Oil Shale, 2003, Vol. 20, No. 1
pp. 25-32
ISSN 0208-189X

https://doi.org/10.3176/oil.2003.1.04

LANDSCAPE EVALUATION IN INDUSTRIAL AREAS

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In the North-East of Estonia, the landscape is contrasting: different natural and man-made landforms exist together. In this area, oil shale mining and processing have essentially changed the landscape, and as a result, different man-made industrial landscape forms have come into being. The attitude of local inhabitants towards the heritage of oil shale industry has been traditionally negative. Nevertheless, the artificial "mountainous" and "hilly" relief offers also a positive effect, having some expressive image in the background of the natural plain landscape forms. For protection of cultural landscapes from damages, 32 landscapes that are more valuable were selected, whereat the historical, cultural, natural, recreational, aesthetic, scientific, etc. factors were taken into account. In the future, a special stewardship for more attractive areas will be worked out.

Introduction

Landscape is an ever-changing entity due to natural processes and human activities. In the same time, landscape is a resource of many different values. The goal of sustainable landscape and land-use planning is to find those values and to design different management ways for optimal use of these values in the future [1, 2]. However, the evaluation process involves the problem of changeability of the landscape values, which are as variable as the whole landscape.

Those problems are especially topical for the north-eastern part of Estonia (NE Estonia) where local oil shale industry – oil shale mining, its combustion in power plants and thermal processing in chemical plants – has essentially changed the landscape, and as a result new artificial landscape forms have come into being. Because of that, the landscape in the NE Estonia is contrasting: different natural and industrial landforms exist together.

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The present paper deals with specifics and evaluation of cultural and industrial landscapes in NE Estonia, as well as describes the role and value of industrial landscape elements in identity of the local inhabitants.

Study Area

The study area (over 3,370 sq km) is located in the North-East of Estonia (Ida-Viru County) between the Gulf of Finland and Lake Peipsi, bordering on Russia in the east (Fig. 1). In this area the Estonian oil shale basin is situated (the largest commercially exploited oil shale deposit in the world). The Estonian deposit has been exploited since 1916, and its total yield tops about 1,000 million tons of oil shale.

From the very beginning both methods – the open-cast and underground mining have been used. The resulting man-made landforms (quarries, deformed areas, waste heaps, ash plateaus, etc.) which are related to oil shale mining, thermal processing and burning in energetic facilities are an important component in the landscape of NE Estonia. Today the total mined-out area constitutes about 330-335 sq km with nine closed mines, two operating underground mines and two open pits located on this territory.

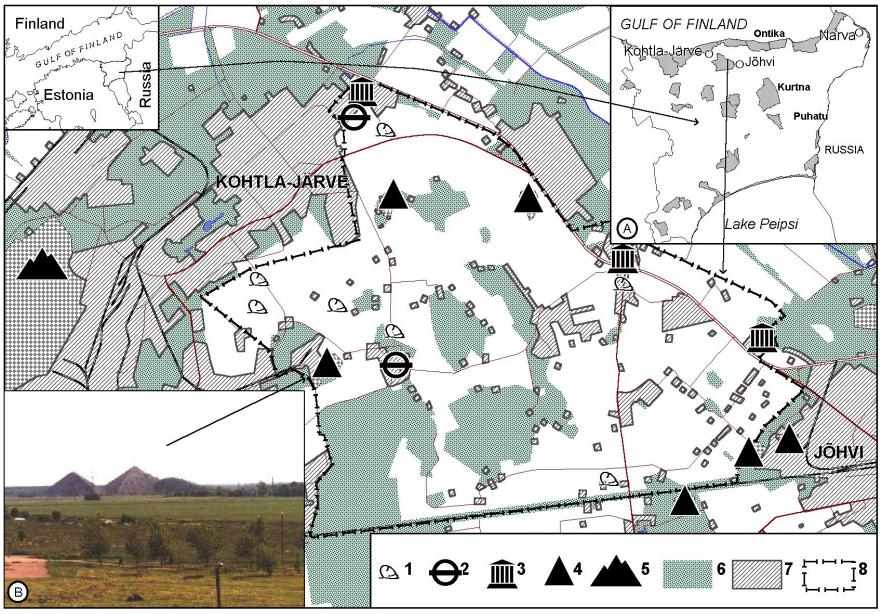

Fig. 1. The study area: *A* – location of all valuable landscapes in Ida-Viru County; *B* – view to typical heaps. Legend: *1* – cult-stones (sacred dimpled stones used for rites since 5th century BC to the Middle Ages); *2* – old settlements from the Bronze Age (1500–700 BC); *3* – manor estates from Middle Ages; *4* – heaps (waste piles); *5* – semi-coke dumps; *6* – forests; *7* – building areas; *8* – border of valuable landscape

Typical direct effects of mining involve cutting of forest for expanded mines, subsidence of forest and farmlands. About 115 sq km of the NE Estonian territory are occupied by open pits and there are 32 waste piles with a total area of 3.4 sq km there. These "artificial hills" have mainly the shape of a reversed cone with height between 13–55 m. The ash (semi-coke) dumps near oil shale processing plants (near the town of Kohtla-Järve) cover an area of about 2.4 sq km. The ash dumps are over 100 m high, thus having the highest relative height in NE Estonia. The area of ash plateaus, which stretch in the neighborhoods of oil-shale-fired power plants near the town of Narva, is more than 20 sq km [3–6].

Besides this, Ida-Viru County has a varied nature where many interesting and beautiful natural landscape forms can be distinguished. Here the North Estonian glint and limestone cliff is at its highest and most magnificent, reaching 56 m above the sea level at Ontika (see Fig. 1). Also, many beautiful natural areas are present, including the coastal areas of Gulf of Finland and Peipsi Lake, etc., bogs and swamps, natural forest areas, etc.; altogether eleven nature and landscapes preserves have been formed.

The sandy beach of Narva-Jõesuu (to the north from the town of Narva) is one of the most suitable areas for recreation in Estonia. In the central and southern part of NE Estonia, the mires are a characteristic feature of landscapes: on this territory the Estonian largest system of mires – Puhatu – is situated, together with the biggest lake system of Kurtna (forty lakes on the area of about 15 sq km).

Methods

In 1999, a project to define the more valuable landscapes was initiated by the Estonian Government. The main aim of this project was the selection of unique landscapes with important aesthetic, cultural, natural or recreational values. It included also necessary directions for landowners to co-ordinate their activities (such as constructing buildings, mining operations, soil improvement, etc.), which may cause essential changes in the landscape. For selection and determination of valuable landscape areas, a method designed by the Institute of Geography of Tartu University and the Institute of Environmental Protection of Estonian Agricultural University was used [7].

In order to define valuable landscapes, the following aspects were taken into account: cultural-historical, aesthetic, natural, recreational, and scientific ones, as well as the aspect of identity and self-consciousness.

Areas with significant **cultural-historical** value were defined as traditionally cultural landscapes. During the last century, the structure of settlements and land-use has been generally persistent with only insignificant changes. Those areas where historical signs from different periods have been aggregated and preserved (the so-called "areas of historical concentrate") as well as intellectual heritage are also valuable. An additional attraction is

provided by churches, old manor and farm houses, dwelling houses and factory buildings with original architecture located there, any ancient populated areas, monuments and memorials, strongholds, birthplaces of famous prominent figures in social and cultural life, connection with former battlefields, folk traditions or legends, etc.

Beautiful landscapes, their variety, originality, guardianship and magnificent views from roads were estimated as **aesthetic values**. As a rule, abundance of valuable natural and historical objects ordinarily gives a visually remarkable effect to landscapes and those areas are aesthetically significant too.

Naturally valuable objects include primeval trees, old parks, boulders, landforms with geologically or geomorphologically original history and structure, etc. (some of them also possess **scientific value** as research objects).

Nature protection objects, as well as mosaic landscape areas (including the natural groves, half-natural grasslands, water bodies, smaller wetlands, etc.) were considered **especially valuable areas**.

Areas with sandy beaches, water bodies, varied relief and vegetation, beautiful views and sights, also hiking paths, camping and campfire places (**recreation areas**) are more suitable for tourism.

The areas and objects having a significant importance for local inhabitants and being in need of special care were classified as **valuable landscapes in terms of identity and self-consciousness**.

Results and Discussion

Register of Valuable Landscapes

To specify valuable landscapes, a detailed regional database of local natural and historical sights and other objects was compiled. As a result, more than 1,050 different objects [8, 9] were inventoried and placed to the regional (Ida-Viru) map, using GIS-methods. An analysis of the collected data proved that the majority of the valuable objects had been concentrated over the county's territory in the form of clusters. Such clusters were specifically defined, and more attractive areas, whose borders and aesthetic value were established more exactly during field works, were selected. Each of those valuable areas was characterized in the special Register of Ida-Viru County Valuable Landscapes (RVL).

In the course of the project, 32 cultural landscapes were selected, for which the means of protection in order to preserve their present appearance will be applied. Most of them (see Fig. 1) are located in the northern (coastal area of the Gulf of Finland) and southern (coastal area of Lake Peipsi) part of the studied area. In the central part of the region (west and north of the town of Jõhvi), the industrial areas dominate.

In RVL each valuable area was characterized by the following data:

1. the name of the landscape (area); call number; size and location;
2. the category of the landscape dependent on the quantity of valuable objects in the selected area and their essence;
3. the type of landscape (city, settlement, agricultural, natural, industrial or another landscape);
4. detailed description of cultural, historical, aesthetic, natural, recreational, scientific and identity values; guardianship level at the present and recommendations for managing in the future.

The map and photos of more attractive objects were also added. In the future, a more detailed stewardship for selected landscape areas will be devised.

In reality, the landscapes and human principles of landscape value estimation are continuously changing. Those elements, which seem normal or even inconspicuous today, may turn out to become unique and valuable in the future. In this context, the aforementioned problems are more topical in NE Estonia (Ida-Viru County) where the natural and industrial contrasts within the landscape are expressed more significantly. Side by side with virgin forest, swamps and wide areas of land damaged due to oil shale mining and processing are located. Such examples include turned up subsoil in open pits, deformed ground surface on the underground mining areas, ash dumps and solid residue waste heaps near oil shale separation mills, etc. It is a widely propagated opinion among the local inhabitants that such areas are irrevocably lost. Nevertheless, the damaged areas have acquired a qualitatively new value.

Specifics of Industrial Landscapes

One more typical culturally valuable area with industrial elements is located between the towns of Jõhvi and Kohtla-Järve (see Fig. 1). This region is a famous age-old settlement area with farming traditions. In 1916, the oil shale production started there: in the beginning in small quarries and later in underground mines. As a result, totally new conspicuous landscape elements have appeared – the heaps (waste piles) of solid residues from oil shale separation and so-called "black mountains" or semi-coke dumps (hills) from oil shale chemical processing. In the north-eastern part of Estonia these landscape elements are still well known as symbols of oil shale and related environmental and national problems.

Because of reduction in oil shale production (about three times since 1991), environmental problems in the landscape of the so-called "oil shale area" have decreased and changed. For example, some objects are advertised as well-known tourism objects, and many of them are used for sport and leisure.

The main questions are: which will be the status of industrial landscapes in the future and what is our position towards the impacts of oil shale mining on the landscape?

Two main approaches are possible: we may consider the man-made new landforms either a part of culture or an already inseparable part of natural landscapes. Both ways of approach are feasible [10].

In the first case, as the "heaps" are man-made, they should be taken into account as objects of cultural landscape.

In the second case, considering human activity the main feature of cultural landscapes, practically no human impact on the heaps will remain after mine closure, and the successive natural processes can start there. At present orchids are found on the slopes of old semi-coke ash dumps and, according to the Estonian Law of the environment, those areas must be protected.

More approaches are possible if we look at the reality surrounding us as an aggregation of layers (like data layers in the GIS). Such layers can be physical, mental, historical, economical, etc. sides of landscape cognition. Attitude towards landscape value judgment depends on the importance of any layer for a person or public opinion. For example, the semi-coke dumps and waste piles (see Fig. 1) may have, in respect to landscapes, the following different aspects:

- Firstly, they may be sources of surface water and air pollution.
- Secondly, they may be treated as natural laboratories of succession where natural process of development proceeds in extreme conditions.
- Thirdly, the mountains may be treated as a new hilly relief what enriches our natural monotonous plane landscape (Fig. 2). Peaks of hills offer us beautiful views.
- Also we can treat those "hills" as just temporary warehoused material for road building, crude for our future chemical industry, etc.

Fig. 2. The industrial landscape in NE Estonia: view of the semi-coke dumps ("black mountains") in Kohtla-Järve (*author: Aarne Luud*)

The above-described aspects form one possible position in respect of industrial landscapes: we may see here a symbol of environmental pollution and land damages. However, there may be another viewpoint: the industrial landscapes as such may be considered monuments to the work of our parents and grandparents representing an important period in development and history of Ida-Viru County. In any case, the industrial landscapes and their elements will remain after the termination of oil shale mining and processing. They certainly have an essential role in the identity of the local inhabitant. At the present time, this part of identity has slighting cognitive aspect, but there are also essential positive nuances.

Thus, the main problem for future planning is: how to organize the management of defined valuable landscapes to preserve everything of value and to avoid irrational changes. One extreme method is to preserve landscapes at their present state. In the long-term perspective this so-called "museum method" will be expensive and may prevent normal development of the region. Another extreme would be a self-acting development. However, uncontrollable succession will make to disappear some of the existing beauty sights and views. It is necessary to discuss which values are important for local habitants and how many resources they are willing to spend to preserve or develop landscapes. Changing and management of landscape processes is probably rational only in cases when they damage the environment; otherwise there is no need to change natural processes.

Conclusions

In Ida-Viru County, in the area of the Estonian oil shale basin the valuable cultural landscapes were determined which differed from the rest by their aesthetic value and large quantity of valuable cultural-historical and recreational objects. In some of such areas, the artificial man-made landforms (a result of oil shale mining and processing) are located.

The attitude of local inhabitants towards the heritage of oil shale industry is traditionally negative because of several objective historical and environmental reasons. Negative nuances overshadow the industrial landscapes which deserve more distinction and attention. In the future the status of industrial landscapes needs a more exact defining, and special means must be worked out to protect and manage those valuable cultural areas.

Acknowledgements

This work is a part of complex studies in the field of industrial landscapes evaluation (theme No. 0282119s02). We would like to thank the Ida-Viru County Government for financing the project of valuable cultural landscapes

defining in Ida-Viru County area. The authors are grateful to A. Kont and R. Rivis for inventory of valuable objects.

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Presented by E. Reinsalu
Received July 12, 2002