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## **Steps towards an integrated eco-economy**

*The case of Randers, Denmark*

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## Steps towards an integrated eco-economy: the case of Randers, Denmark

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### Abstract

*Short title: Eco-economy in the Randers area, Denmark*

An important factor in the recent economical development of the Danish city Randers has been the project Randers Rainforest (RR). RR is a tropical zoo, which consists of an indoor exhibition within three domes, as well as an outdoor exhibition which includes the neighbouring meadows adjacent to the River Guden. RR has been an active part in creating and facilitating a multidimensional project space which combines experience economy, nature conservation, biodiversity enhancement, environmental regulation services, rural and landscape management, and food networks. RR can be interpreted as an attempt to develop an integrated eco-economy, which transcends established borders between public and private organizations, private and community enterprise and between rural and urban spatial development. The specific aim of the paper is to demonstrate how modernization has decoupled urban and rural space and has produced 'left-over' spaces within both domains. It will also be demonstrated how the tropical zoo project in Randers have revalorized 'left-over' qualities and reintegrated significant ecosystem services and other functions into the local economy, thus providing an overall enhancement of urban green infrastructure

**Keywords: Urban, rural, decoupling, reintegration, eco-economy**

### 1. Introduction: spatial aspects of modernization

The notion of modernity has been characterized as a "notoriously ambivalent and highly contested concept" (Gregory *et al.*, 2009) and it has been argued that it makes most sense to conceptualize modernity as "a broad semantic field marked by tensions, contradictions and possible dialectical energies" (Gregory *et al.*, 2009). It has nonetheless gained wide currency within disciplines such as human geography and sociology. Some basic characteristics can be attributed to modernity (Gregory *et al.*, 2009), including (1) that modernity is used as a means to periodize European history, (2) that modernity designates a secular project of liberation and emancipation, (3) that modernity is characterized by a process of global incorporation leading from the Age of Exploration onto colonialism and on to globalization, and finally (4) that modernity designates a particular mental attitude that seeks to rationally understand the world we live in by finding order within and achieving domination

over nature (Withers, 1996). In Giddens account of the basic dimensions of modernity (Giddens 1990), he emphasizes the interplay between four institutional dimensions, (1) the development of the capitalist economy, (2) industrialism (through which nature is transformed), (3) increased monitoring capacity, and (4) consolidation of military power (more specifically, the monopolization of violence on behalf of the state). Giddens and colleagues have also emphasized de-traditionalization as an important aspect of modernity (Giddens, 1984, 1990, 1991; Beck *et al.*, 1994). The pursuit of novelty, doing something 'new', as opposed to sticking to traditional ways is also emphasized as a constitutive dimension of modernity.

In our context, we will focus on the spatial aspects of modernization, which concerns different processes of spatial change, all of them relating to the relation between nature and society. Modernity and the process of modernization is not evenly distributed across space. It can be argued, that the pursuit of novelty is more easily attained in an

urban setting, rather than in a non-urban setting (Gregory *et al.*, 2009). In that perspective, modernity is a predominantly urban phenomena. Manuel Castells diagnosis of the network-based economy emphasizes how major parts of the economy is enacted in the 'space of flows' (Castells, 1996, 2000a, 2000b, 2002). The access points to the global networks which forms the backbone of 'space of flows' is typically located within metropolitan areas (Castells, 2002). Castells distinguishes between the 'space of flows' with 'space of place', spaces of specific localities, which within the context of the network economy becomes subject to pressure to adapt to forces of change and the continued access to 'space of flows'. This pressure gives rise to multiple processes of spatial change.

The theme of the paper is to demonstrate how spatial changes associated with modernization have been played out in urban space as well as the surrounding rural areas of the Danish city of Randers. The paper is based on case studies of the development of the urban economy of Randers, the efforts to modernize areas in the urban fringe of Randers during the 20<sup>th</sup> century, as well as the development of the project Randers Tropical Zoo, which indicates a new significant phase of the development of the urban economy. The specific aim of the paper is to demonstrate how modernization has decoupled urban and rural space and has produced 'left-over' spaces within both domains. It will also be demonstrated how the tropical zoo project in Randers have revalorized 'left-over' qualities and reintegrated significant ecosystem services and other functions into the local economy, thus providing an overall enhancement of urban green infrastructure.

## 2. Theoretical approach

The challenges concerning spatial change, which can be attributed to modernization, is particular difficult for non-urban areas. The dimension of changing rural-urban relations is an important dimension of spatial change to consider. It has been argued, from different perspectives, that one effect of modernization is patterns of uneven development between rural and urban areas. One perspective concerns ecosystem services and their valorization. Rural areas are distinguished by a high share of natural resources (natural capital). Gutman (2007) has argued that the traditional 'rural-urban compact', where the urban population paid for ecosystem services from the surrounding rural areas have stopped working. Pre-modern food systems which were embedded within the traditional urban-rural compact can be described as von Thünen-economies, where production was placed relatively close to markets and only a minor share was exported (O'Kelly and Bryan, 1996; Block and DuPuis, 2001; Mäki, 2004).

Town and country could thus be described as a functionally integrated system. The links between urban and rural space were radically changed during industrial modernization. This process was among other factors driven by disembedding mechanisms such as transport and communication technology. The notion of metabolic rift have been used to describe this severing of links between rural and urban areas (McClintock, 2010). In terms of demographics, the majority of the population now lives in cities, and the contribution of rural areas to total GDP is decreasing (Maddison, 2001; OECD, 2006). The result is that the capital which is abundant in rural areas, natural capital, is worth less in relation to e.g. financial capital. As a result, the rural population experiences increasing marginalization and natural environments are being destroyed (Gutman, 2007).

Other contributors have also emphasized that modernization has resulted in rural areas possessing unvalorized, 'left-over qualities' (Anderson, 2000; Anderson and Bell, 2000; Jack and Anderson, 2002; Patterson and Anderson, 2003). The notion 'left-over' signifies resources that are left over by urban capitalism. It should be noted, that the process of decoupling is itself also unevenly distributed across the rural-urban gradient. Several studies have identified a very diverse pattern of development in the urban fringe or in peri-urban areas (Bryant, 1995; Qvistrom, 2007; Sharp and Clark, 2008; Zasada *et al.*, 2011). Still, it has been argued that rural areas face an 'eco-economic' paradox, as rural areas can experience being endowed with great wealth in terms of natural capital, but can still be relatively poor and underdeveloped in terms of possession of other forms of capital (Kitchen and Marsden, 2009). Kitchen and Marsden (2009) distinguish between two different approaches to rural development, the bio-economy approach and the eco-economy approach. One aspect of Kitchen and Marsdens critique of the bio-economy approach (OECD, 2009) is that it does not address the territorial aspect of the challenges faced by rural areas, primarily because it is narrowly focused on the agricultural sector and its role as supplier of input to the urban-based bio-medical industrial sector (Kitchen and Marsden, 2009, 2011). Based on a theoretical synthesis of elements from ecological modernization theory, the ecosystems services approach and ecological economics, they have proposed the notion of eco-economy as an approach to rural development which explicitly aims to address the 'eco-economic paradox'. One of the aspects of the paradox is that areas with distinct assets such as attractive landscapes and other natural resources still perform worse in economic terms than urban areas which holds higher stocks of e.g. human and financial capital.

This is further driven by the historical trend of financial capital yielding higher returns than capital derived from income (Piketty, 2014). The notion has been explored further in a range of subsequent publications (Horlings and Marsden, 2011; Kitchen and Marsden, 2011; Marsden, 2010, 2012). One of the core dimensions in the approach is the integration of enterprises across the various sectors of the regional economy. Empirical explorations of the notion of eco-economy emphasizes the integration of sectors such as restaurant/catering with agriculture and the cultural sector, as well as integration between tourism and landscape conservation and several others (Sonnino and Marsden, 2006a; van der Ploeg and Marsden, 2008; Marsden, 2010). What unifies these processes is the targeted utilization of unused or under-valored territorial resources as a source of value. Enterprises such as nature tourism, eco-tourism, various forms of experience economy, reintroduction of crops or husbandry animals which are endogenous to the region can be interpreted as examples of this approach to local or regional development. Such initiatives are all examples of how resources are 'opened' for new or renewed use.

### **3. Method**

The paper utilizes material from a historical account (Hansen, 2011a) of the land-use changes taking place across most of Denmark in the period 1880-1950. The study by Hansen (2011a) documents the radical changes in patterns of land use taking place during the period, focusing primarily on how the use of agricultural engineering changed the shape of the Danish landscape. The paper is also based on empirical data derived from the second author's industrial PhD project, during which he was employed by Randers Rainforest (Christensen, 2013). Empirical data produced throughout the project included semi-structured qualitative interviews with respondents from within Randers Rainforest, as well as outside the organization. Additional sources of data included participant observation at various meetings in the development department at Randers Rainforest as well as meetings with external partners. Other sources of data include literature review, reports, websites and analysis of minutes of meetings and other archived material. The latter utilized content analysis as the analytical approach (Krippendorff, 2004).

### **4. Case: from decoupling to reintegration in the urban periphery of Randers**

Our case study will provide an account of how urban modernization has been taking place in the city of Randers. After that we provide an account of how modernization took place in the rural (today peri-urban) areas surrounding Randers, using the case of two meadow areas as an

example. It is demonstrated that the historical development lead to a decoupling between rural and urban areas, particular with regard to ecosystem services. In the last section of the case, it is demonstrated how the development of Randers Rainforest indicates a process of reintegration between rural and urban spaces, which again indicates in overall shift in development trajectory of the urban economy, and in particular a shift in the spatial organization of the local economy.

#### *4.1 Effects of urban modernization in the Randers area*

The Danish city Randers is sited in north-western Denmark, where the river Guden flows into a fjord. The river Guden is Denmark's largest (and only) river, and connects Randers with the cities Viborg and Silkeborg, which are located upstream. With a little more than 60.000 inhabitants, Randers is the sixth largest city in Denmark. The city connects a number of roads to the river as well as to the sea. Randers has historically been a city distinguished by trade as well as industry (particularly in the period after WW2). Before WW2, the city was known for being an important market place for horses (the city still has a statue on a central square, which depicts a "Randers stallion"). Some of the main figures for the development of the economy of Randers is that by 1960, 45% of the workforce was employed in craft and industry, 29% in trade and transportation, and 22% in administration and service (DCB, 2014). By 2002, these numbers had changed to 28% of the workforce being employed in craft and industry, 26% in trade and transportation, and 45% in administration and service (DCB, 2014). These changes in distribution reflect a structural development where significant reductions of the number of people employed in industry have taken place. Furthermore, Randers experienced a period of structural adjustment of the city's industries during the 1980s. Until then the city had been dominated by a limited number of industries, which employed a large share of the workforce. Industries such as Dronningborg Maskinfabrik (a producer of combine harvesters and other agricultural machinery), the rope producer Randers Reb, the machine producer Scandia and the brewery Thor were all emblematic to the city. Most of these industries got into economic problems during the 1980s and by the early 1990s, most of the major enterprises which had earlier distinguished Randers had been shut down or scaled down by new owners. The result was that the city had to go through a difficult process of restructuring the local economy. Part of the challenge was to change focus to small- and medium sized enterprises instead of fewer and larger enterprises. Another challenge was to increase skills among the local workforce, in order

to enable the shifts in competencies required for coping with abrupt changes. The developments within the local economy of Randers conforms to some of the mechanisms prescribed by modernization theory, after which local economies become subject to pressure to adjust to changing markets and competitive contexts.

#### *4.2 Effects of rural modernization in the Randers area*

Apart from the development of the urban industrial sector of Randers, the surrounding rural areas have also been subject to a process of modernization. The historical development of Danish economy follows a slightly different pattern than in neighboring countries such as Sweden and UK, as agriculture was the first sector to modernize, before urban industries. When the American civil war ended in the late 19<sup>th</sup> century, the supply of grains on the world market increased (Ingemann, 2002), which was a major blow to the Danish economy, as Denmark was a major exporter of grains. The response by Danish farmers was to specialize in husbandry farming such as dairy and pork, still with export markets as a major focus. Inspired by examples in Scotland and England, the Danish farmers chose a cooperative path to agricultural industrialization of the emerging dairy and meat production (Henriksen *et al.*, 2012; Ingemann, 2006). Starting from the 1880s, Danish agriculture transformed itself quite radically, as cooperative dairies and abattoirs were built in virtually every parish across the country. The developments were driven by a host of factors, including agricultural science, new transport and communication technologies, agricultural technology, active involvement by the Danish state, as well as access to financial capital. With regards to spatial change, Danish agro-industrialization intensified land use towards the end of the 19<sup>th</sup> century. This process took place through land reforms, which increased the number of farms through smallholding, but also by cultivating marginal lands (Dalgaard *et al.*, 2009). The number of Danish farms peaked in the 1930s, with appr. 210.000 farms (Dalgaard *et al.*, 2009). During the 1930s the share of cultivated land also reached a peak, with agriculture occupying appr. 75% of the total area (Dalgaard *et al.*, 2009). The period from 1880 to the 1930s also entailed a significant range of initiatives in terms of agricultural engineering. In order to cultivate heaths, moors and meadows, which used to be marginal lands, thousands of miles of drains were established. Parts of this work also served as public employment measures during the post-1929 crisis. A part of the agricultural engineering initiatives was reclaiming of land through drainage, but also reclaiming of land from the sea. Some of these projects also took place in the Randers area. We will focus on two of these

projects, based on a historical account (Hansen, 2011a) of the land-use changes taking place across most of Denmark in the period 1880-1950, which can be termed as the era of Danish agricultural modernization.

The River Guden is after Danish standards a large waterway and historically the meadows surrounding the river have always been subject to seasonal floodings, depending on the volume of water being transported by the river. From an agricultural perspective, the cultivation of the meadows were hampered by these frequent inflows of water. In 1916 twenty-four farmers from the area Vaeth Enge, located in the southwest of Randers, approached the engineering company Hedeselskabet in order to develop a project to raise a dam and stop the frequent inflow of water (Hansen, 2011a, 2011c). Even though a significant minority of the local farmers rejected the proposal, a majority among the farmers were positive towards the project. In 1920, a dam between the meadows and the river were built of material dug from the meadows. In the case of water flowing in through the dam, a wind-driven pump should pump the water back into the river. The original budget for the project was projected to be DKK 64.000,- (Hansen, 2011c). But in the end, the farmers were handed a bill of DKK 350.000,-, more than five times the original amount. The high costs of the project was an economic disaster for the farmers, and some of them were forced to sell their farms as a result of the costs, which could be attributed to a number of miscalculations on behalf of the entrepreneur, Hedeselskabet. (Figure 1)

Apart from the high costs, the dam did not function very well. Water kept pouring in through the dam, and in 1925 an attempt was made to repair the dam and the capacity of the pumps were expanded. By 1926 the project was officially terminated, even though the problems had not been fully addressed. The entrepreneur concluded, that further efforts would be pointless (Hansen, 2011c). A deepening of the river in 1934 led to some improvements for the higher parts of the meadow, whereas the lower parts were still relatively wet. From WW2 and onwards, it was possible to grow grain crops in the meadows, even though the humus-rich soil gradually deteriorated due to the subsequent exposure to oxygen.

In the neighboring area Vorup Enge, similar efforts were being carried out. As in the case of Vaeth Enge, the objective was to keep the water from flooding the meadows in order to increase the agricultural potential of the area (Hansen, 2011b). The local farmers had proposed the project around 1920, but the unfortunate outcome of the Vaeth Enge project made the farmers reluctant to set the project in motion. Favorable

governmental support in 1945 resulted in the project being carried out, as the government guaranteed for potential losses associated with reclaiming the land from the river. As the map illustrates, an area of 88 hectares of land were drained due the building of dams along the river. (Figure 2)

As in the case of the Vaeth Enge project, the construction of dams had some flaws, as water kept seeping in through them. The dams were repaired by adding extra material in 1962, which was only partly successful (Hansen, 2011b). As in the case of Vaeth, the meadows were depleted due to tillage, and the level of the meadows were 1 meter lower after 50 years of cultivation (Hansen, 2011b).

Both projects originates from a period in Danish history, where the development goals were to claim new land, and where actors such as farmers as well as the Danish state were prepared to pay the associated costs of the modernization process. The price was not only paid in terms on money, but also in losses of the ecosystem services which the meadows provided before the projects. The original meadows were a significant contributor to the regional biodiversity, both in terms of flora and fauna, as well as a major storage of carbon in the shape of the humus-rich soil. Another dimension was the potential for nitrate reduction by the wet meadows, which was not deemed problematical when the projects were initiated. A final price which modernization paid, was in terms of flooding risk. The dams had the effect of increasing water throughflow in the main river, which increased flooding risk further downstream. With the closest neighbor being the city of Randers, it can be argued that the process of agricultural modernization exported risks to the city. At the same time, new challenges with regards to maintaining agricultural productivity were introduced within the projects in Vaeth and Vorup Enge. In that regard, the areas surrounding the river and close to the city of Randers, were decoupled or disembedded from the development of the city.

#### *4.3 Reintegration of the urban fringe: new territorial development in the 1990s*

By the early 1990s the established urban industries were in a process of restructuring, and the city had to rely on other types of enterprises to support its future growth. At the same time, the agricultural areas close to the city had also reached a turning point. The benefits which should have emerged from the dike projects, did not constitute a lasting improvement, as intensive land use had to be abandoned due to increasing wetness (again caused by depletion of the humus-rich soil) even though so many efforts had been put into converting marginal lands into cultivated land. It

was also in the early 1990s that the first steps were taken towards a new kind of enterprise, which constituted a novelty in relation to most other enterprises known to Randers. The project Randers Tropical Zoo (in Danish Randers Regnskov) was based on a vision to create a new tourist attraction in Randers. Our inquiry into the Randers Tropical Zoo project is based on a recent industrial PhD project, which was carried out in collaboration between Randers Tropical Zoo and Department of Agroecology, Aarhus University (Christensen, 2013)

The project group behind the initial idea (both composed of private people with interest in biodiversity as well as actors from the municipality) entered into a formal partnership with the municipality. Randers Tropical Zoo was organized as a non-profit foundation. From an early stage, the municipality of Randers became a very active player in developing the project. An early indication of the active involvement of the municipality was that the city council designated a vacant area close to the river as the site of the enterprise. The core idea was to build a tropical zoo, where visitors should interact in a relatively direct way, as they were supposed to move through the ecosystems contained in the zoo. As the zoo was supposed to emulate tropical ecosystems, the exhibition should be contained in domes. Construction commenced in 1994, and in 1996 the first two domes were officially opened (RR, 2014a). The first two domes emulated an African and Asian rainforest, and were followed by a third dome with a Latin American rainforest environment, which opened in 2003. The enterprise has been successful, as it today attracts appr. 300.000 visitors each year, and have made a significant contribution to the local economy. (Figure 3)

Being coined as a zoo, it is no surprise that Randers Tropical Zoo exhibits many of the characteristics which have been attributed to zoos (Rabb and Saunders, 2005). This includes the provision of a certain degree of menagerie, e.g. the exhibition of exotic species, as well as serving as a living museum and as conservation centre. (Figure 4)

As illustrated by figure 4, the development of the notion of zoos have changed historically and has been observed to having integrated new aspects (Rabb and Saunders, 2005). The new role for the zoos of 21st century is moving beyond both a reactive approach just educating visitors coming to the zoo, and engaging purely in *ex situ* conservation projects. Furthermore, the surrounding community is sought engaged, with community understood in a wide sense including policy makers, scientists, citizens and companies, *ex* and *in situ*, in supporting a vision of creating a

more sustainable comportment towards nature (Christensen, 2013).

Randers Tropical Zoo has actively sought to transcend some of the established boundaries for zoos. One example of a formalized description of their strategic reorientation can be found in Randers Tropical Zoo's reformulation of a model from the international umbrella organisation for zoos. The strategy was developed as part of a new project with the working title Randers Bioplanet, which has been in development since 2008. (Figure 5)

Some of the core ideas include the vision of combining *ex situ* conservation with *in situ* conservation in novel ways. One of the significant innovations which can be attributed to Randers Rainforest is that they have interpreted this in a distinct territorial sense. Some of the projects that Randers Rainforest has initiated illustrate how they have enacted their distinct vision.

#### 4.4 Conservation projects

Randers Rainforest has engaged in various conservation projects in the immediate neighborhood of the enterprise. On the eastside of the domes, an orchard with rare or close-to-extinct Danish fruit tree varieties have been planted. The varieties of fruit trees have been acquired from both private and public holdings, such as gene banks and private orchards. As part of the process of reintroducing these rare varieties of apple, pear and plums, Randers Rainforest established a cooperation with the technical department of the municipality. The municipal gardening staff have planted seedlings or stems from the fruit trees in parks throughout the city. Even though the locations of the trees have not yet been georeferenced or made public through the web, rare genetic material has been spread through the urban space of Randers, thus enhancing urban biodiversity. Another significant conservation effort is the reintroduction of an ancient breed of Danish dairy cattle on the meadows in the south of Randers Rainforest, Vorup Enge (Klausen, 2011). The dairy cattle breed, Jysk Sortbroget, had been marginalized after the rising popularity of Holstein-based breeds of dairy cows which were introduced throughout the 19<sup>th</sup> century and has been threatened with extinction for many years. In 2011 Randers Rainforest found some surviving cows on a Danish farm and bought enough to be able to sustain a small herd. (Figure 6)

At present, the cows are not milked, leaving all the milk for the calves of the herd, which is less work-demanding on behalf of Randers Rainforest, whose staff manage the herd.

#### 4.5 Nature restoration

Randers Rainforest has also been involved in nature restoration projects. One of them is a collaboration with a private foundation, the Aage V. Jensen Nature Foundation, whose aim is to restore Danish nature and to protect wild animals (AVJF, 2014). The foundation was interested in reestablishing the former wet meadows surrounding the river Guden, specifically on the two locations Vaeth and Vorup meadows. In 2006, the foundation formed a partnership with Aarhus County (Randers was part of Aarhus county at that time) (Hansen, 2011b, 2011c). The foundation bought the meadows from the local farmers. The total area purchased by the foundation was nearly 700 hectares (as of 2012). In addition to the meadows Vaeth and Vorup on the southern side of the river, they have also bought meadows area on the northern side of the river. Aarhus County had an active role in relation to planning and implementation of the restoration of the wet meadows. The meadows were rewetted by breaching the dams along the river on both locations. As the figure below illustrates, a lake has now formed on the southside of the river. As the tidal pull affects the river as well as levels of rain, water levels in the lake is dynamic throughout the year. The interest on behalf of the county was not only nature restoration and biodiversity, but also to increase nitrate reduction, which has been a policy objective for several Danish Water Plans since 1987. (Figure 7)

The estimated nitrate reduction capacity for the two sites Vaeth and Vorup is appr. 70 tons nitrate/year (Hansen, 2011b, 2011c), which is a significant addition to the services provided by the meadows, apart from their contribution to local biodiversity. Another service which has been reintroduced, is flooding buffering, as the breaching of the dams at the two locations acts as a buffer to the flow of water in the river, which again reduces flooding risks further downstream.

The meadows are not only used for nitrate reduction. As mentioned above, ancient breeds of cattle are grazing on Vorup Meadows. The most recent expansion of the functions of the meadows, is a rewilding project, where another species close to extinction, European bison, have been reintroduced to the area close to the river, a bit further west from Vorup Meadows. Randers Rainforest has bought a small number of bisons from a herd in Poland. European bison was also an integrated part of the Danish landscape before the Middle Age, but vanished as their habitats were significantly altered by the rise of pre-modern agriculture. (Figure 8)

## 5. Discussion

The developments in Randers can be described as different phases of disembedding and subsequent phases of reembedding. Disembedding has been taking place both with regard to rural and urban spaces, and in particular regarding the connections between them. The established urban industries of Randers experienced throughout the 1980s a disembedding from the economy as they were subject to pressure to adapt to changing market conditions. Most of them were not able to meet the challenges. Also in the surrounding rural areas, disembedding took place. The modernization process of Vaeth and Vorup meadows in the 1930s resulted in a disembedding of the areas from the development of the city, particularly with regard to ecosystem services. The meadows used to serve as a buffer in relation to flooding, a service which was removed by the building of the dams along the river. Another service which was disembedded was nitrate reduction. From 1987 and onwards, Denmark experienced a major political attention to reducing nitrogen leaching from agricultural areas (Grant *et al.*, 2002; Miljøstyrelsen, 2014; Regeringen, 2004). The background was the public debate concerning the effects of surplus nutrients on the aquatic environment, both with regards to surface water (phosphorus and nitrogen) and groundwater (nitrogen). The loss of nitrate reduction capacity which can be attributed to the draining of the meadows, was a very direct result of trying to embed the meadows into modern rational farming systems.

In the case of the meadows, they were expected to become embedded into rational, efficient farming. But even though some success was achieved trying to enhance the agricultural capacity of the meadow areas, the meadows could still not be considered to be highly productive, and over time they became subject to rewetting due to the depletion of the humus-rich soil. In that regard, the meadows did not become embedded into modern, rationalized farming systems and modernization can in this context be described as, quite literally, an unfinished project. The meadows did become 'left-over' qualities, qualities which were of no use for either agro-industrialization or urban industrialization.

The modernization process within the city experienced a major shift, as many of the established workplaces were shut down or restructured during the latter half of the 1980s and early 1990s. The process of change within the urban economy is the distinct entrepreneurial context within which the first incarnations of the project later known as Randers Tropical Zoo emerged. Instead of continuing the path towards industrial modernity, the zoo project represented a distinct kind of economy, namely experience

economy (Pine and Gilmore 1999). But at the same time, Randers Tropical Zoo interpreted their role as a zoo in a distinct territorial sense. Instead of pursuing conservation projects in remote locations alone, they also wished to enhance biodiversity in their local area. This process has played out as collaboration between public authorities (Randers Municipality, Aarhus County) and private actors (Aage V. Jensen Nature Foundation). The conservation projects on Vorup meadows, including the reintroduction of local endangered breeds of cattle, and the rewilding project on the south bank of the river have not only helped to increase local biodiversity, but have also made a valuable contribution to the enterprise of Randers Tropical Zoo. The conservation projects have also reintroduced some significant ecosystem services: first and foremost nitrate reduction, which is an important contribution to meeting the objectives within the Danish Water Directives, and in recent years, the objectives of the EU Water Frame Directive; another reintroduced service is buffering of surplus freshwater, which serves as flooding regulation.

The projects on the fringe of the city of Randers are an example of how rural and urban space can be reintegrated. An important driver for this process has been the crisis within both the urban and rural domain. Randers Tropical Zoo emerged as a distinct territorial approach to redeveloping the local economy, as it acts as a hub, a junction of interrelations, for many different ways of revalorizing territorial assets. The zoo is placed on a low-lying area close to the river, neighboring other areas which originally had been designated for industrial use. The municipality were during the mid-1990s aware that the low-lying areas were not very fit for industrial use, due the high risk of hazardous substances being spilled should leak into the aquatic environment. The zoo offered an opportunity to introduce a distinct form of enterprise, which were not potentially harmful to the natural environment to the same degree as the established industries. In that regard, the zoo integrates two former 'left-over' areas, the meadows on the banks of the river and the high-risk industrial zone close to the river. The result is that the zoo acts a hub where 300.000 visitors each year can walk through the exotic environments within the domes, but they can also walk through the meadows and experience rare species of animals as well as the abundant bird-life on the wet meadows, which can be observed from a number of watchtowers which have been built throughout the meadows on both sides of the river. Other local effects include the reduction of flooding risks for the local community. In addition, the wet meadows also act on more aggregate scales, as the meadows remove tons of



surplus nitrogen, which originates from agricultural areas beyond the area. Apart from the reintegration of local services and functions, Randers Tropical Zoo are still engaged in ex-situ conservation projects, as well as other international engagements. In terms of its complex spatiality and its revalorization of territorial assets, Randers Tropical Zoo exhibits some of the characteristics which Sonnino and Marsden (2006a) have attributed to eco-economy. They emphasize that eco-economy is characterized by being both “..vertically (i.e. politically and institutionally) disembedded and horizontally (i.e. spatially and ecologically) embedded” (Sonnino and Marsden, 2006a). Sonnino and Marsden also emphasize that actors involved in eco-economy are distinguished by an “..ability to reconfigure the time-spaces and the spatial relations around them; in this sense, many of the actors involved are active geographers..(..)..however, this does not mean that they are completely separated from the powers, conventions and competing geographies of the conventional sector..” (Sonnino and Marsden, 2006a)

The latter observation touches upon some of the more critical perspectives of the projects in Randers. Marsden (2013) acknowledges that there are many examples of radical systemic and structural change, which can be attributed with the notion of eco-economy. Some of the examples have been documented both in the UK context as well as in other European contexts (Kitchen *et al.*, 2006; Sonnino and Marsden 2006a, 2006b; Sonnino 2007; van der Ploeg and Marsden 2008; Kitchen and Marsden 2009). Across these cases, the challenge is that these might “..occupy a multiplicity of lower level niches and have yet to demonstrate their scalability to a level at which they are seen as true competitors..” as Marsden puts it (2013). It can be argued, that the scalability of the experiences in Randers might be limited. One argument is that the geography of the city is unique, with a river running through the city, thus connecting the city with green spaces which stretches for miles both east and west to the city. The zoo has managed to reintegrate many of the ‘lost’ services and ‘left-over’ spaces, and have thus been successful with regards to improving the green infrastructure of the city and to utilize the distinct geography of the city. The city of Randers have also seen the emergence of another successful experience enterprise, an Elvis Presley Museum, which indicates some degree of experience economy clustering (elvispresley.dk 2014). Randers Tropical Zoo has not been equally successful in establishing new projects which stretch beyond experience economy, even though efforts are being made. The zoo, in collaboration with Aarhus University and the dairy company ARLA, have during recent years applied for

funding for projects which were supposed to develop food products based on milk from their rare breeds, as well as other place-specific food products. This particular project was planned to be upscaled from the site of the zoo to include farms along Randers Fjord with similar geographical attributes. The applications have so far been unsuccessful. Some of the participants in these applications have argued that scalability, and more specifically, contestation over the issue of scalability on behalf of the funding committee might have played an important role in the (negative) assessment of the proposals (Dalgaard and Kjeldsen, 2014). It can thus be argued, that the scalability of the projects in Randers still has to be demonstrated on a wider scale.

## 6. Conclusion

Will it be possible to something similar to the projects in Randers in other locations? The tropical zoo project has demonstrated that it is possible to revalorize ‘left-over’ parts of urban and rural space and reintegrate them into the local economy and improve green infrastructure. Even though there are distinct features of the geography of Randers, which might also reduce the scalability of the projects, it is not the only project which has paved new ways into a more territorially embedded economy, which seeks to revalorize territorial assets. Many other projects, which cut across different sectors, have been documented (Kitchen and Marsden, 2009; Kitchen *et al.*, 2006; Sonnino, 2007; Sonnino and Marsden, 2006a, 2006b; van der Ploeg and Marsden, 2008). These projects share many similarities with the project in Randers. One of the common challenges is the issue of scalability, which will be very important to address for the Randers projects in the years to come.

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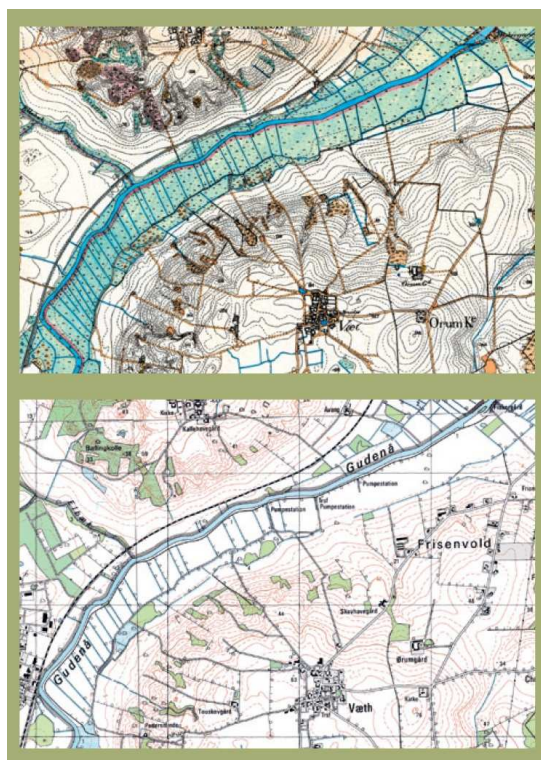


Figure 1. Vaeth meadows before (1878) and after (2001) the project (Hansen, 2011c)

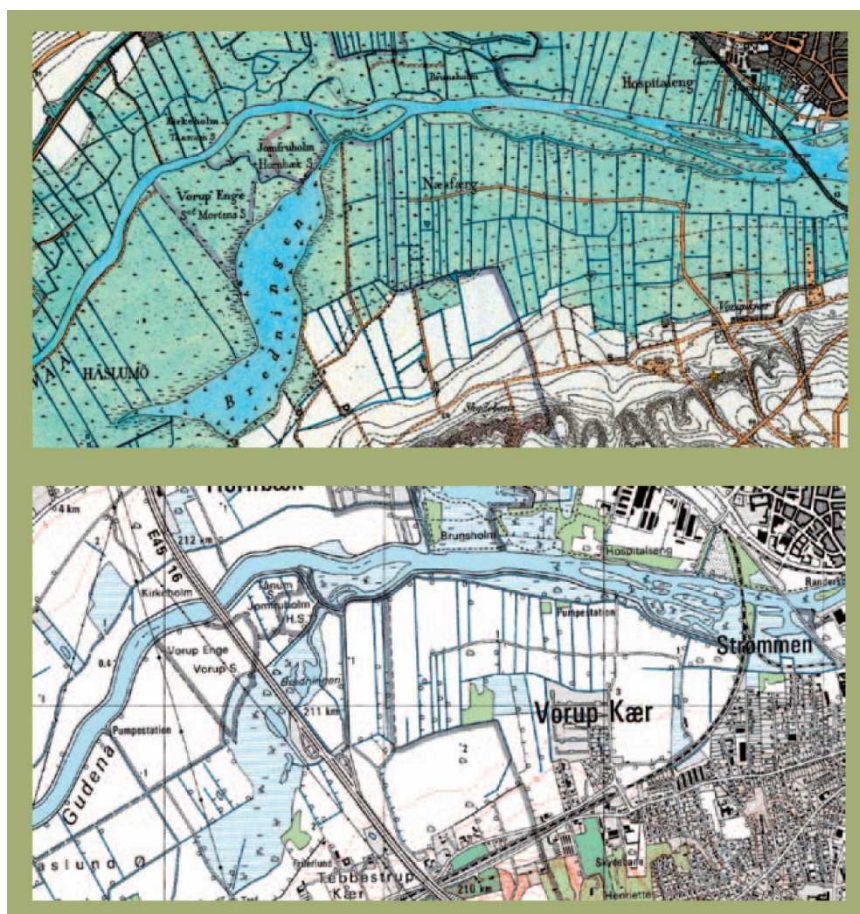


Figure 2. Vorup Enge before (1878) and after the project (2001) (Hansen, 2011b)





Figure 3. Randers Tropical Zoo – overview (RR, 2014b)

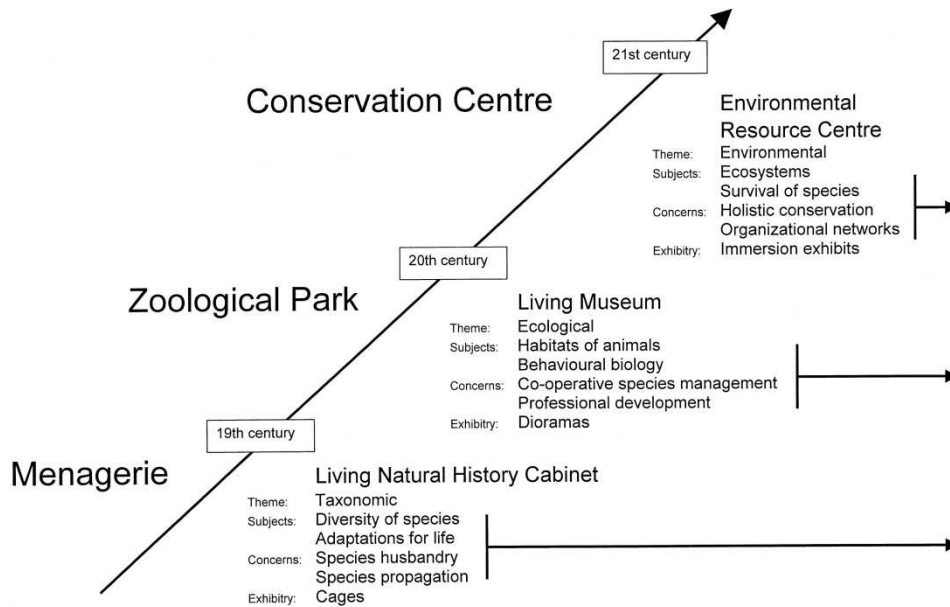


Figure 4. Evolution of zoos and aquariums (Rabb and Saunders, 2005)

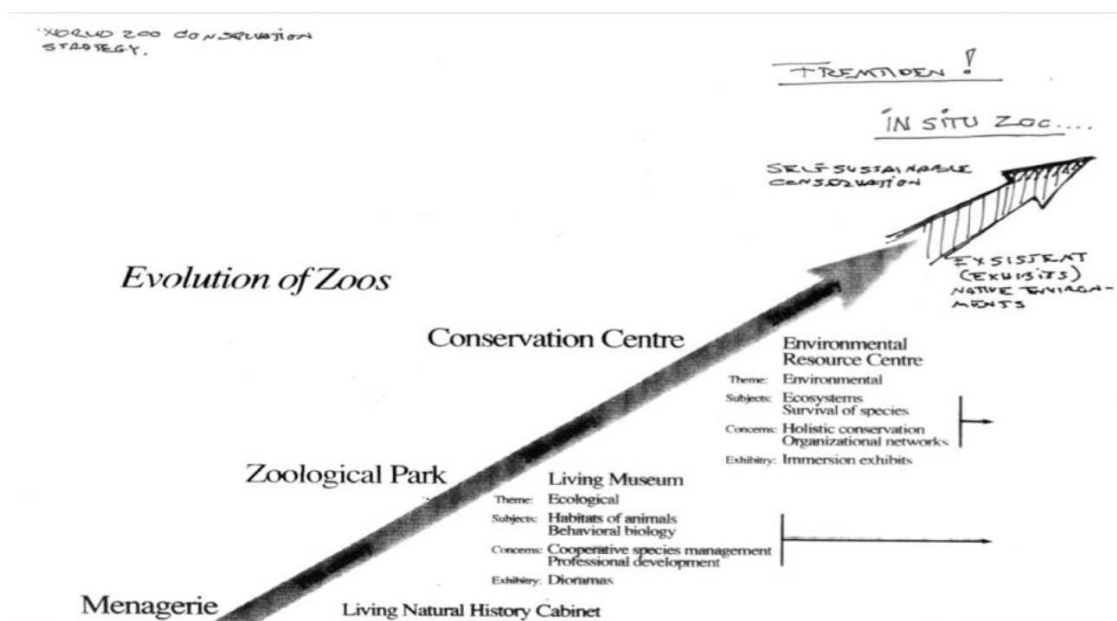


Figure 5. Evolution of zoos - vision for the proposed Randers Bioplanet project. Meeting notes (Christensen, 2013)



Figure 6. Ancient Danish dairy cow breed grazing on Vorup Meadows (RR, 2014b)





Figure 7. Overview of the reestablished wet meadows of Vorup in 2013 (GoogleMaps, 2014)



Figure 8. European bison on the meadows on the southside of River Guden (RR, 2014b)



