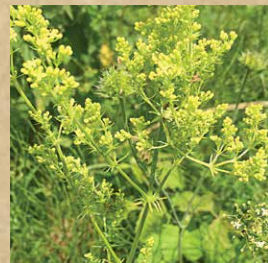




# Grassservice

“Alternative use  
of biomass for  
maintenance of grassland  
biodiversity and ecosystem services” **Layman’s  
report  
2013-2017**



**“Alternative use of biomass for maintenance of grassland biodiversity and ecosystem services”  
Layman’s report**

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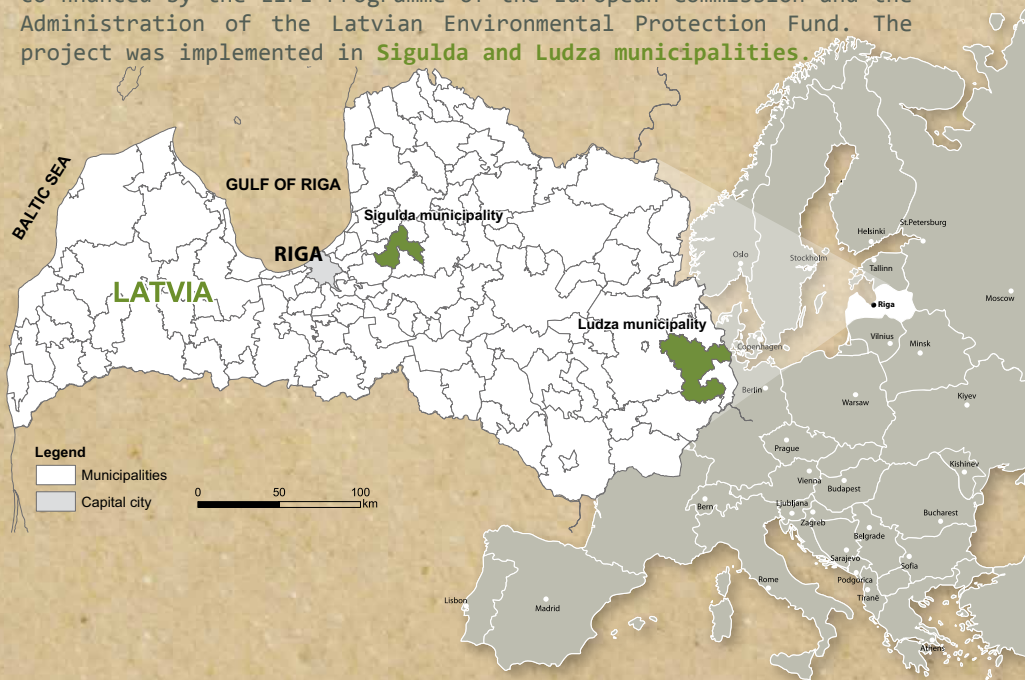
# Introduction

The idea of the LIFE GRASSSERVICE project arose in 2012, observing trends in the Latvian countryside. The grassland – an ecosystem that has developed through interaction between man and nature, and provides a home for many plant and animal species and countless benefits for man, – often deteriorated in many places due to the lack of management or, on the contrary, over-intensive management. As a result, many grassland areas deteriorated in biological quality, were overgrown with trees and shrubs, or destroyed by being transformed into arable land.

Another problem that alarmed the authors of the project was the under-utilisation of grass resources often observed in many places. The management of many grassland areas was limited only to mowing and removing the grass, or, in the worst cases, shredding and leaving it on the spot. Land owners received rural support payments for maintaining the grassland, while the grass biomass was being wasted as a resource.

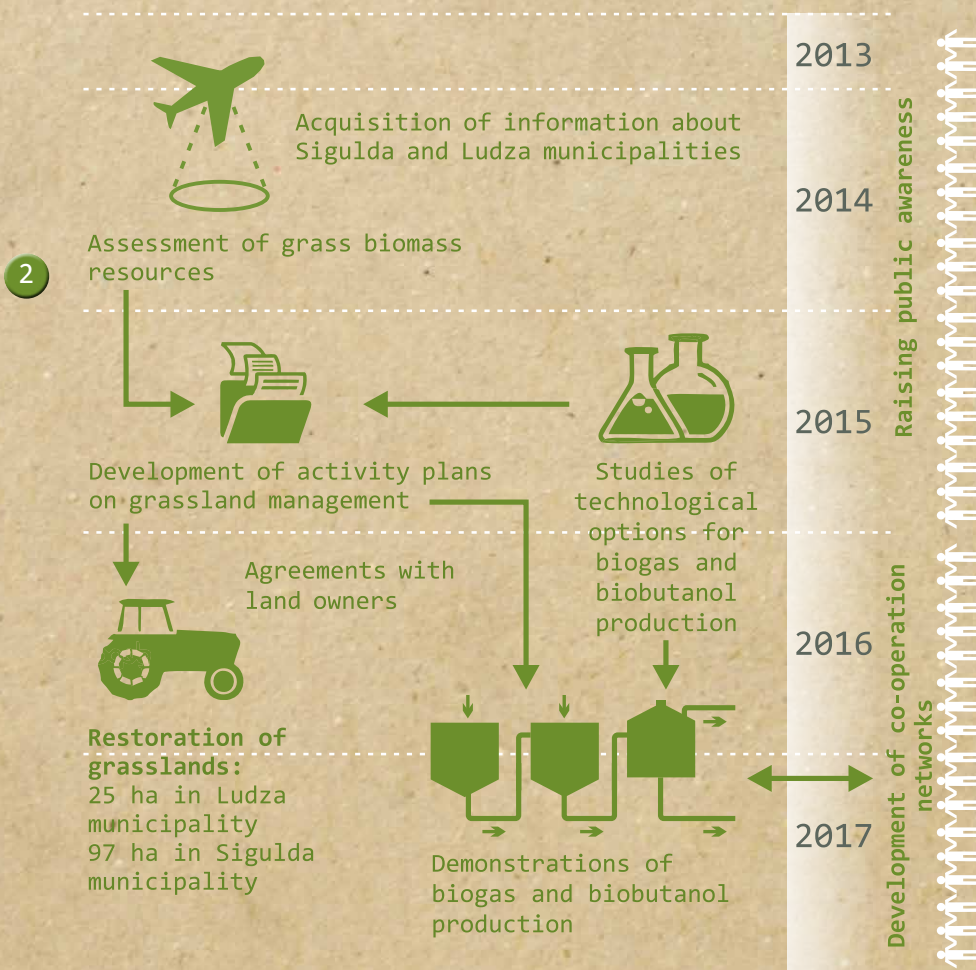
As agriculture was stagnating, and it was clear that livestock farming could not absorb the available grass resources, the idea of the alternative use of grass biomass resulted in the implementation of the LIFE GRASSSERVICE project. The **goal** of the project is to ensure maintenance of biologically valuable grasslands by enhancing alternative, economically sustainable approaches to the use of grassland biomass, as well as establishing co-operation models between farmers, entrepreneurs and local authorities.

The total **budget** of the project was approximately 1.3 million euros, co-financed by the LIFE Programme of the European Commission and the Administration of the Latvian Environmental Protection Fund. The project was implemented in **Sigulda and Ludza municipalities**.



## Project in brief

The project involved organisations of various backgrounds: the NGO **Baltic Environmental Forum - Latvia** implemented the project management and supervised grassland restoration activities in Sigulda municipality, the **Latvian Fund for Nature** performed the assessment of grassland habitats and grass biomass in both project areas, **Bio RE Ltd.** and **Riga Technical University** explored possibilities of producing biofuels from grass biomass and constructed pilot facilities for demonstrations of fuel production, while the **administrations of Sigulda and Ludza municipalities** ensured cooperation with the local inhabitants; in parallel, the **administration of Ludza municipality** also implemented grassland restoration activities in its territory.







## Assessment of grassland quality and grass biomass

- In 2014-2015, information on the distribution and quality of grasslands, as well as the quantity and productivity of grass biomass depending on the type of habitat was gathered in the project areas - Sigulda and Ludza municipalities - by using fieldwork and remote sensing methods (obtaining high-resolution data from an aeroplane), as well as radar and satellite data.
- Studies of grassland quality proved that, of the biologically valuable grasslands, only 20% in Sigulda and 41% in Ludza municipality can be assessed as good or medium quality; the remainder is of low quality or does not even meet the minimum quality requirements.
- The number of livestock in Sigulda and Ludza municipalities is not sufficient to consume all the available grass biomass - 67 thousand tonnes in Sigulda and 120 thousand tonnes in Ludza municipality. The obtained data shows that approximately 30% of Sigulda and 60% of Ludza municipality grass is not used.
- The economic value of grasslands was estimated in both municipalities based on the biogas producing potential reaching 1.6 million euros in Sigulda municipality and 2.8 million euros in Ludza municipality.
- Based on the results of the assessment, the project activity plans for Sigulda and Ludza municipalities were developed, including the assessment of the condition and existing management of the grassland, a proposal for a grassland ecological network, priority grassland restoration sites, as well as demonstration activities of alternative uses of grass biomass.

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The methodology of the assessment of grass biomass developed within the project and the resulting information on grassland productivity, as well as the methodology for assessing grassland management, can also be used in other projects and research.







## Grassland restoration in Sigulda municipality

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- In Sigulda municipality, grassland restoration took place in an area of 97 ha - 62 ha in More parish, 9 ha in Allaži parish and 26 ha in Sigulda parish and Sigulda town.
- The restoration works were performed between autumn 2016 and the end of summer 2017. The activities were hampered by unfavourable meteorological conditions: high rainfall, warm winters with a short frost period, as well as a cool summer with a late vegetation season, making it difficult to transport and use machinery.
- Trees and shrubs have been felled, stumps and roots milled and soil levelled in the restoration sites. In order to facilitate the dissemination of plant seeds, the so-called "green-hay method" was tested for the first time in Latvia, spreading freshly mowed grass from biologically valuable grassland onto the places where the soil was exposed during restoration activities. Controlled burning was carried out in one of the areas to get rid of the accumulated thatch and nutrients in the topsoil. Primary mowing was carried out after the restoration in all grasslands.
- There are habitats of European Union significance in the restored grasslands: 6120\* *Xeric sand calcareous grasslands*, 6210 *Semi-natural dry grasslands and scrubland facies on calcareous substrates*, 6270\* *Fennoscandian lowland species-rich dry to mesic grasslands*, 6450 *Northern boreal alluvial meadows*, 6510 *Lowland hay meadows*.
- The restored grasslands will be used as pastures for cattle and horses, as well as attractive elements of the landscape enjoyed by visitors to the Gauja River valley. In one of the territories, it is planned to develop a "glamping" facility (a well-equipped campsite).





## Grassland restoration in Ludza municipality

- In the town of Ludza, a grassland area of 25 ha between the Lake Mazais Ludza and Lake Dunāklis has been restored by felling trees and shrubs, removing stumps and roots and levelling the soil, as well as removing stones and waste. The so-called “dry hay method” was tested on the grassland, spreading hay with biologically valuable grass seeds on the restored areas. Primary mowing was carried out after the restoration.
- The restoration works were performed between autumn 2015 and the end of summer 2016.
- The habitats of European Union significance 6210 *Semi-natural dry grasslands and scrubland* can be found in the restored area.
- Restoration works have not only improved the biological and agricultural quality of the grassland, but also the landscape of this site favoured by local people. Today, all travellers on the road can enjoy the view of Lake Dunāklis previously hidden by trees and shrubs. The restored grassland will be managed using the grass and hay as fodder or bedding for livestock.

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The extensive experience gained within the project, unique to Latvia, in the restoration of grasslands and organisation of work (using appropriate machinery, the impact of weather conditions on the organisation of work, testing new methods) will later be transferred to other experts, stakeholders and project beneficiaries in Latvia for applying on a larger scale.







## Biofuels: biogas

- Biogas is one of the most widely produced biofuels, which mostly consists of methane released during the anaerobic fermentation process.
- Within the project, experts of *Bio RE Ltd.* experimented with the estimation of the biogas producing potential of grass biomass when exposing raw grass, silage and hay to various physical-chemical processes (including mechanical shredding, steam explosion, chemical treatment) with the aim of developing the most efficient technology for its full use in biogas production.
- Based on the results of the research, a biogas pilot facility (prototype) was developed with an innovative reactor design, allowing biogas production with methane concentrations 13-15% higher compared to the existing plants, which use grass biomass as feedstock. The combined hydrolysis process ensures a high degree of hydrolysis of grass biomass that is required for biogas production. The hydraulic retention time (the time when the feedstock stays in the system producing all planned biogas) is only 14 days, which allows the same amount of biogas to be obtained from a much smaller biogas reactor.
- A reactor of 600 l volume is capable of processing 50 kg of grass biomass per day, producing 5 m<sup>3</sup> of biogas, or 100 m<sup>3</sup> per tonne of grass; the prototype also includes a combined heat and power (CHP) plant with an electric power output of 2 kW and a heat output of 4.5 kW.
- During the demonstrations, around 330 people visited the biogas pilot facility in Ludza and Sigulda municipalities (data as at the project's closing seminar in November 2017).

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Subsequent to project completion, the demonstrations at the pilot facility in Latvia will continue. The results will be used for the development of an industrial scale biogas plant.







## Biofuels: biobutanol

- Biobutanol is a liquid biofuel with properties closer to petrol than those of ethanol. 1 tonne of dry biomass can yield 50-250 litres of biobutanol.
- Within the project, experts at Riga Technical University conducted studies in how to adapt the existing biobutanol production technologies to the use of grass as feedstock. The optimal amounts of the loading dry and wet biomass and the most appropriate biomass fraction sizes were identified in order to reduce the processing time and energy consumption.
- The studies led to the conclusion that the optimal biomass size is less than 1 cm, and 24 hours of environmentally sound biological treatment is sufficient to produce around 250 kg of sugars from 1 tonne of dry biomass, which further serves as a raw material for biobutanol production.
- The new technology is intended for small-scale production facilities with a variety of possible raw materials (dry and wet grass, agricultural waste, wood, chips) and can be combined with other product production lines.
- During the demonstrations, around 330 people visited the biobutanol pilot facility in Ludza and Sigulda municipalities, and approximately 200 visitors became acquainted with the facility at the premises of Riga Technical University (data as at the project's closing seminar in November 2017).

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After completion of the project, it is planned to develop a mobile biobutanol production unit on the basis of the current pilot facility, which will allow it to be transported to places where raw materials are available.





## Public awareness

- The aim of the public awareness actions of the project was to enhance knowledge about the diversity of grassland ecosystems, biologically valuable grasslands and alternative uses of grass biomass.
- 4 information boards have been developed and installed within the project; altogether, 14 articles on project activities have been published in local newspapers; 3 scientific articles, several reports and booklets have been prepared; 10 informative and demonstration events took place in the project pilot areas.
- The project has been presented in more than 20 different seminars, forums, conferences and meetings in Latvia and abroad; it was promoted on social networks and websites, as well as many events familiar to the public, such as the education and music event "Nature Concerthall", the outdoor conversation festivals "Pārceļtuve" and "Lampa".
- As one of the aims of the project was to facilitate cooperation among landowners, tenants, farmers, entrepreneurs and the local government, special information exchange platforms have been developed on the websites of Sigulda and Ludza municipalities aimed at optimising grassland management by publishing information on available/required grass biomass, providers of grassland management services, as well as land lease. The information platforms are available on the websites of the municipalities under the section about the LIFE GRASSSERVICE project.

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More information on project activities and results, as well as reports and publications are available at [grassservice.balticgrasslands.eu](http://grassservice.balticgrasslands.eu).





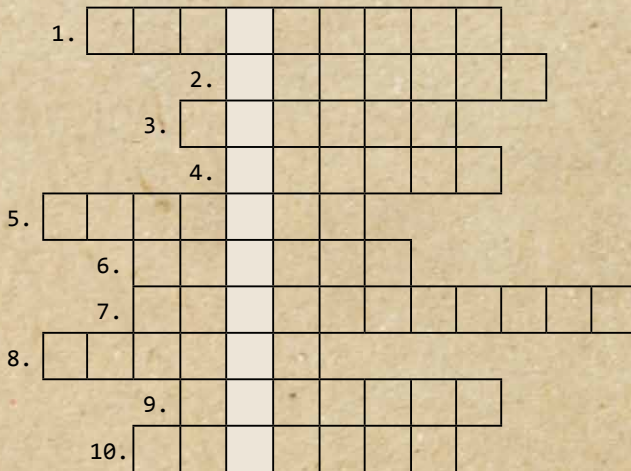
## Future perspectives

- **Grassland restoration** not only enhances the ecological importance of grasslands and its biodiversity potential, but also creates favourable preconditions for further management; therefore, grassland restoration activities should be facilitated and supported in future within projects and the rural development programme.
- The current trends in agricultural development show that large size farms managing wide areas are mostly economically viable. Small grassland areas, which usually possess the highest biodiversity, are used for small scale animal production or for the maintenance of open landscapes. Therefore, **rural support payments** will continue to have huge significance for the preservation of nature diversity in future.
- **Pellet production** is by far the most economically sustainable alternative use of grass biomass. Pellets can be used both for fodder and heat production. Pellets for fodder can be supplemented by additives and they are easy to store and transport.
- The use of grass for the production of biofuels will, most likely, not gain popularity in the near future as an economically sustainable branch of the energy industry, as it cannot compete with fossil fuel products without targeted state support. **Biogas** has perspective in the case of state support and continued development of technologies, while **biobutanol** production in Latvia has not yet spread outside laboratories, therefore, it will only be possible to judge its economic viability if the construction of production facilities and testing production are commenced.
- However, alternative uses of biomass may serve as a **local solution for farms** that do not use grass for livestock breeding, or have excessive amounts of it, but wish to preserve grasslands as essential elements of landscape and biodiversity. The use of grass for the non-commercial production of biofuels (for self-consumption) will contribute both to the energy supply of the farm and rational use of grass biomass.



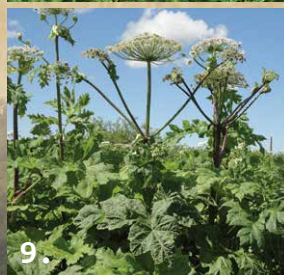
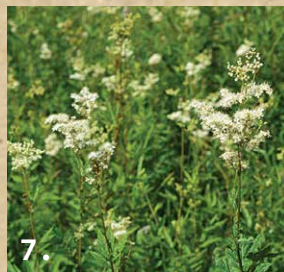
## For leisure

We invite you to complete the crossword to check your knowledge and understanding of the Layman's report. Correctly\* fill in the horizontal lines, and the vertical line will form a word representing a biofuel type.



### Horizontal

1. One of the most important pollinator species, which lives in grasslands
2. Animal class, which is particularly abundant in grasslands
3. The main use of grass biomass
4. One of the most used biofuels
5. A type of grassland use
6. One of the most significant grass consumers
7. Plant species characteristic for wet grasslands, used also as medical plant (top picture)
8. One of the most important methods of grassland management
9. Invasive plant species introduced for fodder provision, which is now rapidly expanding in agricultural and other land (bottom picture)
10. A compacted grass product



\*The crossword answers can be found at the project website [grasssservice.balticgrasslands.eu](http://grasssservice.balticgrasslands.eu), section "Information for the public"