Legal analysis of the national legislation and implementation of paludiculture in Latvia

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Summary

Aim of this study is to recognize main obstacles and possibilities in the current legal and policy framework conditions for implementation of paludiculture in Baltic states and to propose how the current framework could be improved.

Paludiculture is the agricultural or silvicultural use of wet and rewetted peatlands. Harvest can be used as a biomass, raw materials or fodder. There are four types of areas suitable for cultivating paludiculture crops in Latvia: agricultural lands, forest lands and extracted peat fields and polders. There are 26 1435 ha abandoned and overgrown agricultural lands with organic soils, approximately 11 500 ha of extracted peatlands and 50 000 ha of polders.

Study shows that in the current legal and policy framework can be found both – indirect support and important restrictions for paludiculture implementation.

The main strategies and planning documents recognize the necessity to balance economic and environmental interests. National Development Plan of Latvia emphasize to stimulate the sustainable use of land and other natural resources and biodiversity through the use of environmentally-friendly technologies. Latvia's bio-economy strategy, Rural Development Plan and Land Management Policy (is in development phase) emphasize urgent activities in balancing economic interests with ensuring environmental quality and preserving and enhancing biodiversity, creation of "new" bio-economy industries, replacement of fossil resources with bio-based resources, reduction of GHG emissions in bio-economy sectors.

Growing biomass on organic soils (implementing paludicultures) can provide bio-(raw) materials (e.g. *Sphagnum* moss and cattail), capture carbon in soil, thus reducing GHG emissions. It also preserves and enhance biodiversity as increased water level conditions creates optimal living conditions for many species. Paludiculture plants temporarily can live also in high water level (flood) conditions, therefore installation of paludiculture fields in areas with high flood risks would help not only to catch the flood waters but also to clean them from nutrients.

Sustainable development strategy of Latvia mentions reed as one of the local energy resources that should be promoted in the use of combined heat and power plants of regional biomass co-generation (wood waste, straws, and reeds). Latvia 2030 predicts that in 2030 the proportion of renewable resources will reach 50% and paludiculture products (reed, reed canary grass, wood) can increase share of biomass in renewables.

About 90% of the lands in Latvia suffer from excessive moisture, consequently most of the strategies and regulations related to land management are about drainage of the land. Because paludicultures require high water level these documents are hindering development of paludicultures, e.g. Rural development programme 2014-2020, Guidelines for the development of forestry and related sectors (2015-2020) as they are promoting land amelioration and reconstruction of drainage systems. Many scientific research prove that drainage of peat/organic soils leads to higher GHG emissions and soil

degradation[1]. Even minimal drainage promotes rapid oxidation of peat[2], complete rewetting of the organic soil would be required in order to avoid greenhouse gas emissions. [3]

The only crop that is considered as paludiculture crop and can receive direct payments is reed canary grass. Direct payments also may be received for an area where a single age species of short rotation coppice is sown and cultivated - aspen tree (*Populus spp*.), osier (*Salix spp.*) or grey alder (*Alnus incana*). Berry cultivation also are supported, but most of berry cultivation areas in Latvia are drained, therefore are not considered as paludicultures. Several requirements are not supportive for paludicultures. To benefit from direct payments, farmer have to take care of amelioration system and that agricultural land applied for support is not overgrown with trees, hogweed and cattail.

Farmer can get support for a use of a raised bog or an extracted peatland that is used for fruit and berry gardens in agriculture as they are considered as environmentally friendly methods in horticulture.

None of documents included in the study describes different management of organic soils. Organic soils increase GHG emissions in the agricultural sector, therefore they have to be treated differently as mineral soils.

[1] Joosten, H. The Global Peatland CO_2 Picture: Peatland Status and Drainage and Related Emissions in All Countries of the World; Greifswald University: Greifswald, Germany, 2010.

[2] Kechavarzi, C., Dawson, Q., Bartlett, M. & Leeds-Harrison, P.B. (2010). The role of soil moisture, temperature and nutrient amendment on CO2 efflux from agricultural peat soil microcosms. Geoderma, 154(3-4), ss. 203-210.

[3] https://pub.epsilon.slu.se/14284/1/norberg_l_170427.pdf

Content

1. Introduction

Paludiculture ('palus'– Latin for 'swamp') is the productive use of wet peatland in ways that preserve the peat body. Paludiculture includes traditional activities such as reed mowing for thatch or collecting litter for bedding, as well as new practices, such as the utilisation of biomass from wet peatlands for biofuel. In many cases even new peat is formed – the aboveground biomass is harvested and the belowground biomass forms new peat[4].

Latvia covers an area of 64 573 km². The population in Latvia is almost 2 million of which 22.2% live in rural areas. According to State Land Service data, 36.5% of the territory of Latvia or 2 352 614 ha are agricultural lands and more than 54% is a forest. Approximately 177 000 ha of agricultural land is abandoned and 79 000 ha of it is overgrown. Organic or hydromorphic soils (with peat layer at least 30 cm) in Latvia cover 148 100 ha or 7.7% of agricultural lands. A relatively large part – 20 128 hectares or 12.2% of the total area of the agricultural lands are hydromorphic/organic soils that are abandoned and totally or partly overgrown with scrubs. Another 6307 ha or 3.8% of organic soils are overgrown with non-productive tree species. The value of agricultural production (cereals, oilseeds, fodder crops, milk, cattle production etc.) on organic soils is 36 million euro. The total value of agricultural production in the country 996 million euro. In both classes of soils, the value of output could potentially be much higher[5].

Latvian agriculture is characterised by (Figure 1):

- predominantly large farms: Latvian farms have an average size of 23 ha, larger than the average EU28 holding size of 16.1 ha;
- elderly farmers: only 5 % of Latvian farmers are below 35 (EU28: 6.0 %) and 30 % are over 64 (EU28: 31.1 %);
- a strong contribution to the economy: the primary sector (agriculture, forestry and fishing) accounts for 3.2 % of the country's economy (total GVA) and agriculture for 7.7 % of total employment. This is higher than the European average both in economic terms (1.5 % in EU28) and employment terms (4.3 % in EU28).

[4] http://www.succow-stiftung.de/tl_files/pdfs_downloads/Buecher%20und%20Broschueren/Bochure%20Paludiculture.pdf

[5] The study "Assessment of the contribution of organic soils in agriculture - multifactor impact assessment of effective land-use solutions in Latvia" ("Organisko augšņu devuma novērtējums Latvijas lauksaimniecībā – daudzfaktoru ietekmes izvērtējums efektīvas zemes izmantošanas risinājumu piedāvājumā") Interreg project "BIO4ECO", Latvia University of Life Sciences and Technologies, 2017 (in Latvian)

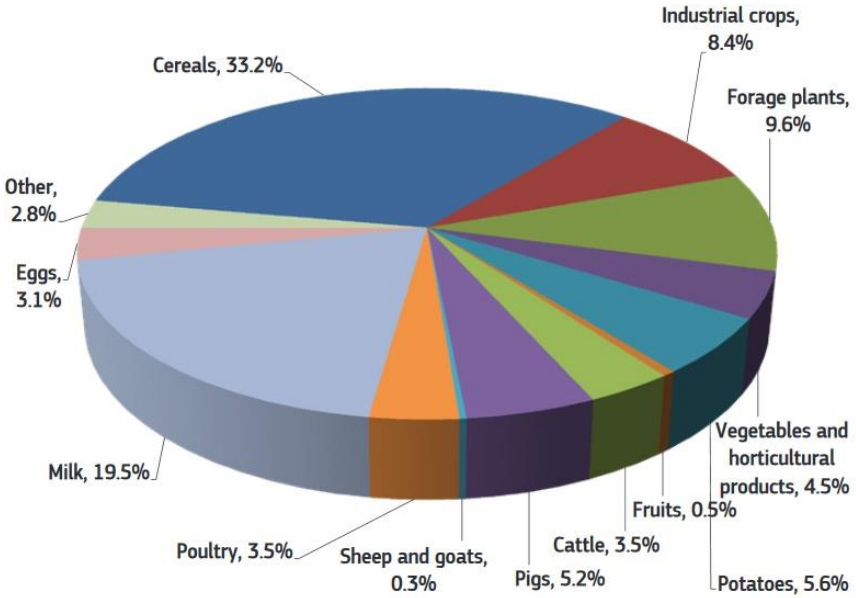

Figure 1. Agriculture output components in Latvia (2014-2016 average); values at constant producer prices (Source: Eurostat, Comext)

Agriculture and forestry remain a major source of employment in rural areas, although since 2007 the number of people employed in agriculture (174 000) has decreased by 20%. [6]

Energy, including the transport sector, is the largest source of GHG emissions (64%). Agriculture is the second most important source of GHG emissions with 23.6% of total emissions of Latvia[7].

The total projected GHG emissions from agriculture in the period up to 2050 are increasing. The main reason for this is the increase in the prognosed indicators of the development of agricultural production - the number of animals, total crops, the use of nitrogen mineral fertilizers, and the cultivated area by agricultural holdings. Another reason for increase of GHG emissions is the return of unused agricultural land to agricultural production (Figure 2). [8]

[6] https://ec.europa.eu/agriculture/sites/agriculture/files/rural-development-2014-2020/country-files/lv/factsheet_en.pdf

[7] https://www.meteo.lv/fs/CKFinderJava/userfiles/files/Vide/Klimats/Majas_lapai_LVGMC_2018_seginvkopsavilkums_24052018.pdf

[8] https://www.zm.gov.lv/public/ck/files/Lauksaimniecibas_prognozes_2050_gads.pdf

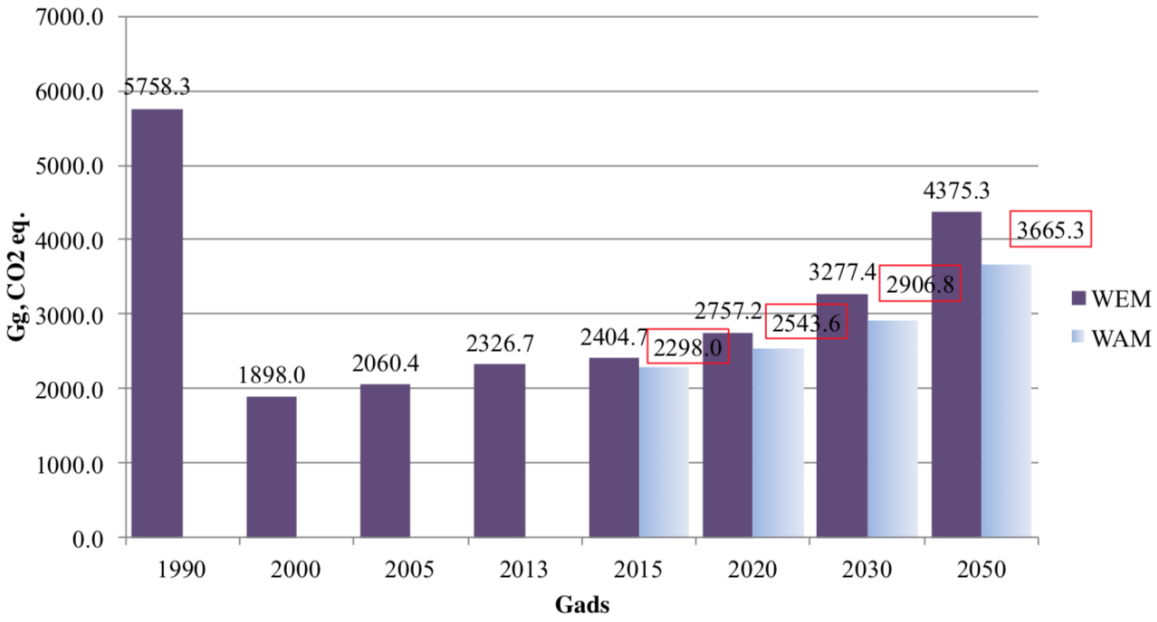

Figure 2. Total GHG emissions from agricultural sector, CO2 eq.Gg (WEM – with existing measures, WAM – with additional measures – more precise farming)

Despite some positive signs, several factors hold back the growth in agricultural sector – the low professional qualification of employees in agriculture and forestry, an insufficient use of innovative solutions, a high proportion of semi-subsistence farms and the low competitiveness of enterprises and farms. In addition, risk management systems are undeveloped and there is a lack of cooperation between farms, enterprises and research institutions.

A majority of farmers have limited financial resources with which to modernise their farms. In 2013, the country had a high share of semi-subsistence farms (56.5% or ~46 000 farms) where the main source of income is direct payments under the 1st Pillar of the CAP (59% of income).[9]

1. National Strategies and development planning documents related to paludicultures

Analysis of the National Strategies and planning documents related to the paludicultures includes following documents:

1) Bio-economy Strategy Latvia
2) Guidelines for the Sustainable Use of Peat 2018-2050
3) Land Policy Plan
4) Sustainable development strategy of Latvia (until 2030);
5) National development plan of Latvia (NAP 2020; 2014-2020);
6) Guidelines for the development of forestry and related sectors (2015-2020);
7) Environmental policy guidelines (2014-2020);

[9] https://ec.europa.eu/agriculture/sites/agriculture/files/rural-development-2014-2020/country-files/lv/factsheet_en.pdf

8) Landscape policy guidelines (2013–2019);
9) Energy Development Guidelines for 2016-2020
10) Rural development programme (RDP 2014-2020);

2.1. Bio-economy Strategy Latvia

Latvia's bio-economy strategy[10] emphasize urgent activities in balancing economic interests with ensuring environmental quality and preserving and enhancing biodiversity, creation of "new" bio-economy industries, replacement of fossil resources with bio-based resources, reduction of GHG emissions in bio-economy sectors. **Growing biomass on organic soils (implementing paludicultures) can provide bio-(raw) materials (e.g. *Sphagnum* moss and cattail), capture carbon in soil, thus reducing GHG emissions. It also preserves and enhance biodiversity as increased water level conditions crates optimal living conditions for many species.**

2.2. Informative Report on Land Management Policy

Land Management Policy is still in the development phase.

The aim of developing Land Management policy is to promote the unused land diversion for productive, economically viable and sustainable use, by promoting the science-based and economical use of local resources, thus creating new and high demanded products and on the same time positively contributing to the GHG emission reduction commitments and continuing to ensure the preservation of the image of Latvia as a "green" country. Taking into account this aim, it is important that organic soils remain wet.

One of the policy objectives that can influence paludiculture development is "to stimulate to use the land for purposes that are best suited for its (soil) quality and location". **Implementing paludicultures is the best option for those areas where are organic soils and water level can be raised as it prevents GHG emissions.**

Another aim – "The increase in agricultural production is ensured by investments in improving the quality of land. More intensive use of land is implemented by preserving existing ecosystems and by investing in improving land quality by arranging drainage systems, increasing the amount of organic matter in the soil and preventing soil acidification" **in case of organic soils intensive drainage can lead to loss of existing ecosystems and soil carbon.**

The policy recognizes that it is important to "establish motivational instruments that would encourage landowners' interest in using the property to provide ecological functions or for environmental conservation purposes", therefore it is important to inform landowners that dryer is not always better – in case of organic soils, landowner can benefit more leaving them wet. Paludicultures are even more important if we look on another target of the policy – "Land use aspects of climate change adaptation are taken into account - spatial planning and land use take into account the risks of climate change such as flood risks, coastal erosion risks. Urban development enhances the ability to adapt to climate change, including the provision of accessible green areas for recreation, as well as rainwater and groundwater discharges." **Paludiculture plants temporarily can live also in high**

[10] Latvian Bioeconomy Strategy 2030 http://www.llu.lv/sites/default/files/2018-07/Latvian-Bioeconomy-Strategy-Summary-WEB_0.pdf

water level (flood) conditions, therefore installation of paludiculture fields in areas with high flood risks would help not only to catch the flood waters but also to clean them from nutrients.

2.3. Sustainable development strategy of Latvia

The aim of the strategy[11] is to highlight the country's development guidelines and the spatial perspective for the period up to 2030.

Strategy mentions also the usage of some of the paludiculture products: in renovating the existing and building new heat plants and co-generation plants, local energy resources – wood, straws, **reeds** and, using environmentally friendly methods of extraction, also peat – should be used in the production of thermal energy (p.48). Use of straws, reeds, and peat for the needs of heat supply is also possible in local heat plants. The proportion of peat in the final energy consumption may be increased if the best available technologies for the extraction of peat, which do not emit methane, are used in extraction thereof. For the promotion of the development of RER sector, significant increase in the use of combined heat and power plants of regional biomass co-generation (wood waste, straws, and reeds) should be ensured – they as high-efficiency pilot projects may be located in small and medium-sized cities of the state (p.52).

2.4. National development plan of Latvia (NAP 2020)

One of the Strategic Objectives of NAP 2020[12] is "Sustainable management of the natural and cultural capital" and one of its tasks is to stimulate the sustainable use of land and other natural resources and biodiversity through the use of environmentally-friendly technologies. **Impact of the NAP 2020 to paludicultures (and *vice versa*) is similar to Bioeconomy Strategy and Land Management Policy.**

The total budget for all tasks under this Strategic Objective is 529 million lats (726 million eur). Responsible institutions are the Ministry of Agriculture, Ministry of Environmental Protection and Regional Development, Ministry of Economics, and local governments. Indicative sources of financing are Cohesion Policy, Common Agricultural Policy and Common Fishery Policy funds and the state budget.

As the achievable performance indicator in 2020, the share of managed agricultural lands is 95% and forestry (forest area of the total national territory) is 52.7%.

The vision of the NAP 2020 is that Latvia can be proud to lead responsible and sustainable management of natural resources at the European and global level - forest and agricultural land, water resources and sub-terranean depths (soil and subsoil) - and preserve the diversity of the natural environment in Latvia. The priority to achieving these aims is given to the creation of prerequisites for sustainable and balanced economic development and the efficient use of available resources, to support those who produce and provide services and to restrict economic instruments to those who do not use these resources efficiently and sustainably.

[11] http://www.pkc.gov.lv/sites/default/files/images-legacy/LV2030/LIAS_2030_en.pdf

[12] http://www.pkc.gov.lv/sites/default/files/images-legacy/NAP2020%20dokumenti/NDP2020_English_Final.pdf

2.5. Guidelines for the development of forestry and related sectors (2015-2020)

The guidelines[13] foresee an increase in the value of the forest by increasing the area of cultivated coppices, increasing the total length of reconstructed and built forest roads and what could affect paludicultures - increasing the total length of reconstructed forest drainage systems. Guidelines also include explanations why these measures are necessary:

- The amelioration systems in more than 0.5 million hectares of forest land are outdated and neglected. According to the State Forest Service, due to the increased moisture level, the total area of lost forests since 1991 has been 5800 hectares. Annually, as a result of nonfunctional drainage systems, 240 ha of forest stands are lost.
- Considering the risks that could be caused by the increase in precipitation because of the climate changes in the Baltic Sea Region, as well as the fact that inadequate soil moisture regulation contributes to the degradation of meliorated forest soils and reduces the growth of forest stands, it is necessary to renovate drainage systems taking into account economic benefits while respecting also environmental requirements.
- For the conservation of species and habitats in specially protected areas, it is planned to remove amelioration systems in limited amount if this does not pose a threat to adjacent forests and properties. The renovation and reconstruction of amelioration systems in forest lands increase wood growth and forest stands are able to attract more CO2.

An assessment of the current situation showed that in Latvia's forests, by 2020, drainage systems have to be restored in an area of 280,000 ha. The total cost of these long-term investments is around € 50 million. The restoration of drainage systems is an investment-intensive long-term investment in preserving and increasing the value of the forest, therefore, Guidelines 2020 intends to support the renovation of drainage systems in the state, municipal and private forests under the support of RDP 2020. The available funding makes it possible to restore forest drainage systems in the area of about 100 000 ha by renovating forest drainage ditches at 4600 km. Amount of the additional of wood would be about 40 - 45 million cubic meters in the next 50 years. Each specific project application for land reclamation is evaluated by the Rural Support Service in accordance with the requirements of the Cabinet of Ministers Regulations No.600 of 30 September 2014 entitled "Procedure for the granting of state and European Union support in the form of an open call for projects for the Investment in tangible assets".

It is obvious that areas with organic soils close to or within the well drained forests also will be affected and it can be difficult to raise up the water level, therefore implementation of paludicultures can be limited or impossible due to the high installation costs.

2.6. Environmental policy guidelines (2014-2020)

One of the tasks mentioned in the guidelines[14] is to prepare soil maps corresponding to the international FAO classification in 2020. 90% of the agricultural lands in the country would be mapped. In addition, it is planned that 80% of the necessary studies on soil quality will be provided in 2020, the impact of various factors on the soil, erosion estimates were made.

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13 https://www.zm.gov.lv/public/ck/files/ZM/mezhi/meza%20pamatnostadnes/Pamatnostadnes_2015_2020.pdf

14 http://www.varam.gov.lv/lat/pol/ppd/vide/?doc=17913

The task of the "Environmental Monitoring" policy is to improve the implementation of land monitoring. As a result, by 2017, information has been obtained about the overgrowth of the land surface throughout Latvia. It is concluded that about 88 000 ha of agricultural land is overgrown and over 207 000 ha is abandoned.

Updated soil maps and information about organic soils are important in order to choose best sites for paludiculture field installation and estimate the potential of paludiculture in Latvia.

2.7. Energy Development Guidelines for 2016-2020

In order to ensure a balanced energy policy that is in line with economic and social interests, the main goal of Strategy 2030 is a competitive economy by developing a balanced, efficient, market-based energy policy that ensures the further development of the Latvian economy, its competitiveness in the region and the world, as well as the welfare of society.

By implementing the energy policy development measures set out in Strategy 2030, forecasts show a gradual, cost-effective and environmentally-friendly growth of local energy resources, contributing not only to the achievement of climate GHG targets, but also to the economic growth of Latvia.

The EU Renewable Energy Directive[15] (RED) requires that the share of energy from renewable sources in energy in gross final consumption of energy be 40% in 2020 in Latvia. Latvia is gradually approaching its goal. In 2016, the share of renewables was 37.2%.

Latvia 2030 predicts that in 2030 the proportion of renewable resources will reach 50%. The main types of renewables in Latvia are fuel wood and hydropower. To a lesser extent, wind power, biogas, biofuels, straw and other biomass are used. Solar energy is only used in very small quantities. **In order to increase the share of biomass in energy and to use forest resources more for production of materials with higher added value, biomass from paludicultures could become a future source of energy.**

2.8. Rural development programme (2014-2020)

The Rural Development Programme (RDP) for Latvia was formally adopted by the European Commission on 13 February 2015 and last amended on 9 February 2018. It outlines Latvia's priorities for using around € 1.5 billion of public money that is available from 2014-2020 (nearly € 1.08 billion from the EU budget and nearly € 500 million from national funding).

The 4 most important RDP measures in budgetary terms (total public funding) are:

- More than € 535 million allocated for Measure 4: Investments in physical assets
- More than € 265 million allocated for Measure 13: Areas facing nature constraints
- More than € 150 million allocated for Measure 11: Organic Farming
- More than € 125 million allocated to Measure 7: Basic services and village renewal in rural areas.

Three priorities of the RDP are related to paludicultures:

[15] Directive 2009/28/EC of the European Parliament and of the Council of 23 April 2009 on the promotion of the use of energy from renewable sources and amending and subsequently repealing Directives 2001/77/EC and 2003/30/EC

- Priority1: Knowledge transfer and innovation in agriculture, forestry and rural areas. The programme aims to raise the professional qualifications and skills of farmers and agricultural/forestry entrepreneurs by investing around 1.6% of the RDP funding. The objective is to increase farmers' knowledge about efficient production, environmental and climate-friendly resource management methods and to create cooperation opportunities between farmers and researchers. A funding for consultancy on management of organic soils incl. paludiculture could complement this programme.
- Priority 4 - Restoring, preserving and enhancing ecosystems related to agriculture and forestry. This is the main priority of the RDP. Under this priority, forests and farms should be managed in a more environmental-friendly manner.
- Priority 5 sets out: "Promoting resource efficiency and supporting a low-carbon, climate-resilient economy in the agriculture, food and forestry sector". Within this framework, Latvia has chosen to pursue sustainable development goals to increase energy efficiency in agriculture and food processing, reduce greenhouse gas and ammonia emissions in agriculture, and promote carbon storage and sequestration in forestry, and the following support measures and sub-measures will contribute to this priority: 8.1. "Forest cultivation, supplementing and maintenance of semi-overgrown agricultural land. Breeding and care of forests ", 8.5. "Investments to improve the sustainability and ecological value of forest ecosystems" as well as individual activities aimed at increasing energy efficiency and reducing GHG and ammonia emissions under support measure M04. 10% of agricultural land will be under contract for GHG and NH_3 reduction. Under this priority, production of renewable energy from waste and by-products will be supported. Outdated drainage systems will be rebuilt and reconstructed.

4. National regulations related to paludiculture

4.1. Amelioration Law

Taking into account the geological and climatic conditions characteristic of the territory of Latvia, about 90% of the lands suffer from excessive moisture. The geological peculiarity is that groundwater is squeezed into the surface of the soil, and thus, creating a wet conditions in places other than peatlands and wetlands. Therefore, in order to facilitate the effective use of land, in the second half of the 19th century construction of amelioration systems was started. On almost 1.5 mln. ha of agricultural land in Latvia there are built drainage systems, including 53 polders with a total area of 50 thousand ha for the regulation of the humidity regime of flood lands.

The purpose of the Amelioration Law is to ensure such mechanism for the management of amelioration systems, which promotes sustainable management and use of natural resources, ensures the water regime necessary for the safety and welfare of inhabitants, development of infrastructure, as well as construction, operation, maintenance, and management of amelioration systems.

A land owner or lawful possessor has the right to perform land amelioration in conformity with the requirements laid down in the laws and regulations regarding construction of amelioration systems, and has the obligation to operate and maintain an amelioration system in accordance with the requirements of the relevant laws and regulations. (Section 3)

For planting of woody plantations in the ameliorated land to be used for agriculture and for other activities in places where it may disturb the operational regime of the amelioration system the State limited liability company *Immovable Properties of the Ministry of Agriculture* shall issue technical regulations for the following activities in ameliorated land. (Section 4)

Construction, reconstruction, or renovation of structures and engineering networks within the boundaries of ameliorated land or outside them, or in operation protection zones around amelioration structures and installations may not deteriorate the groundwater regime and the operation of the amelioration system. (Section 5)

Land owners or lawful possessors shall jointly ensure the design and construction of an amelioration system for common use in accordance with the procedures laid down in laws and regulations. (Section 6.)

Amelioration systems depending on their effect on the groundwater regime shall be classified as follows (Section 7):

1) drainage system - a complex of dedicated structures for draining of land;

2) irrigation system - a complex of dedicated structures and installations for irrigation of land;

3) two-way amelioration system - a drainage system which may also be also be used for irrigation of land.

Polders

Polders can become sites for paludiculture growing because they have the opportunity to regulate the water level and often agricultural activities already take place.

Polder is a drainage system designed to protect the area from flood during spring floods or floods. There were 48 polders with the total area of 50,000 hectares in 2010 in Latvia.

According to the provisions of the Latvian Construction Standard LBN 224-15 "Melioration systems and hydrotechnical structures" depending on the hydrological regime, polders are divided into:

• winter (non-overflowing) polders, whose areas are completely enclosed with protective gutters from estimated spring waters. Estimated water level - the maximum spring load with a 1% probability of exceeding the water level in a watercourse or body of water, or the water level of the highest seawater observed in the long-term period.

• summer (overflowing) polders, whose areas are surrounded by dams from summer - autumn floods. Estimated water level - the maximum summer-autumn flood water level with a 5% probability inundation if the polder areas are used for summer plants, vegetable, technical or fodder crops, and with a 10% exceeding probability if areas are used for meadows and pastures. It is acceptable that during the spring floods area is overflooded.

4.2. Procedures for the Extraction of Mineral Resources

There are three types of areas suitable for cultivating paludiculture crops: organic soils on agricultural lands, organic soils on forest lands and on peat extraction sites. Most promising sites for paludicultures are depleted peat extraction sites, because they already have some infrastructure (e.g. roads), they are far from residential areas, therefore water level can be raised without harming private houses.

Laws and regulations oblige extractor of mineral resources after the completion of the extraction to recultivate the site. The purpose of recultivation is to ensure the full usage of the site after the completion of extraction of mineral resources.

The aim of the conservation is to ensure preservation of the place of extraction in such a condition that does not threaten public health and life, and the environment, as well as to provide resumption of possible extraction work.

The extractor of mineral resources shall ensure the conservation of the mineral resource extraction site if the extraction work is suspended for a time period longer than one year. The extractor of mineral resources shall ensure the storage of the documents related to the extraction of mineral resources.

The aim of the re-cultivation is to ensure further quality utilisation of the extraction site after the termination of mineral resource extraction, to eliminate the threats to public health and life and the environment, as well as to promote integration of the extraction site into the landscape.

Re-cultivation may be performed simultaneously with the extraction of mineral resources. Re-cultivation shall be commenced within one year after the termination of mineral resource extraction.

If the type of re-cultivation differs from the project, before the remediation, the extractor of the mineral resources has to submit to the construction board of the local government the re-cultivation sketch (free-form pre-project material illustrating the intention of the re-cultivation).

If construction works are provided for in the recultivation composition, they shall be harmonized in accordance with the conditions specified in the regulatory enactments regulating construction.

The peat extraction sites shall be re-cultivated by:

- performing re-naturalisation (restoration of an environment characteristic to a peatland);
- preparing them for utilisation in agriculture, for example, by creating fields for the cultivation of berries;
- preparing them for utilisation in forestry;
- creating bodies of water;
- preparing them for recreation; or
- preparing them for utilisation in another manner.

The completed works of conservation and re-cultivation shall be accepted by a commission created by the construction board and consists of representatives relevant local government, land owner, extractor of mineral resources and State Environmental Service.

4.3. Land Management Law

The following conditions shall be observed in the use and protection of land[16]:

- the land user shall carry out activities in order to preserve the quality of land and soil and prevent their degradation;
- the territories in which signs of soil degradation have been detected, shall be used in a way to limit further soil degradation and ensure the preservation of soil fertility.
- if it is necessary to change the category of land use for implementation of the intended activities, it shall be changed, taking into account the requirements of the spatial development planning documents of the local government and other laws and regulations,
- if changing of the category of land use is proposed in relation to ameliorated land, in the cases specified in the Amelioration Law, technical provisions for the activities to be performed in the ameliorated land shall be issued by the institution responsible for amelioration.

Drainage of organic soils may result in soil degradation . For example, the use of organic soils in agriculture, when they are drained and the surface are disturbed (plowed, graized etc.) causes soil subsidence and surface degradation. While, without recultivating the extracted peat fields, the soil loose fertility and soil surface can even mineralize. Such land management is contrary to the Land Management Act.

4.4. Environmental Impact Assessment

Preparation required for the restoration and management of habitats and species habitats includes not only careful planning, but also the initial impact assessment carried out according to the regulatory enactments. In many cases, prior to habitat restoration one should carry out expertise, coordinate activities, elaborate building design, and receive permits. It is necessary to access whether the proposed activity will result in any adverse changes that may significantly affect human health and safety, landscape, cultural and natural heritage, as well as other habitats or species. **The Law "On Environmental Impact Assessment"** is applicable to the activities that meet specific criteria, according to which the impact of the intended activity[14] on the environment can be assessed, especially if it is realised in protected nature territories, micro-reserves, wetlands of international importance, the Baltic Sea and Gulf of Riga coastal protection zone, surface water body protection zones, and can affect protected species, their habitats and protected habitats.

The Law provides for an assessment of the intended activity; **initial impact assessment** is required for activities that may significantly affect the Natura 2000 area. The initial impact assessment is performed by the State Environmental Service. Activities that require an initial impact assessment are defined by the Law[15]. An initial impact assessment is required for a change of category of use of agricultural land (> 50 ha); construction of new drainage and irrigation systems (if land area > 100 ha); reconstruction of the existing drainage or irrigation systems (if land area > 500 ha); afforestation and deforestation (if land area > 50 ha). When planning the habitat restoration activities in forest or

[16] https://likumi.lv/ta/id/270317-zemes-parvaldibas-likums (translated into English, but without the update)

mires, which are related to the change of the hydrological regime and the implementation of which may result in major changes, an initial impact assessment should be performed.

If it is stated in the initial impact assessment that the activity may significantly affect a protected nature territory of European importance (Natura 2000), then the assessment of the impact on the Natura 2000 site is performed in accordance with the procedure provided for by Cabinet Regulation[16].

If in accordance with the initial impact assessment, habitat restoration requires the procedure of environmental impact assessment (for example, restoration of mire habitat related to a substantial change of hydrological regime and possible impact on the adjacent areas), the State Environmental Service sends the prepared statement to the responsible authority to give an opinion on the relevance or irrelevance of the environmental impact assessment. One should recognise that the decision will take at least 130 days, which will be spent on the preparation of the programme, and statement of the environmental impact (additional time should be considered for the preparation of the report on the environmental impact assessment).

If, in accordance with the results of the initial impact assessment the intended activity does not require an environmental impact assessment, the State Environmental Service issues the technical regulations for each specific intended activity in conformity with Cabinet Regulation[17].

It is expected that for implementing paludiculture on formerly drained agricultural or forestry areas an environmental impact assessment is needed as well.

5. Agricultural policies

The financial support paid may be classified into three main groups:

1. **(EU and national) direct payments**, which include the Single Area Payment Scheme (SAPS), complementary national direct payments (CNDP) that are called transitional national support since 2013, and various special support schemes that have been introduced to support agriculture – CAP Pillar 1. The source of finance for SAPS and special schemes is the European Agricultural Guarantee Fund (EAGF). Latvia's direct payment allocation for 2014-2020 amounts to around €1.5 billion. CNDP were funded from the government budget.

2. **Support payments for rural development** or CAP Pillar 2, the Rural Development Programme 2007 – 2013 (RDP 2007 – 2013) (funded from the European Agricultural Fund for Rural Development (EAFRD) and the government budget).

3. **National support payments (national subsidies)**; the source of finance is the government budget.

Farmers in Latvia, as they are across the EU, are subject to so-called 'greening' rules, designed to ensure that they farm in a sustainable way and help contribute to the EU's efforts to tackle climate change, biodiversity loss and soil quality. Under this system, 30 % of the direct payment allocation, paid per hectare, is linked to three environmentally-friendly farming practices: crop diversification, maintaining permanent grassland and dedicating 5 % of arable land to environmentally friendly measures (so-called 'ecological focus areas').

The Latvian authorities have also decided to earmark 15 % of the direct payments allocation for voluntary coupled support – i.e. linking payments not only to the number of hectares farmed but also to specific products or processes – in this case dairy cows, dairy goats, bovine animals, sheep, starch potatoes, certified seeds of grasses and fodder crops, seed potatoes, certified seed of cereals, spring rape and turnip rape, vegetables, fruits and berries, protein crops and barley.

In order to ensure a fairer distribution of direct payments between farmers, the Latvian authorities have also opted to apply a 5 % reduction of payments on all amounts above €150,000 per farm, benefiting smaller farms in particular. Latvia also applies the small farmers scheme (SFS), a simplified system of support for the smallest beneficiaries, that replaces any other form of direct payment for the farmers concerned. Under this scheme, farmers receive a lump-sum payment of €500. In exchange, farmers taking advantage of this scheme are exempt from cross-compliance (i.e. environmentally friendly farming rules) and from greening rules.

Most of the funding will go on investments in physical assets, support for areas facing natural constraints, organic farming and basic services and village renewal in rural areas.

5.1. Direct payments

Direct payments are annual financial support to farmers. Any physical or legal entity has the right to claim financial assistance from the state and the European Union, which can be received for each farmed hectare of agricultural land[17].

A farmer may receive the following European Union direct payments (Fig.3):

- a single area payment;
- payment for an agricultural practice beneficial for the climate and the environment (greening payment);
- payment for young farmers;
- payment under the small farmers scheme;
- voluntary coupled support for dairy cows, goats, bovine animals, sheep, protein crops, starch potatoes, seed potatoes, fodder crops, certified cereal seeds, barley, spring rape and spring turnip rape, vegetables, fruits and berries.

[17] http://www.lad.gov.lv/lv/klientiem/ka-sanemt-atbalstu/platibu-maksajumi/

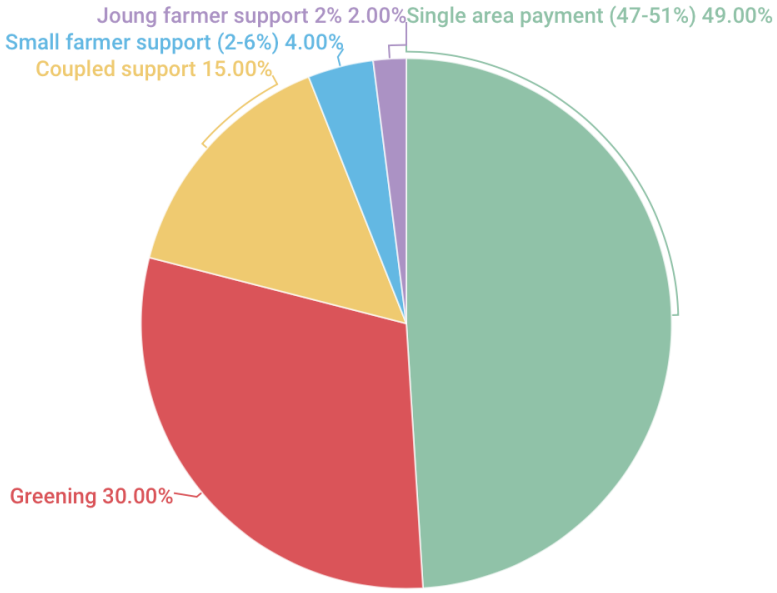

Figure 3. Structure of direct payments in Latvia starting from 2015.

5.1.1. Single area payment

In the group of organic soils from 163 926 ha only 93 200 ha or 56.9% have been applied for single area payments. This means that this area is agricultural land and is used in accordance with the rules for the use of agricultural lands. Another 34 741 ha or 21.2% are cultivated, although no support has been required. This land can also be considered as used for agricultural purposes or used without additional investment.[18]

Legal basis	Rules for granting direct payments in Latvia are provided in Cabinet Regulation No. 126 adopted 10 March 2015 "Procedures for Granting of Direct Payments to Farmers"[19].
Key requirements	Minimum Conditions for Receiving payments Direct payments for areas shall be granted to a farmer for the following agricultural land: • land in the ownership or legal possession (use) of the farmer on 15 June of the current year; • if the overall area of eligible agricultural land of the holding applied for aid is at least one hectare in accordance with Article 10 (1) (b) of Regulation No 1307/2013. The minimum size of agricultural parcel, whereof an application may be submitted

[18] The study "Assessment of the contribution of organic soils in agriculture - multifactor impact assessment of effective land-use solutions in Latvia" ("Organisko augšņu devuma novērtējums Latvijas lauksaimniecībā – daudzfaktoru ietekmes izvērtējums efektīvas zemes izmantošanas risinājumu piedāvājumā") Interreg project "BIO4ECO", Latvia University of Life Sciences and Technologies, 2017 (in Latvian)

[19] https://likumi.lv/ta/en/en/id/273050-procedures-for-granting-of-direct-payments-to-farmers (translated, but outdated)

shall be 0.3 hectares.

An agricultural parcel shall mean a continuous area of agricultural land:

- occupied by permanent grassland or grassland sown in arable land, and that as of 2016 has been declared by one farmer, applying for a payment under the small farmers scheme;
- occupied by permanent crops or arable land, except grassland sown in arable land, and area occupied by hemp and that as of 2016 has been declared by one farmer, applying for a payment under the small farmers scheme;
- occupied by agricultural plant species of vegetables for which voluntary coupled support is to be granted if each species occupies less than 0.3 hectares and the overall arable land of the holding is less than 10 hectares;
- occupied by fruit trees and agricultural plant species of berries (except strawberries) for which voluntary coupled support is to be granted if each species occupies less than 0.3 hectares;
- that has been applied by one farmer and that is occupied by not more than one crop or there is not more than one type of use of the land. The respective condition shall also apply to hemp area that has been declared by one farmer in 2016 by applying for a payment under the small farmers scheme.

Upon request of the Rural Support Service, the farmer shall properly certify that the area of agricultural land applied for aid on 15 June of the current year is in the legal possession (use) thereof, unless the latter is certified with an entry in the Land Register.

The farmer who has an area of agricultural land in the ownership or legal possession (use) thereof which is smaller than one hectare, shall not receive the aid if the total amount of direct payments to be granted is less than 100 euro.

Impacts

Requirements impacting paludicultures

Several points in the regulations are related to the paludicultures:

- Direct payments shall not be granted for agricultural land, if there are bulrushes (*Typha*) or there is wetland that within the time period from 15 May to 15 September is covered by water for a time period exceeding four weeks in a row.
- Direct payments may be received for an area where a single age species of short rotation coppice is sown and cultivated - aspen tree (*Populus spp*.), osier (*Salix spp.*) or grey alder (*Alnus incana*) - with a maximum rotation period of five years, and where no land amelioration systems have been registered according to the land amelioration data on 1 July 2011, as well as no new land amelioration system has been created after 1 July 2011.

	Area declared for SAPS in 2018, ha:
Short rotation coppice:	
• aspen tree (Populus spp.)	250,84
• osier (Salix spp.)	431,55
• grey alder (Alnus incana)	17,96

	<table><tr><td>reed canary grass</td><td>251,47</td></tr><tr><td>+</td><td></td></tr><tr><td>Blackberries</td><td>302,17</td></tr><tr><td>cranberries</td><td>172,13</td></tr></table> *Source: RSS data on SAP applications for 2018* • In accordance with Article 4 (2) (a) of Regulation No 1307/2013, grassland sown in arable land, papilionaceous plants sown in pure stand and permanent grassland shall be maintained in a state suitable for grazing, if by 15 August of the current year they are grazed or mowed down and the mowed grass has been gathered irrespective of the number of times mowing has been conducted, except [..] an area occupied by switchgrass (*Panicum virgatum*) and reed canary grass (*Phalaris arundinacea*) for the purpose of acquiring energy and the flowering stage of which was reached in the previous year, if the respective area has been mowed and harvested by 1 May of the current year.
Gaps	Several requirements are not supportive for paludicultures. To benefit from direct payments farmer have to take care of amelioration system and that agricultural land applied for support is not overgrown with trees, hogweed and cattail. The farmer shall comply with the following requirements for a good agricultural and environmental condition: a land amelioration system within one's responsibility is maintained in the agricultural land, ensuring its activity and maintenance, as well as regulation of land humidity regime. Aid for areas in the form of direct payments shall not be granted for agricultural land, if: • there are more than 50 separately growing trees per one hectare; • there are bulrushes or there is wetland that within the time period from 15 May to 15 September is covered by water for a time period exceeding four weeks in a row;
Perspectives	According to the interview with the representatives from Ministry of Agriculture, single area payment is granted for an eligible hectare of agricultural land regardless of the crop grown on it. Consequently, the areas declared for aid must be recognized as or even transformed into agricultural land, where permanent crops (perennial plantations are crops that grow on a long-term basis on a given plot of land and yield several crops (eg. fruit and berries, strawberries, gardens etc.) an be cultivated or it can be taken by permanent grassland. There are special requirements in the Regulations for growing hemp, there could be also special requirements for paludiculture crops. Direct payments may be received for permanent grassland recognised as biologically valuable grassland or grassland and bird habitats of European Union importance depending on agricultural activities, if they have been grazed, mowed and gathered by selecting a mowing technique suitable for the conditions of water content in the soil by 15 September of the current year. Because of the raised water level,

	paludiculture sites are attracting birds, therefore these sites can become bird habitats of European Union importance.

5.1.2. Greening

The greening requirements and their relation to paludiculture are presented below.

Legal basis	Rules for granting direct payments in Latvia are provided in Cabinet Regulation No. 126 adopted 10 March 2015 "Procedures for Granting of Direct Payments to Farmers".
Key requirements	In accordance with the European Union (EU) regulation a new climate change and environmental-friendly farming payment or greening payment, closely linked to the Single Area Payment (SAP), was introduced in 2015. In order to receive a greening payment, farms must comply with following greening requirements: ○ diversification of crops - farmers who declare over 10 hectares of arable land depending on the size of the farmer's holding, must have 2 or 3 different crops. The diversification of crops is intended to improve the overall quality of the soil. ○ establishment / maintenance of an ecologically focus area - farmers declaring more than 15 hectares of arable land, in order to achieve the objective of biodiversity conservation must declare at least 5% part of this land declare as EFA. ○ maintenance of existing permanent grassland ○ shall not convert or plough environmentally sensitive permanent grassland. In accordance with Article 46 (2) of Regulation No 1307/2013, the following areas/objects are regarded as an ecological focus areas in Latvia: • land lying fallow which is not used for the production of agricultural products or for grazing of animals from 15 January to 15 July during the current year and where plant protection products are not applied; • land below secular trees, avenues and secular stones that are protected in accordance with the laws and regulations regarding protection and use of specially protected nature territories and the boundaries of which are defined in the natural data management system "Ozols"; • land in the area of at least 0.01 hectare that is occupied by tree or shrub clusters or stones, if the area in question is not recognised as a forest with max area not exceeding 1,5 hectares; • 1-20 meters wide field margins or bufferstrips where there are no tree and shrub sprouts older than one year; • ponds in the area of 0.01 up to 1,5 hectares, also including the riparian vegetation in not more than 10 metres wide zone; • areas with undersown grasses • sown in pure stand or mixture by 15 September of the current year, in

	cereal or cereal and protein crop after-sowing - Italian ryegrass, perennial ryegrass, hybrid ryegrass, Festulolium, timothy grass, cocksfoot, meadow fescue, tall fescue, red fescue, sheep's fescue, rough-stalked fescue, smooth brome, soft brome, meadow foxtail, smooth-stalk meadowgrass, swamp meadowgrass, rough-stalked meadowgrass, common bent grass, Roth redtop or creeping bent grass and papilionaceous plants including alfaalfa, birdsfoot trefoil, clover, vetch, sweet clover or sainfoin; • area occupied by nitrogen-fixing crops - alfalafa (*Medicago*), birdsfoot trefoil (*Lotus corniculatus*), clover (*Trifolium*), field beans (*Vicia faba*), vetches (*Vicia*), peas (*Pisum*), sweet clover (*Meliotus*), galega (*Galega*), lupine (*Lupinus*), sainfoin (*Onobryschis*) and soybean. Nitrogen-fixing crops shall be cultivated in pure stand or mixture, consisting only of nitrogen-fixing crops. If nitrogen-fixing crops are cultivated in a field that is situated near a water body which has been specified in accordance with the laws and regulations regarding the classifier of water management districts, at least two metres wide zone shall be created along the relevant water body that shall not be used in the production of agricultural products. • Areas with catch crops - spring rape, annual ryegrass, white mustard, oil raddish, oats, phacelia, buckwheat, spring vetch, winter vetch, rye, beans, peas or fodder radishes sown in mixture no later than by 1 September of the current year and maintained at least until 31 October of the current year. No plant protection products are used on the area during the mentioned period. • Ditches registered in LPIS until 1 March of current year.
Impacts	Greening requirements encourage compliance with the requirements for agricultural practices that are beneficial for the climate and the environment, have a positive effect on the conservation of soil organic matter by encouraging extensive farming.
Gaps	The conditions for granting of greening payment are defined in the Cabinet Regulation No. 126, but those do not include rules specificly applied on organic soils. Several ecological focus areas may be attributed to the maintenance of soil organic matter such as land lying fallow, areas with catch crops or green cover and areas with nitrogen-fixing crops (from the interview with Min.of Agricult.).
Perspectives	According to the information available on the home page of the Latvian Rural Advisory Center, there are several plants[20] that can receive direct payments and also are suggested for growing on organic and wet soils: • Timothy (*Phleum pratense*) - One of the most durable grasslands in peat soils, tolerate to the moist, short-term flooded meadows. • Tall Fescue *(Festuca arundinacea)* - modest soil requirements, can grow on shallow soils. Suitable for growing in wet meadows.

[20] https://likumi.lv/ta/id/273050#piel9 look for "9.pielikums.

	• Swamp meadowgrass (*Poa pratensis L.*) - infested with humus-rich sandy loam, loamy sand and sandy soils. Grows well in peat soils, tolerates flooding. • Red Fescue (*Festuca rubra*) - both in dry, sandy soils that are more acidic and in wet organic soils. Can also be grown in peat soils and places exposed to the water erosion. • White clover (*Trifolium repens*) is moderately moist, lime and humus-rich soils and dried in cultivated fens. The clover has a lower winter-hardiness in peat soils. This list could be prolonged with the paludiculture plants. If the permanent grassland areas will decrease below 2012 level, farmer will be obliged to transform ploughed grasslands back to permanent grasslands. That means that valuable agricultural land has to be transformed into grasslands while there are 20 128 ha (or 12.2% of agricultural lands) of overgrown organic soils (that are considered as agricultural lands) in Latvia. Introducing paludicultures could be a win-win situation for climate and farmers.

5.1.3. Cross-compliance requirements

Cross-compliance is the link between the receiving direct aid and compliance with previously established requirements in environmental, public, animal and plant health and animal welfare in other regulatory enactments. In order to receive full payment of aid, the farmer is obliged to comply:

- Good agricultural and environmental condition (GAEC);
- Statutory Management Requirements (SMR).

Cross-compliance requirements have to be met by farmers who manage agricultural land and apply for EU direct payments and area payments for the Rural Development Program. Cross-compliance covers a large number of requirements in different areas, however, the farmer would have to comply with these requirements even if he did not apply for support payments, all these requirements are already included in EU and Latvian legislation.

GAEC 6 standard in EU CAP Horizontal regulation[21] is defined as: "Maintenance of soil organic matter level through appropriate practices including ban on burning arable stubble", this standard does not include peatlands and organic soils as separate soil categories.

In Latvia, GAECs are defined in the Article 76 of Cabinet Regulation No. 126, adopted 10 March 2015 "Procedures for Granting of Direct Payments to Farmers". Two of the requirements can be related to paludicultures:

- a land amelioration system within one's responsibility is maintained in the agricultural land, ensuring its activity and maintenance, as well as regulation of land humidity regime:

[21]Regulation (EU) No 1306/2013 of the European Parliament and of the Council on the financing, management and monitoring of the common agricultural policy and repealing Council Regulations (EEC) No 352/78, (EC) No 165/94, (EC) No 2799/98, (EC) No 814/2000, (EC) No 1290/2005 and (EC) No 485/2008

- trees and shrubs in the width of at least one meter are removed from water drainage beds and collecting ditches, their sprouts are mowed at least once every two years, ground wash-out, household waste, fallen trees, silt and beaver barrage preventing water inflow is removed;
- drainage holes in the drainage system are covered up, the silt is removed from the drainage hole, as well as the drainage collector outlets are cleaned, and ligneous plants in the distance of at least five meters on each side of drainage collector outlets are removed;

- stubble-field or dry grass on the field is not burnt down.

Amelioration of organic soils is directly counteracting the requirement of GAEC 6 as organic matter is not preserved but lost from peat soils under these regulations.

5.1.4. Coupled support

Coupled support is production-related support aimed at maintaining production in sectors that are experiencing difficulties. BSA was introduced in 2015, in 2018 BSA was applied to:

- Dairy Cows
- Goats
- Bovine Animals
- Sheep
- Protein Crops
- Starch Potatoes
- Certified Seed Potatoes
- Certified Seed of Grasses and Fodder Crops
- Certified Cereal Seeds
- Barley
- Spring Rape and Spring turnip rape
- Vegetables
- Fruits and Berries

Voluntary coupled support for certified seed of grasses and fodder crops may be received, if timothy grass, hybrid ryegrass, Italian ryegrass, red fescue, perennial ryegrass, tall fescue, smooth-stalk meadowgrass, cocksfoot, red clover, white clover, eastern galega, alfalafa, alsike clover, phacelia, birdsfoot trefoil, peas, vetches, field beans or lupine (sweet or yellow, white or narrow-leafed) are cultivated in the respective area.

5.2. CAP 2nd Pillar Payments

Support for Rural Development (RD) is the 2nd Pillar of the Common Agricultural Policy. It provides Member States with an envelope of EU funding, to manage nationally or regionally, under multi-annual, co-funded programmes. In total, 118 programmes are foreseen in all 28 Member States. The new RD Regulation for the 2014-2020 period addresses six economic, environmental and social priorities. Programmes contain clear targets setting out what is to be achieved. To better coordinate actions and maximise synergies with the other European Structural & Investment Funds (ESIF), a Partnership Agreement has been agreed with each Member State highlighting its broad strategy for EU-funded structural investment.

Program financed activities:

- Agri-environment and climate (activities "Maintenance of biodiversity in grasslands", "Use of environment-friendly methods in horticulture", "Stubble fields in winter" and "Creation of a protective environment for growing nectar plants");
- Organic Farming (Sub-Actions "Transition to Organic Farming", "Development of Organic Agriculture");
- Natura 2000 payments and Water Framework Directive payments (Compensation payments for NATURA2000 forest areas);
- Payments for areas with natural or other specific constraints;
- Investments in the extension of forest areas and the improvement of the viability of forests (support for "afforestation and the development of forest land", "improving the nutritional and ecological value of forest ecosystems").

Rural Development Programme's (RDP) measures are based on an in-depth analysis of planning and the selection of measures designed to help farmers modernize farms and become more competitive, protect the environment and promote the diversification of agricultural and non-agricultural activities, and promote the viability of rural communities.

Although the RDP provides activities that mitigate climate change and reduce GHG emissions, only a small number of activities are really contributing to this. There is even less activity and support that would encourage the cultivation of paludiculture crops.

Support for rural development - for improving the environment, climate and the countryside - is allocated to the following measures:

- Agri-environment and climate activities:
  - Maintenance of biodiversity in grasslands,
  - Use of environment-friendly methods in horticulture,
  - Stubble fields in winter,
  - Creating a protective environment for growing nectar plants;
- Organic Farming sub-actions:
  - Transition to Organic Farming,
  - Development of Organic Agriculture;
- Natura 2000 payments and Water Framework Directive payments (Compensation payments for NATURA2000 forest areas);
- Payments for areas with natural or other specific constraints;
- Investments in the extension of forest areas and the improvement of the viability of forests - support for
  - afforestation and the development of forest land,
  - improving the nutritional and ecological value of forest ecosystems.

5.2.1. Applying environmentally friendly methods in horticulture

Legal basis	Cabinet Regulations No. 171 adopted 7 April 2015 "Regulations on the granting, administration and monitoring of national and European Union support for the improvement of the environment, climate and the countryside during the 2014-2020 programming period"
Key	Eligible area of activity "Applying environmentally friendly methods in horticulture" in accordance with Regulation Article 28 (2) of Regulation (EC) No 1305/2013 is the

requirements	agricultural area comprising: • agricultural land in which apples, pears, sweet and sour cherries, plums, shrimps (blueberries, blueberries), large cranberries, and other fruit trees, berry bushes and perennial crops for the production of edible fruits, as well as strawberries, potatoes or various vegetables (excluding cabbage, pea, beans or maize for animal feed); • a raised bog or extracted peatland that is used for fruit and berry gardens in agriculture, and is grown in shrubbery (blueberries, blueberries), large cranberries, blueberries, raspberries or blackberries. Applicant for aid pursuant to Regulation Article 28 (2) of Regulation (EC) No 1305/2013 is a farmer who engages in agricultural activities using environmental-friendly horticultural methods in accordance with the general requirements for integrated production of agricultural products laid down in the regulatory enactments regarding the procedures for integrated cultivation, storage, marking and control of agricultural products. The eligible area per eligible hectare, which complies with all conditions for receiving the aid is 364 € - for apples, pears, sweet and sour cherries, plums, blueberries (brushwood, bilberries) or large cranberries.
Impacts	The rules can have a beneficial effect on the implementation of paludicultures, as it also provides support for the use of extracted peatlands.
Gaps	There are no paludiculture plants on the list of supported plants.
Perspectives	The rules also support the use of raised bogs and that would allow to grow *Sphagnum* mosses. Regulations should include paludiculture plants.

5.2.2. Investments in tangible assets

Legal basis	Procedure for granting State and European Union support in the form of open call for projects under the measure "Investments in tangible assets" provided in Cabinet Regulation No. 600 adopted 30 September 2014
Key requirements	Objectives of the measure "Investments in tangible assets" in accordance with the provisions of Regulation (EC) No ... / ... of the European Parliament and of the Council (EU) of 17 December 2013. 1305/2013 on support for rural development by the European Agricultural Fund for Rural Development (EAFRD) and repealing Council Regulation (EC) No Article 4 of Regulation (EC) No 1698/2005 (hereinafter referred to as Regulation No 1305/2013) is: • sub-measure to support agricultural holdings in order to improve their economic performance and competitiveness, and to foster the development of co-operation by ensuring the sustainable management of natural resources and supporting a climate-resilient economy; • increase the efficiency of processing agricultural products and increase the added value of products by promoting the development of competitive

	cooperation and the development of sustainable agricultural production and the introduction of innovations in enterprises; • improve the infrastructure related to agricultural development, increase forest productivity, improve the health of the stands and improve the quality of timber by preserving and improving the long-term contribution of the forest to global carbon circulation, maintaining biodiversity and ensuring climate change mitigation and the competitiveness of the agricultural and forestry sector promotion.
Impacts	The purpose of the sub-measure is to support farms in order to improve their economic performance and competitiveness, and to foster the development of cooperation, ensuring sustainable management of natural resources and supporting a climate-resilient economy.
Gaps	One of the supported activities that has negative impact on paludiculture implementation is restoring or rebuilding of drainage systems. RDP explain the importance of drainage: "The rebuilding and restoration of land reclamation systems play an important role not only in maintaining favourable conditions for the implementation of economic activities, but also to prevent forest damages - around 300 hectares of forest stands annually perish due to too high water level.[22]. Vegetation growth and CO2 sequestration decreases and plant parts die off in swampy areas. Therefore, only well drained and aerated soils provide a carbon balance ensured by normal plant respiration and photosynthesis." These statements are completely controversial to many scientific research proving that drainage of peat/organic soils leads to higher GHG emissions and soil degradation[23]. Even minimal drainage promotes rapid oxidation of peat[24], complete rewetting of the soil would be required in order to avoid greenhouse gas emissions. [25]
Perspectives	Regulations also states what is innovation: innovation within the meaning of these Regulations is the introduction of a new product in production that promotes the creation of new market niches, the launch of production of non-produced products in Latvia, the introduction of scientific and technical or other field ideas and the introduction of technology in the production process required in the market for the production of a competitive product. According to these regulations some of the paludiculture plants (*Sphagnum*, cattail) and their usage are innovations in Latvia.

5.2.3. Investing in expanding forest areas and improvement of the viability of forests

Legal basis	Procedure for granting, administrating and monitoring the support of the state and

[22] CSB data

[23] Joosten, H. The Global Peatland CO_2 Picture: Peatland Status and Drainage and Related Emissions in All Countries of the World; Greifswald University: Greifswald, Germany, 2010.

[24] Kechavarzi, C., Dawson, Q., Bartlett, M. & Leeds-Harrison, P.B. (2010). The role of soil moisture, temperature and nutrient amendment on CO2 efflux from agricultural peat soil microcosms. Geoderma, 154(3-4), ss. 203-210.

[25] https://pub.epsilon.slu.se/14284/1/norberg_l_170427.pdf

	the European Union for the implementation of the measure "Investing in the extension of forest areas and improving the viability of forests"
Key requirements	The Regulations prescribe the procedure for granting, administering and monitoring the support of the state and the European Union to the following sub-measures for the measure "Investing in the extension of forest areas and improving the viability of forests": • afforestation; • restoration of forest stands destroyed by forest fires and natural disasters; • investing in improving the sustainability and ecological value of forest ecosystems. In accordance with regulatory enactments regarding forest renewal, afforestation and plantation forests, the applicant shall coordinate activities with local government territorial planning documents. One applicant may qualify for support in the planning period up to 20 hectares. The sub-measure "Forest cultivation" can be implemented on: • agricultural land: - in the entire contour of the area of the unit of land, where the fertility is not more than 25, and the area in the contour, where the fertility of the land is greater than 25 points, up to four hectares; - erosion-prone agricultural land; - agricultural land on peat soils; • scrubland - in the land listed in the estate state cadastre in the group of scrubs; • other lands – e.g. quarries.
Impacts	RDP describes that although there has been a steady trend in the growth of the stock so far, reaching 631 million cubic meters, a relatively large proportion of adult forest stands has developed. Based on the latest information on the GHG dynamics, it is evident that due to the age structure the sequestration of carbon in Latvian the LULUCF sector tends to decrease and therefore the sink in the sector gets smaller.[26] It is projected that this trend will continue and after 2020 the sector may generate emissions and violate the no-debit-rule of the EU LULUCF regulation in the frame of the 2030 Climate and Energy Framework[27]. Particularly this problem may occur in private forests with a relatively high proportion of adult grey alder (*Alnus incana*)

[26] National Greenhouse Gas Inventory (1990-2012) 284.lpp. http://cdr.eionet.europa.eu/lv/un/colqlvn8g/envu0zhea/LV_NIR_15_04_2014.pdf

[27] Regulation (EU) 2018/841 - Inclusion of greenhouse gas emissions and removals from land use, land use change and forestry in the 2030 climate and energy framework, and amending Regulation (EU) No 525/2013 and Decision No 529/2013/EU

	forests. Although for some time, such forest stands provide carbon sequestration, they have a short life span and forest owners are often not interested in managing them, therefore, it is necessary to promote their replacement with more stable forests that contribute to the carbon sequestration. According to the data of the State Forest Service, in private forests without economic activity, the stock in gray alder stands is an average of 200 m^3 / ha, which later decreases. The rest of the species (pine, spruce, birch stands is 300m^3 / ha and more). Replacing the short rotation coppice forest (grey alder) with the planted forests gives an increase in carbon sequestration of at least 50% in the long run. [28]
Gaps	Support is focused on areas with low fertility that are not used in economic activity, thus ensuring rational management of these unused areas. Tendering activity of the applicants was smaller than originally planned. In addition, for economic reasons, the support of tenderers is lower than planned, as aid applicants are initially required to invest their own resources in the project. The cost of installing a forest stand is relatively high (1085 Eur / ha), which may make it difficult to implement this sub-measure, especially when the project is implemented by tenderers who own small areas.[29] In the framework of the sub-measure, it is planned to further promote the achievement of climate and environmental objectives, but only by supporting the use of genetically valuable forest plant material, because it gives an increased stock of forest stands, sustainability of forests and in that way adaptation to climate change would be promoted. Support for afforestation is not granted for afforestation in an area with closed drainage systems. What exactly it means – it is not described.
Perspectives	Planting black alder would be a good solution providing carbon sequestration and valuable wood in areas where pine, spruce and birch do not grow well - abandoned agricultural lands with low soil fertility and high water level.

[28] https://www.zm.gov.lv/public/files/CMS_Static_Page_Doc/00/00/01/33/82/Programma.pdf
[29] Rural Development Programme

6. CAP post-2020

Situation is relevant to Estonia and subsequent information is provided in report "Paludiculture – opportunities and obstacles in Estonia Analysis of legal rules and strategies" by Sim Vahtrus and Meryln Mannov (2018).

7. Conclusions and recommendations

The study suggested that:

2. More information about paludicultures should be provided to the policymakers, farmers, scientific organizations and other stakeholders.
3. It is important to change the requirement that aid for areas in the form of direct payments shall not be granted for agricultural land if there are bulrushes or there is wetland that within the time period from 15 May to 15 September is covered by water for a time period exceeding four weeks in a row.
4. Although the list of agricultural crops might already include plants that are considered as paludiculture crops (reed canary grass) and some plants in the list could grow also in increased humidity conditions on organic soils (e.g. timothy grass), the list should include also other paludiculture plants.
5. Additional support schemes are necessary to support paludicultures – investments in specific agricultural equipment, production facilities and capacity building of farmers.
6. It is necessary to review the deadlines for harvesting to allow winter harvesting of some of the paludiculture crops (e.g. reed and cattail).
7. It is important not only to recognize that organic soils increase GHG emissions in the agricultural sector, but that they have to be treated differently as mineral soils, therefore it is necessary to subdivide agricultural lands – with mineral soil and with organic soil and to set different support measures for each of them. Applying the same measures for organic soils as for mineral soils can never lead to climate-friendly management of organic soils.

Annex - List of interviews and interviewees

1. Interview with **Kristīne Sirmā** from **Ministry of Agriculture, Republic of Latvia**, Head of Department of Sustainable Agriculture Development, On 27th of July 2018.
2. Interview with **Andris Orlovskis** from **Ministry of Agriculture, Republic of Latvia**, Senior Officer of the Department of Direct Payments and Sectoral Economics, On 27th of July, 2018 and 04th of September 2018.
3. Interview with **Gunta Bāra** from **Ministry of Agriculture, Republic of Latvia**, Senior Officer of the Department of Rural Development Fund Support, On 11th of September 2018.