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Enhancement of sustainable land soil resource management in agriculture - E2SOILAGRI

NIBIO Inception report

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Enhancement of sustainable land soil resource management in agriculture - E2SOILAGRI. NIBIO Inception report

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Sammendrag

Dette er en oppstartrapport for NIBIOs bidrag i prosjektet "E2SOILAGRI". Rapporten sammenfatter informasjon om det latviske jordinformasjonssystemet som framkom gjennom intervjuer med partnere og interessenter i prosjektet. Arbeidet er definert som underaktivitet 4.1 i Terms of Reference for NIBIOs rolle i prosjektet.

Summary

This is an inception report which summarizes information on the Latvian Soil Information System which was obtained during interviews with partners and stakeholders in the project "E2SOILAGRI". This task is defined as sub-activity 4.1 in the Terms of Reference for the NIBIO assignment.

LAND/COUNTRY: Latvia

STED/LOKALITET:

GODKJENT /APPROVED	PROSJEKTLEDER /PROJECT LEADER
Hildegunn Norheim	Siri Svendgård-Stokke
NAVN/NAME	NAVN/NAME

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Preface

NIBIO is a partner in the project "Enhancement of sustainable land soil resource management in agriculture" (E2SOILAGRI) implemented by the Ministry of Agriculture of the Republic of Latvia and funded under the Norwegian Financial Mechanism Program "Climate Change Mitigation, Adaptation and Environment". The main objective of the project is to improve Latvian soil data for the development and implementation of climate change policies. The project is managed by Latvian authorities. The project period is from February 2021 to January 2024.

NIBIO has an advisory role in the project. NIBIO is owned by the Norwegian Ministry of Agriculture and Food and has a role in contributing to food security and safety, sustainable resource management, innovation and value creation in Norway. NIBIO is a partner in E2SOILAGRI due to its ongoing soil survey on agricultural land and the experience in making data from the survey easily accessible for different users.

The E2SOILAGRI project is supported by Norway through the Norway Grants. The Norway Grants, together with the EEA Grants, represent Norway's contribution towards a green, competitive and inclusive Europe. Through the Norway Grants and the EEA Grants, Norway contributes to reducing social and economic disparities and to strengthening bilateral relations with beneficiary countries in Central and Southern Europe and the Baltics. Norway cooperates closely with the EU through the Agreement on the European Economic Area (EEA). Together with the other donors, Norway has provided €3.3 billion through consecutive grant schemes between 1994 and 2014.

Norway Grants are financed solely by Norway and are available in the countries that joined the EU after 2003. For the period 2014-2021, the Norway Grants amount to €1.25 billion. The E2SOILAGRI benefits from a EUR 1,56 million contribution from Norway Grants.

This report is an inception report from NIBIO and summarizes the information obtained during sub-activity 4.1 in activity 4 in the project, Exchange of experience of experts from NIBIO on sustainable management of soil resources. Sub-activity 4.1 is defined as the involvement of NIBIO experts into the implementation of the project.

In person study visit to Latvia was planned, but due to the Covid-19-restrictions in Latvia, this study visit was postponed several times and finally organized as remote meetings on telecommunication platforms.

Ås, 09.02.22

Hildegunn Norheim

Innhold

1 Introduction

1.1 Summary E2SOILAGRI

The main objective of the E2SOILAGRI project is to improve national soil data in Latvia for the development and implementation of climate change policies. This is done through

- Improvement of reliable, country-specific soil information database in agricultural land
- Establishment of national soil carbon monitoring system
- Improvement of national greenhouse gas (GHG) emission calculation system.

The main partners and stakeholders in Latvia in E2SOILAGRI are the University of Latvia, the State Plant Protection Service, the Latvian State Forest Research Institute "Silava" and the State land Service. The Ministry of Environment Protection and Rural Development is the project operator, and the Ministry of Agriculture is the project promoter.

The expected results from E2SOILAGRI are:

- Updated historical information database for Latvian agricultural soils
- National soil classification system updated and internationally harmonized with the United Nations Food and Agriculture organization (FAO) World Reference Base (WRB) classification
- Soil mapping methodology developed (1:10 000)
- Distribution of peat soils in agricultural land assessed
- 200 soil carbon monitoring sites in agricultural land established
- GHG emission factors in drained organic soils developed
- 10 experts trained to perform soil description and mapping according to the national and international FAO WRB classification system.

E2SOILAGRI is implemented in Latvia and by the Latvian partners in the project. The Norwegian partner (NIBIO) has an advisory role in the project.

NIBIO is the public agency responsible for soil mapping and soil monitoring in Norway. The institute has more than 100 years of experience from working with soil surveys. A systematic approach to national soil mapping of agricultural land has been in place from 1980. The department of soil survey at NIBIO has gained extensive experience not only in collecting data, but also making data easily accessible and clear for different users. NIBIO is furthermore familiar with the major current international classification system (The World Reference Base, WRB).

Norwegian methodologies used in soil survey are very similar to the ones that are planned to be introduced in Latvia. Consequently, the national adaptations of international soil classifications used over the years in Norway will provide Latvia with valuable experience needed to set up methodologies and a system for soil survey.

The Norwegian Soil Survey is using an adjusted version of the FAO WRB (2014 version) classification system. Adjustments have been made in order to make the system usable for in situ decisions on the soil properties and to be able to distinguish between and describe important soil properties for Norwegian conditions in a better way.

Norway has (by 2021) not yet established a national soil carbon monitoring system, but a system description has been developed and is under consideration by the Norwegian Ministry of Agriculture and

Food. This proposed system may serve as a reference for the establishment of a Latvian soil carbon monitoring system.

NIBIO will, as a partner in the E2SOILAGRI project, make its experience regarding soil survey and mapping in Norway available to the partners of Latvia. A key element in this knowledge transfer is the organization of a study and training visit to Norway. NIBIO will also provide an external view on the topics addressed and solutions proposed in the. By following the project, and conducting a mid-term and a final evaluation, NIBIO will provide comments, suggestions and recommendations for the project itself and the consecutive soil information system in Latvia.

A project inception workshop was initially planned at the start of the project but had to be cancelled due to Covid -19 restrictions. Project meetings between NIBIO and the partners and stakeholders were instead held by telecommunication using Teams. The project implementation partners and the stakeholders presented their plans of project implementation, activities and expected results, providing NIBIO with the required background to understand the project goals and organization.

1.2 The Interview Process

One of the NIBIO tasks in the assignment is to be involved in the implementation of the project. In sub-activity 4.2 according to the Terms of Reference, a series of interviews with stakeholders and associated organizations was held in the period November 22nd to December 2nd in 2021. Questions were prepared and sent to each organization in advance. Geir-Harald Strand and Siri Svendgård-Stokke were performing the interviews. The agenda and the participants in the interviews are listed in table 1. After the interviews, the partners and stakeholders were followed up with e-mails.

Table 1. Agenda for interviews

Date	Time (GMT+2)	Partner/Stakeholder	Name, surname of participant
22.11.2021	12.00-13.15	University of Latvia (UoL)	Raimonds Kasparinskis Imants Kukuļs Ivo Vinogradovs
23.11.2021	10.00-12.30	State Land Service (SLS)	Artūrs Pizičs Anete Māra Harkeviča
23.11.2021	13.30-16.00	State Plant Protection Service (SPPS)	Skaidrīte Rulle Marta Lapina Lauris Leitāns Guna Šmitiņa Vita Dernova Gints Zabītis
25.11.2021	10.00-12.30	Latvian Forest Research Institute (Silava)	Andis Lazdiņš Aldis Butlers Mārtiņš Vanags Duka Emīls Mārtiņš Upenieks
	13.30-16.00	Ministry of Agriculture (MA)	Kristīne Sirmā Dace Guste
26.11.2021	13.00-15.00	Associated organizations	Institute of Agricultural Resources and Economics: Inga Jansone Latvia University of Life Sciences and Technologies, Faculty of Agriculture: Ilze Vircava Latvian Agricultural Organization Cooperation Council: Aiga Kraukle Riga City Forests: Jānis Ģērmanis Rural Support Service: Juris Griņevičs State Land Service: Artūrs Pizičs Ministry of Environment Protection and Rural Development: Mārtiņš Turks
02.12.2021	10.00-13.00	Ministry of Environmental Protection and Regional Development (MEPRD)	Agita Gancone Mārtiņš Turks Edvīns Kāpostiņš

2 The Latvian Soil Information System

The following summarizes the NIBIO interpretation of the present situation regarding the Latvian Soil Information System, based on the preformed interviews. This is one of the main contributions from NIBIO at the given stage of the project, giving an outside overview in the inception period.

Seen from the outside, Latvia has a soil information system, but it is fragmented, incomplete and there is also a need for harmonization and standardization. A process aiming to establish a coherent (and official) soil information system has started. The different elements in the current, fragmented system will be renovated, standardized and complemented. This is an overarching process, and far larger than the E2SOILAGRI project. E2SOILAGRI is a project that supports this overarching process and the formation of the new and coherent Latvian soil information system by improving data and classification systems, training surveyors and in some cases collecting new data.

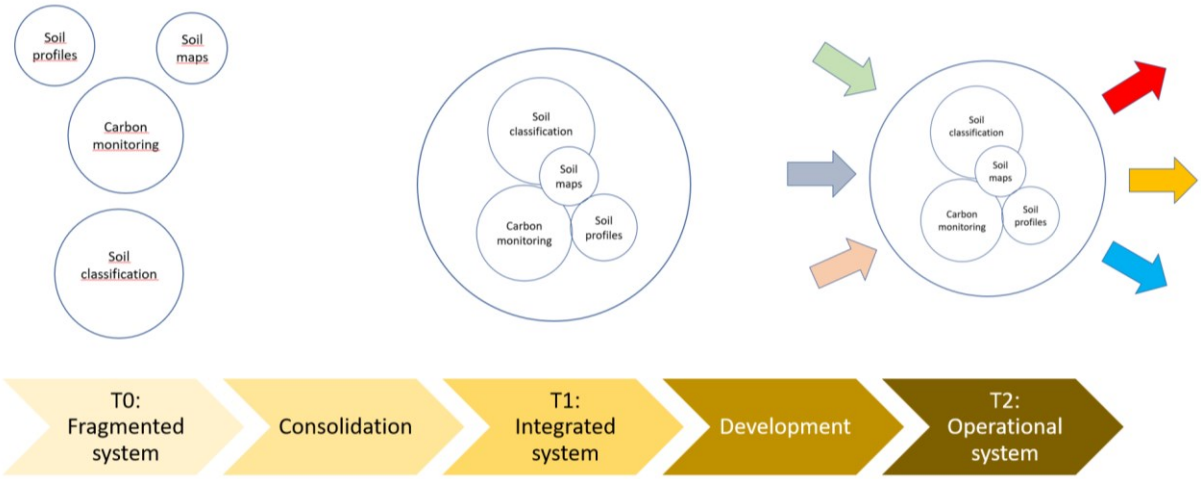

Figure 1: The development of the Latvian soil information system

A simple, conceptual outline of the ongoing process is found in Figure 1. The figure depicts a timeline starting at T0 (now or recently), currently moving towards T1 (in near future) and aiming towards T2 (in a few years). The current situation (T0) is that Latvia has a solid amount of soil information, but the information is fragmented, standardization is insufficient, some of the data are outdated and there are knowledge gaps. Latvia is in a consolidation phase where the goal is to integrate the existing information in a single data system with updated and standardized information. This integrated system should be completed in near future (T1).

When the integrated system is established, Latvia will move into a development phase where applications and services are added to the database. These functions will facilitate the dataflow to and from the database. They include procedures for entering new or updated soil maps, new soil profiles and monitoring data. It is also possible to link the data to external databases (e.g. climatic observations and cadastral data) and carry out analysis. On the service side, the data should be available for national and international reports, and information tools should be provided for farmers, advisors, agricultural officers and national agencies who use soil or soil quality data in their day-to-day operations. This kind of operational system should be available in few years (T2).

Compared to Norway, the soil information situation is in many ways better in Latvia. Latvia has a complete soil map of agricultural land. The coverage in Norway is only 55 %. Latvia has also started a soil carbon monitoring system. This is planned, but not yet started in Norway. Norway has, however, consolidated the existing data and established an integrated system with standardized and harmonized

data in a single database. The Norwegian soil information system has also reached the operational stage in the sense that a number of functions and services have been created, allowing information to flow to and from the system.

E2SOILAGRI is a project that supports the process described in Figure 1, but the process itself is much larger than E2SOILAGRI. E2SOILAGRI will in particular provide tools and assistance for use in the consolidation phase, and to some extent also the development phase.

2.1 Soil System Components

This chapter is a description of the individual components of the existing soil information system in Latvia.

Soil maps (Layer 1)

The soils of the agricultural land in Latvia were mapped during the period 1959–1991. The mapping process was divided into three stages. Each stage used different versions of the, at the time official, Soviet methodology and soil classification. The maps cover agricultural land and private forest, but not state forests. Approximately 15 000 soil profiles were also described as part of this mapping project. The University of Latvia has georeferenced, digitized and vectorized the maps in a process where two map layers were established. Layer 1 is the soil map showing soil polygons with soil types according to the Soviet classification system. Layer 2 is a "land suitability map" (agricultural land quality map) with suitability (for agriculture) assessed on a scale from 0 (not suitable) to 100 % (most suitable). Layer 2 is discussed in a separate section below.

The issues with the soil maps are:

- The classification system does not match any current international standard
- Mapping was carried out in three separate stages. There may be harmonization issues regarding how the classification system was applied in these three stages
- Data and information upon which classification was assigned can be unavailable or lost
- Some areas may no longer be agricultural land
- New agricultural land has not been mapped
- The soil type may have changed over the 30–60 years that passed since the initial mapping

Several of these issues will be handled by the University of Latvia during the consolidation phase, and are topics addressed by E2SOILAGRI.

Land quality (Layer 2)

During the field inventory, a second layer (Layer 2) of the soil map was produced, showing land suitability. This is the "land quality assessment" that shows the usefulness of land for agricultural production. It is a comparative assessment in terms of regulatory productivity (the amount of crop production that can be obtained at the average land use, production intensity, and organizational level). In Latvia the reference unit land quality assessment is rye. The quality group reflects the amount of rye that can be harvested on 1 ha of agricultural land, where 1 quality point is equivalent to 70 kg of rye. The layer is commonly known as the soil quality map. The original resides at the University of Latvia while the State Land Service (SLS, the public agency in charge of topographic mapping and cadastral data) has obtained a copy of the data. SLS is using Layer 2 to assess land productivity and determine the value of agricultural land. SLS is faced with the challenge that the information in Layer 2 may be outdated and SLS will occasionally edit the information from Layer 2 and change the Land Quality assessment based on input from land holders. The result is an increasing difference between the Layer 2 map held by

SLS and the original Layer 2 map at the University of Latvia. Generally, there is a need for an update of the land quality assessment (Layer 2).

The issues with the land quality layer are:

- The information is sometimes outdated
- Updating is done on a copy of the data and not transmitted back to the original
- The land quality assessment was based on a model, but some of the criteria included subjective assessment

Soil profiles

Soil profiles were described as part of the soil mapping of Latvia during the period 1959-1991.

The issues with the soil profiles are:

- The profile description is analogue
- The profile is not georeferenced
- There are no "generic profiles" providing a link between soil types and empirical profiles

The University of Latvia will georeference (i.e. add geographical coordinates to) the profiles during the consolidation phase. The profile descriptions will not be digitized. It is possible (but not planned) to scan images (pictures of the profile descriptions) for storage and link the pictures to the reference locations.

Peat soil survey of agricultural lands

The University of Latvia is supplementing the soil maps with a peat soil survey in agriculture lands.

Soil carbon monitoring

A soil carbon monitoring system has been started by the State Plant Protection Service (SPPS) and will develop into an operational system for soil carbon monitoring on agricultural land

Forest soil monitoring

There is no operational system for soil monitoring om forest land, but soil data is to some extent collected by SILAVA, linked to the national forest inventory (NFI). Soil samples from forest and agricultural land are not harmonized and reside in different systems.

The issues with forest soil monitoring data are:

- Possible harmonization issues with monitoring data on agricultural land
- Accessibility, but this is also a question of ownership

2.2 Roles in E2SOILAGRI

In the following, all the organizations which are involved in E2SOILAGRI are described, both with their formal role in the project (as understood by NIBIO) and with a short description of the organization's overall role in the Latvian soil information system.

The Ministry of Agriculture (MA)

The Ministry of Agriculture is the project promoter of E2SOILAGRI. The ministry is responsible for the agriculture, food, forestry and fisheries. Its main objectives are formation and implementation of strategies and policies in these areas, and they are involved or financing various projects regarding

agriculture. The soil information system falls under this ministry. MA is consequently also the project promoter and responsible for the implementation of E2SOILAGRI.

The Ministry of Environmental Protection and Regional Development (MEPRD)

The Ministry of Environmental Protection and Regional Development (MEPRD) is the program operator of "Climate Change Mitigation, Adaptation and Environment" program. The Ministry is the main governmental institution responsible for the environment protection, regional development and digital transformation, including activities related to environmental impact and protection, pollution, climate change, GHG, soil quality, regional and sustainable development. In relation to the project, MEPRD is responsible for GHG national inventory, where soil information is an important element. MEPRD is the project operator for E2SOILAGRI and is responsible for reviewing the project's progress and finances.

Partners

University of Latvia, Faculty of Geography (UoL)

The University of Latvia provides academic studies in geography, geology and environmental science and is mostly focused on scientific work. UoL has digitized the soil maps of Latvia and (including the land quality layer) and is georeferencing the soil profiles. UoL is also conducting the survey of peat land. UoL is developing methodology for soil mapping and classification.

State Plant Protection Service (SPPS)

The State Plant Protection Service is a governmental agency under the Ministry of Agriculture. The responsibilities include plant health and quarantine organisms; plant protection product evaluation and registration; seed and plant control and certification; fertilizer control, and soil agrochemical testing and research. SPPS is the manager of soil agrochemical research data and soil chemical test databases. SPPS is implementing the current soil monitoring program – mineral nitrogen monitoring in nitrate vulnerable zone according to the Nitrate Directive an also responsible for establishment of the soil carbon monitoring network and development of a database for data storage.

The Latvian State Forest Research Institute "Silava"

Silava is a scientific research center specializing in forests. They are involved in many different projects, including the forest monitoring program, and the calculations and modelling for GHG inventory. Silava will be responsible for practical soil description according to methodology developed by University of Latvia and practical modelling and calculations.

The Norwegian Institute for Bioeconomy Research (NIBIO)

The Norwegian Institute for Bioeconomy Research (NIBIO) has an advisory role in E2SOILAGRI. NIBIO is owned by the Norwegian Ministry of Agriculture and Food and has a role in contributing to food security and safety, sustainable resource management, innovation and value creation in Norway. NIBIO is a partner in E2SOILAGRI due to its ongoing soil survey on agricultural land and the experience in making data from the survey easily accessible for different users. Moreover, Norwegian methodologies used in soil survey, by using national adaptations of an international soil classification system, can provide valuable experience for the E2SOILAGRI.

Stakeholders (in addition to the above-mentioned organizations)

State Land Service (SLS)

The State Land Service is a government agency in charge of real property object data accumulation and dissemination to institutions responsible for land management and supervision. They are under the supervision of Ministry of Justice. One of the functions of the State Land Service is cadastral or mass valuation (a technical term for land or real estate valuation or appraisal using data or statistical methods). The cadastral value is determined for all land units registered in the Cadaster, which means a

complete assessment of the entire territory of the country. In the context of the soil information system, SLS is a user of land quality data. Land quality data will be used in the calculation of the cadastral value of each land unit, as well as, in the determination of the value base - grouping territories by land quality and determining the value level. Cadastral value is the basis of real estate tax. Land quality is important for the land owners and for comparing different land plots. SLS does to some extent also update the local data set kept by the agency but does not have a procedure to report back to the original database. SLS will benefit from improvements in and maintenance of the land quality dataset.

Associated organizations

Associated organizations are various target groups, agriculture sector representatives and third parties interested in the E2SOILAGRI progress and results, without being direct partner and receiving financing or remuneration. Associated organizations participate in project events, express opinion and review results of E2SOILAGRI activities.

Institute of Agricultural Resources and Economics, Latvia University of Life Sciences and Technologies (Faculty of Agriculture), Latvian Agricultural Cooperatives Association, Latvian Agricultural Organization Cooperation Council, Latvian Peat Association, Latvian Rural Advisory and Training Centre, NGO "Farmers' Parliament", Riga City Forests and the Rural Support Service.

2.3 E2SOILAGRI components

E2SOILAGRI is a project supporting the development of the Latvian Soil Information System. The project will provide tools and assistance for use in the consolidation phase, and to some extent also the development phase. Below, the planned results from E2SOILAGRI are listed and some comments from the NIBIO point of view for each result are made.

Updated historical information database

This implies a question of compatibility between classification systems. A core question is how important and reasonable it is to use the old USSR soil classification and mapping system and to what extent it should be replaced by a new system? Regarding the Land suitability: How was suitability assessed (criteria, methodology) and has the suitability changed during the time from which they were assessed? It's essential to access the methodology, which was used for the original land suitability assessment, for both documentation purposes and for possible future development of land suitability assessments.

National soil classification system updated and internationally harmonized

It's important to have a pragmatic way of doing this, to simplify where necessary without loosing essential information on the properties of the soils.

Soil mapping methodology developed (1:10 000)

A translation of the old classification system is required, and the new system must both be adapted to the chosen international classification system and at the same time be valuable for, and adapted to, the soil properties in Latvia. In addition, the system must be made in such a way that decisions on the soil's main properties can be made in situ, without laboratory analysis.

Distribution of peat soils in agricultural land assessed

Information regarding peat soils is important for international reporting on CO_2 emissions and carbon sequestration. Therefore, it's essential that this information is compatible with international standards, both due to reporting and cooperation.

200 soil carbon monitoring sites in agricultural land established

Information regarding soil carbon monitoring is important for international reporting on CO_2 emissions and carbon sequestration. Therefore, it's essential that this information is compatible with international standards, both due to reporting and cooperation.

GHG emission factors in drained organic soils developed

Information regarding GHG emission factors in drained organic soils developed is important for international reporting on CO_2 emissions factors. Therefore, it's essential that this information is compatible with international standards, both due to reporting and cooperation.

Eight experts trained

NIBIO will organize a study trip for Latvian partners and the trip will provide the participants with insight in the methods used in Norway regarding data capture, both soil descriptions and soil mapping. In addition, the trip will also include the other three aspects of the Norwegian Soil Information System: data management, data processing and dissemination.

3 Observations made by NIBIO in the process

The following is a short list of observations that NIBIO has noticed at this stage of the project, which the Latvian partners might find useful in E2SOILAGRI.

- Translation from the USSR classification to the WRB: the work must be sufficiently documented for the future. Is there an available documentation of the USSR-system?
- A field handbook for the new soil mapping methodology must include all aspects of the soil survey, included soil sampling.
- A pragmatic solution regarding diagnostic horizons, criteria and material which in the original WRB system cannot be identified in situ must be made. At the same time, these solutions must be standardized.
- Cartographic systems (projection and datum), databases, methodology and sample surveys must be documented.
- In an integrated and new Latvian Soil Information System, roles and responsibilities must be specified and agreed upon. The information flow for each step of the system must be documented, not only regarding the field work, but also all the other elements in the system. This, and a good dialogue, is essential if the information flow involves different organizations.
- A *soil information system* is not a transient project. The system must be updated and worked on constantly and should be understood as an ongoing process. As such it must be maintained by a mandated organization and requires sustainable financial support
- The scope of the study visit in Norway will be expanded to all the steps in the Norwegian Soil Information System, including the architecture of the system, processes and technology. The Latvian partners will also get information on the Norwegian national website for map data and other location information in Norway, *Geonorge*. *Geonorge* is part of *Norge digital* (Digital Norway), a partnership involving public enterprises that are responsible for establishing and managing map data and other location information. *Geonorge* is developed and managed by the Norwegian Mapping Authority on behalf of members of the *Norge digitalt* partnership.
- Development of thematic maps from the Latvian Soil Information System is not part of E2SOILAGRI, but according to observations made in the interviews, this can be done in the future. Soil data can be used in combination with other data, for example meteorological and terrain data to produce useful maps for different users and purposes. This will increase the value of the soil information. These thematic maps must be made based on mathematical models.
- The Land Suitability maps (named as layer 2 previous in this report) are being updated by the State land Service. It's important to ensure that these changes in the local copy at STS are transferred to the original version, with the necessary information on versions and verification date.
- The Land Suitability maps need to be updated from time to time. The map was probably produced according to manual assessments in the original mapping. It is thus not possible to repeat or re-run a model. An update of this map is therefore comprehensive and probably outside the scope of E2SOILAGRI and needs to be organized as a separate project later. The updated soil map (Layer 1) translated to WRB can probably be combined with terrain data and climatic data in a model that produces a new Land Suitability map. Our advice is not to include this task in E2SOILAGRI, but to keep this need in mind and make sure that the new Layer 1 has the necessary information to facilitate the production of a new Layer 2.
- NIBIO is working on a report on the Norwegian Soil Survey program. This report will be made available for the Latvian partners.

4 Conclusions

This inception report shows that Latvia has a soil information system. The system is fragmented but has a large amount soil data. NIBIO understands E2SOILAGRI as a project supporting the consolidation of the Soil Information System through standardization, updating and management of the existing data. This will be a very valuable project in making the soil data in Latvia more relevant and useful for a sustainable soil resource management in agriculture.

Immediate upcoming task for NIBIO is now to organize the study trip in a best possible way for the Latvian partners in E2SOILAGRI.

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Norsk institutt for bioøkonomi (NIBIO) ble opprettet 1. juli 2015 som en fusjon av Bioforsk, Norsk institutt for landbruksøkonomisk forskning (NILF) og Norsk institutt for skog og landskap.

Bioøkonomi baserer seg på utnyttelse og forvaltning av biologiske ressurser fra jord og hav, fremfor en fossil økonomi som er basert på kull, olje og gass. NIBIO skal være nasjonalt ledende for utvikling av kunnskap om bioøkonomi.

Gjennom forskning og kunnskapsproduksjon skal instituttet bidra til matsikkerhet, bærekraftig ressursforvaltning, innovasjon og verdiskaping innenfor verdikjedene for mat, skog og andre biobaserte næringer. Instituttet skal levere forskning, forvaltningsstøtte og kunnskap til anvendelse i nasjonal beredskap, forvaltning, næringsliv og samfunnet for øvrig.

NIBIO er eid av Landbruks- og matdepartementet som et forvaltningsorgan med særskilte fullmakter og eget styre. Hovedkontoret er på Ås. Instituttet har flere regionale enheter og et avdelingskontor i Oslo.

Photo (Front and back page): The Ministry of Agriculture of the Republic of Latvia

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