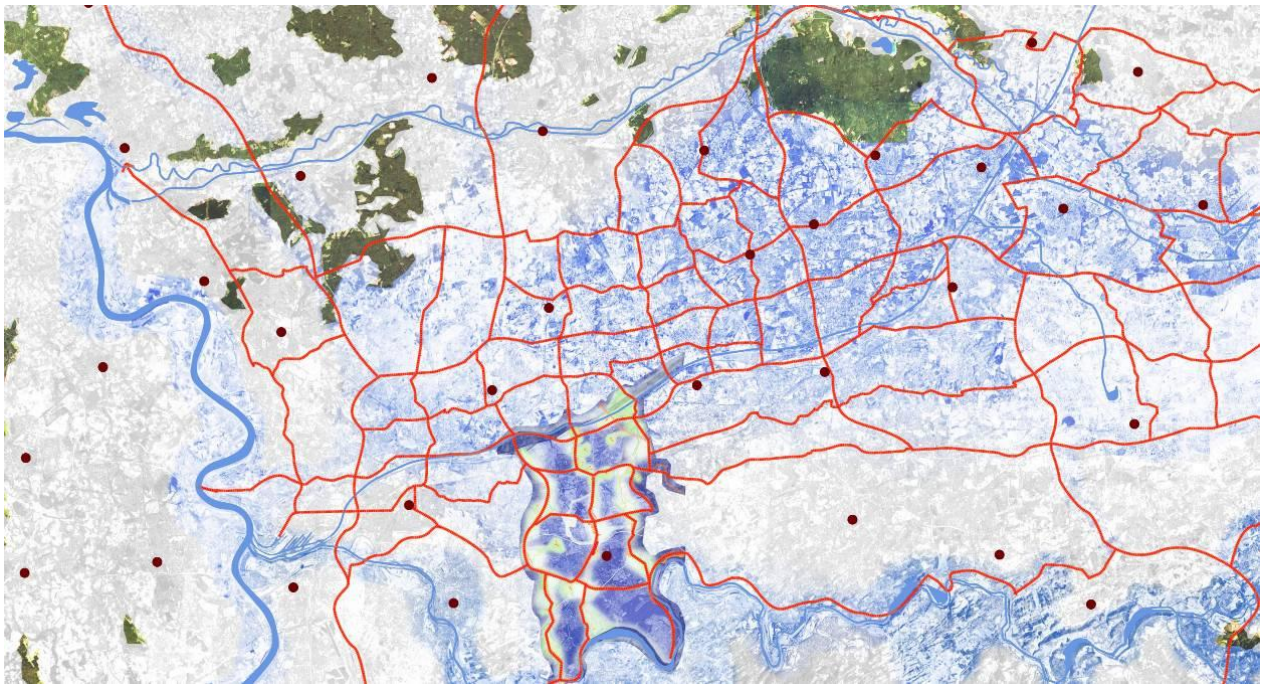

Figure 1: *The combs pattern of the Ruhr*

The combs pattern is very suitable to CultNature, because many built areas are surrounded by brownfields, former railroad tracks and waterways. Distances to spaces which will be restored, are mostly short. This facilitates the use of restored brownfields as green axes of development and location of cultural, social and economic activities alongside and on these axes. Moreover, the comps are also favorable for urban agriculture and decentralized energy services. The full development of the comp pattern as a system of green axes will make the

Ruhr to the greenest agglomeration in Europe and to a global model for many old industrial cities and agglomeration. RAG Montan Immobilien, the company which manages transformation of all brownfields from coal mining in the Ruhr, is currently developing some pilot projects for CultNature.

The comb pattern of green axes may be particular to the Ruhr and not easily repeatable in other cities and agglomerations. There are, however, other patterns, which serve the purpose as well. An example may be the spout pattern discussed for Milan. At Milan, green spouts going out from the city centre are planned as green axes.

3 Conclusions

CultNature is an ambitious concept. Its aim is to transform the industrial cities and agglomerations of the 19th and 20th century into the green cities of the 21st century. For that purpose, it offers a comprehensive solution for a variety of problems and issues in agriculture, production and distribution of energy, in particular of bio-energy, environment, landscape architecture, urban development and other areas. Comprehensive solutions are often difficult to implement, because they require collaboration and networking of a number of different actors in different fields and with different interests. On a first glance, this seems particularly true with respect to CultNature, because CultNature not only aims at whole cities and agglomerations, but also operates most efficiently and profitably on larger scales. Nevertheless, CultNature can be concretely designed and implemented with piecemeal strategies starting with one or a few large brownfields. A piecemeal strategy is likely to mobilise a competitive effect: Owners who start early to restore their brownfields on the basis of the CultNature concept, are likely to gain more than those who follow late. At the beginning of the transformation, restored wasteland is likely to be more valuable since there is not much competing supply. At the beginning of the transformation, it is also easier to find attractive social, cultural and economic activities which can be located alongside and on restored brownfields. Once started in a city or agglomeration, CultNature, hence, my unfold self-reinforcing dynamics.

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