

SEEMLA

Sustainable exploitation of biomass for bioenergy from marginal lands in Europe

SEEMLA Project Grant Agreement no. 691874

Report on site selection for case studies

27 September, 2016



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I. About the SEEMLA project

The aim of the Horizon 2020 funded “Sustainable exploitation of biomass for bioenergy from marginal lands in Europe” (SEEMLA) project is the reliable and sustainable exploitation of biomass from marginal lands (MagL), which are used neither for food nor feed production and are not posing an environmental threat.

The initial challenge of the project is to define MagL in order to achieve high yields on the MagL the goal is to develop and optimize cropping systems for special sites. The project focuses both on existing plantations of energy crops on MagL and on the establishment of new plantations on MagLs. General guidelines and manuals shall attract and help relevant stakeholders as well as piloting shall prove the feasibility of SEEMLA results. The first scenario will enable the assessment of good practice and the refinement of current practices, making them more sustainable (environmental, economic, social). The second approach will transfer good practices to underused MagL.

The project will focus on three main objectives: (i) the promotion of reconversion of MagLs for the production of bioenergy through the direct involvement of farmers and forester, (ii) the strengthening of local small scale supply chains, and (iii) the promotion of plantations of bioenergy plants on MagLs.

The expected impacts are: Increasing the production of bioenergy, famers' incomes, investments in new technologies and the design of new policy measures.

The main target groups are regional authorities and public or private owners of MagLs, who can provide knowledge on land availability and are responsible for managing these. Furthermore foresters, farmers and the civil society affected by transformation of MagL into energy crop plantations are important cooperation partners for the project's success.

The project team is balanced between scientific and technical partners as well as national and regional organizations. FNR will coordinate the project with its eight partners from Ukraine, Greece, Italy and others from Germany By including partners from South-East, Eastern and Central Europe, the knowledge transfer between regions of different climatic and political backgrounds can be established.

Project coordinator

Agency for Renewable Resources

Fachagentur Nachwachsende Rohstoffe e.V.

FNR

Germany

Project partners

Salix Energy Ltd.

SALIX

Ukraine

Institute for Bioenergy Crops & Sugar Beet of the National Academy of Agricultural Science

IBC&SB

Ukraine

Legambiente

LEGABT

Italy

Democritus University of Thrace

DUTH

Greece

Decentralized Administration of Macedonia and Thrace

DAMT

Greece

Brandenburg Technical University Cottbus-Senftenberg

BTU CS

Germany

Institut für Energie- und Umweltforschung Heidelberg GmbH

IFEU

Germany

II. About this document

This report corresponds to D 5.1 Report on site selection for case studies. It has been prepared by:

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Author	Kiourtsis Fotios -Dimitrios Keramitzis (D.A.M.T)
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III. Background

This deliverable “D 5.1-Report on site selection for case studies” is mainly based on the task as described in the Grant Agreement Annex I of the Horizon 2020 project SEEMLA (GA no. 691874).

Task 5.1 Identifying, discussion and selection of suitable MagL cases (DAMT, M2 – M8)

The main objective of WP 5 is to exploit and perform experimental case studies for evaluating and optimizing biomass production tools for MagL under practical conditions.

This task will give an overview on location and general properties of the preselected potential SEEMLA case study sites. This is the first task of WP 5 and it is a further refinement of the site selection to be implemented into the further investigations. One or two of the preselected case study sites will be finally chosen per country (see table 1). This selection step will be a first application and evaluation of tools developed in WP 6 for the SEEMLA approach and the results from WPs 2-4. The selected cases will especially highlight specific regional conditions to be evaluated, implemented and considered.

Nearby productive ecosystems (including forests etc.) or successional sites can serve as references for estimating the potentials of MagL. The first scenario will enable the assessment of good practice and the refinement of current practices, making them more sustainable (environmental, economic, social) and the second approach will transfer good practices to underused MagL.

Main factors amongst others for this selection will be the balance between costs and pursued information, the assessment of biomass productivity of the sites, current management status and possible changes, technical and financial resources for biomass exploitation, plant characteristics, and accessibility. Site preparation and installation of core sites for monitoring will be planned during this first task (see task 5.4).

The task is led by DAMT in close collaboration with project partners from the test regions (SALIX, IBC & SB, BTU CS). Within this task a first assessment of the selected case study sites will be done.

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1. Overview of SEEMLA case study sites in Europe

The case study sites are located in the following European regions (see Fig. 1):

- Lusatia (Germany),
- East Macedonia & Thrace (Greece) and
- Vinnitsa, Poltava, Volyn and Lviv (Ukraine).

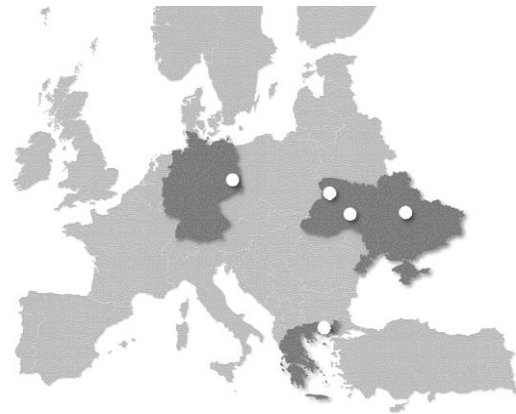


Fig. 1: Location of SEEMLA pilot areas in Europe

A number of potential study cases were preselected as shown in Tab. 1. This preselection was done based on a literature overview before the submission of SEEMLA proposal. The suggested sites were supposed to be marginal. The definition of MagL used by SEEMLA was introduced with the D2.1 report and all sites have been preliminary evaluated according to this definition.

The preselected case study sites were chosen based on the following parameters:

- Land own
- Type of MagL and main site restrictions
- Proposed feedstock
- Main purpose of the resource

Three case study sites have been preselected for Germany, five for Greece and six for Ukraine (see Tab 1). Based on this preselection and based on additional information about site properties the SEEMLA case study sites were finally selected. This report gives a short overview of the sites, their locations and main properties. The upcoming report D5.2 will provide a more precise characterization of the selected sites and a proper classification of their properties with regard to the definition of MagL.

	Location	Land owner	Marginal land type	Main site restrictions	Proposed feedstock	Main purpose of resource
Greece (DAMT)	Rodopi ,Region of East Macedonia and Thrace	Rodopi's land owners	Afforestation of agricultural land	Low nutrient and humus status, insufficient nutrient and humus status	Pine	Recreation for Production of biomass
	Rodopi and Evros ,Region of East Macedonia and Thrace	Rodopi forest Directorate	Recreational forest cleaning	Low nutrient and humus status, insufficient nutrient and humus status	Beech,Pine, Oak	Production of biomass
	Rodopi ,Region of East Macedonia and Thrace	Rodopi forest Directorate	Invasive species	Low nutrient and humus status, pioneer vegetation	Black locust	Nature conservation with Production of biomass
	Evros ,Region of East Macedonia and Thrace	Alexandroupoli Forest services	Abandoned mines	Insufficient nutrient and humus status, unfavourable soil structure, partly compaction and strong acidification	Poplar, Pine	Recreation & Environmental Protection
	Rodopi and Evros ,Region of East Macedonia and Thrace	Komotini Mayor	Contaminated soil agricultural or/and industry lands	Insufficient nutrient and humus status, surface covered with remaining ballast, massive subsurface compaction, partly chemical contamination	Poplar, Pine, Willow	Recreation & Environmental Protection with Production of biomass
Germany (BTU CS)	Lusatian lignite mining district (State of Brandenburg, Germany)	Vattenfall Europe Mining AG	Post-mining landscape	Insufficient nutrient and humus status, unfavourable soil structure, partly compaction and strong acidification	Black locust	Production of biomass
	Cottbus (State of Brandenburg, Germany)	Deutsche Bahn AG	Abandoned railway land	Insufficient nutrient and humus status, surface covered with remaining ballast, massive subsurface compaction, partly chemical contamination	Black locust, Poplar, Willow	Production of biomass and site stabilization
	Lusatia (State of Brandenburg, Germany)	Vattenfall Europe Mining AG and other owners	Natural succession sites (post-mining landscapes and others) as reference sites	Low nutrient and humus status, pioneer vegetation	Pioneer vegetation with target tree species for biomass production	Primary succession (reference site for comparing natural development and plantations at similar marginal land types)
Ukraine (IBC & SB)	South-west of Vinnitsa region (Ukraine)	Yaltushkivska Research Breeding Station	Land with soils of medium and high acidity	High acidity, low nutrient and humus status, unfavourable soil structure, partly compaction	Switchgrass, Willow	Biomass production
	South-west of Vinnitsa region (Ukraine)	Yaltushkivska Research Breeding Station	Land of deferent level erosion influence	Erosion, slope of high angle, low nutrient and humus status, unfavourable soil structure, partly compaction	Miscanthus, Switchgrass	Biomass production
	East of Poltava region (Ukraine)	VeselyiPodil Research Breeding Station	Land with soils of medium salinity	Medium salinity, unfavourable soil structure, partly compaction	Miscanthus, Switchgrass	Biomass production
Ukraine (SALIX)	Volynska / Lvivska oblast	Farmers or Local communities	Land that is not suitable for agricultural use	Low nutrient and humus status, insufficient nutrient and humus status	Willow, Poplar	Biomass production
	Volynska / Lvivska oblast	Farmers or Local communities	Low productive land	Low nutrient and humus status, insufficient nutrient and humus status	Willow, Poplar	Biomass production
	Volynska / Lvivska oblast	Farmers or Local communities	Abandoned agricultural land	Low nutrient and humus status, insufficient nutrient and humus status	Willow, Poplar	Biomass production

Tab. 1: SEEMLA project preselected cases studies

The following terms have also be defined for use in WP5:

- **Pilot area:** whole area of the region/country with selected MagL
- **Study cases:** part of the area or the region that was selected for further analysis, it represents usually one type of MagL.
- **Plot:** small part of a study case where all actions will take place (planting, harvesting, supply chain measurements, LCA measurements). The size of the plot is related to the existing budget of each partner for these activities.

2. Preliminary characterization of marginal lands

A questionnaire (see Tab. 2) was initially set up for a first and general overview of the partner's sites. It was thought as a tool to compile more general information in order to aid the subsequent and detailed site characterization. The information gathered by this questionnaire was chosen based on the Muencheberg Soil Quality Rating (SQR) method provided by Mueller et al. (2007) and the Visual Soil Assessment (Shepherd et al., 2008). The SQR method is used for the detailed description and characterization of all selected study cases. Final results of this characterization will be published with D5.2. The first points of this questionnaire give general information on the location and situation of the sites. The parameters requested under point 2 correspond to the "basic soil indicators" investigated by the SQR method. Point 4 offers a first and rough estimation of potential SQR "soil hazard indicators" at the sites. Finally, short information on the background of marginality and of potential crop yields was requested to get an impression of site history and potentials. Based on this rough pre-assessment the selected study cases can be classified tentatively. The sites were selected to represent the following SEEMLA types of MagL according to the definition given in D2.1.

Abandoned land

The sites provided by SALIX in the western part of Ukraine and possibly the Poltava site of IBC&SB represent the type of abandoned land which was formerly used for conventional agriculture. These sites were set aside due to different site specific reasons. They are characterized by high groundwater levels and seasonal water logging. Most of these sites are at least partly compacted.

Naturally poor or degraded land

The poor forest sites selected as Greek study cases show shallow and stony soils as the result of previous erosion processes. The sites are still in use for forestry or in some parts for pasture.

Degraded land (anthropogenic)

The Vinnitsa site provided by IBC&SB was used as waste dump and is probably contaminated.

Reclaimed land

The post-mining sites of Lusatia (State of Brandenburg, Eastern Germany) represent a typical type of MagL which can be frequently found particularly in central and Eastern Europe. These severely disturbed sites have clearly reduced soil fertility due to the lack of

organic matter and the initially still missing soil structure. Productivity of conventional agriculture on such sites is often low.

Brownfields (anthropogenic wastelands)

Former industrial sites or traffic areas are difficult to use for conventional land use options but might be an alternative for biomass production is not contaminated. The selected former railway site in the city of Cottbus is a representative of the type of MagL with very poor soil conditions (rubble, stones).

Rodopi

1 General site description

1.1 Site location (region, town, distance) Drosia village, 33 km from Komotini (capital of Rodopi prefecture)

1.2 GPS coordinates (WGS 84; Google Earth UTM-Grid) R 41°11'23" H 25°38'46" R H

1.3 Current land use grassland

1.4 Former land use pasture

1.5 Site classification¹ Fallow Set aside Abandoned Degraded Reclaimed
 Waste Land Brownfields

1.6 Size (ha) 0,2

1.7 Type of energy crop planned Willow or Black Locust

2 Soil and climate^{2,3}

2.1 Soil texture² Sandy Loamy Silty Clayey Other

2.2 Moisture condition (soil)² Dry Slightly moist Moist Very moist Wet

2.3 Seasonal weather conditions² Dry Wet Cold Warm Average

2.4 Soil depth (m) Shallow Deep

2.5 Nutritional status Poor Medium Rich

2.6 Organic matter content OM Poor Medium Rich

2.7 Slope (%) 5-10

2.8 Groundwater table below surface (m) undefined

3 Hazards^{2,3}

3.1 Contamination? Metals Organics Other

3.2 Salinisation → high EC? no

3.3 low or high pH? low

3.4 Drought → low annual precipitation (mm) ? 586,8 (average)

3.5 Flooding/ water logging? no

3.6 Steep slope? no

3.7 Stony substrate/ soil? Debris? no

3.8 Soil compaction yes

4 Marginality

4.1 What makes the site marginal? Mountainous and hilly barren lands or abandoned grasslands, which were used in the past for agricultural activities, as cultivation, pastures or production of forage.

5. Expected productivity

5.1 Expected yield(s) (dry or fresh matter) t dm / (ha*yr) (use nearby already established similar plantations/ecosystems)

Minimum expectation	Maximum expectation
15	25

Give yield for every crop if more than one. If dry matter is unknown, please state fresh matter.

Tab. 2: Example of questionnaire for pilot sites

3. Case study sites in Ukraine

The map in Fig. 2 gives an overview of the selected study cases with case study sites in Ukraine.

Ukraine - location of case study regions

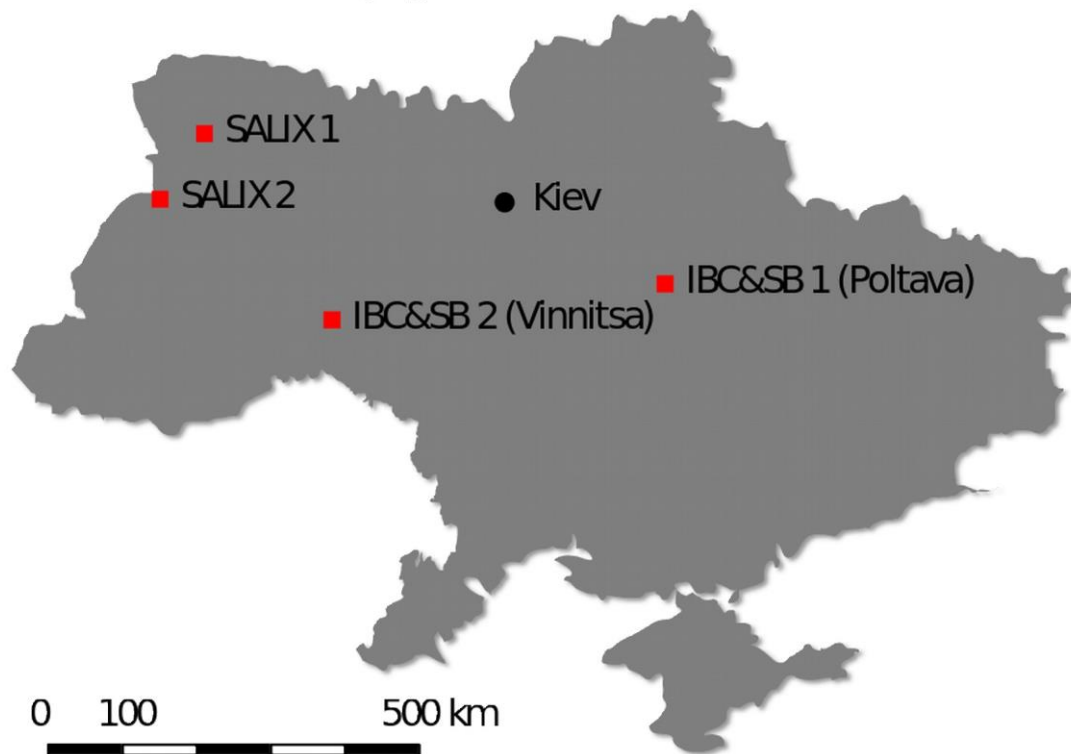


Fig. 2: Location of SEEMLA study cases in Ukraine

3.1 Poltava Region (IBC&SB)

The study case of the Poltava region is located close to the city of Semeniwka (Fig. 3) and possibly represent the type of abandoned land. In this area the case study site IBC&SB 1 is located in an area which was used over the past 40 years for grazing and for hay production. Fig. 4 shows the preliminary boundaries of this case study plot. Beginning in 1976 the area was overgrown by dense woody vegetation. The potentially high fertility of the black soil of this site is reduced by a shallow groundwater table (less than 1 m) and high carbonate content (pH 7.6). The pilot case site if finally selected under the characterization of marginal lands in pilot areas (D5.2) will be used for growing energy willow and miscanthus.

Ukraine - location of case study sites (Poltava region)



Fig. 3: SEEMLA study case "Poltava" in Ukraine

Ukraine - case study site (Poltava region)

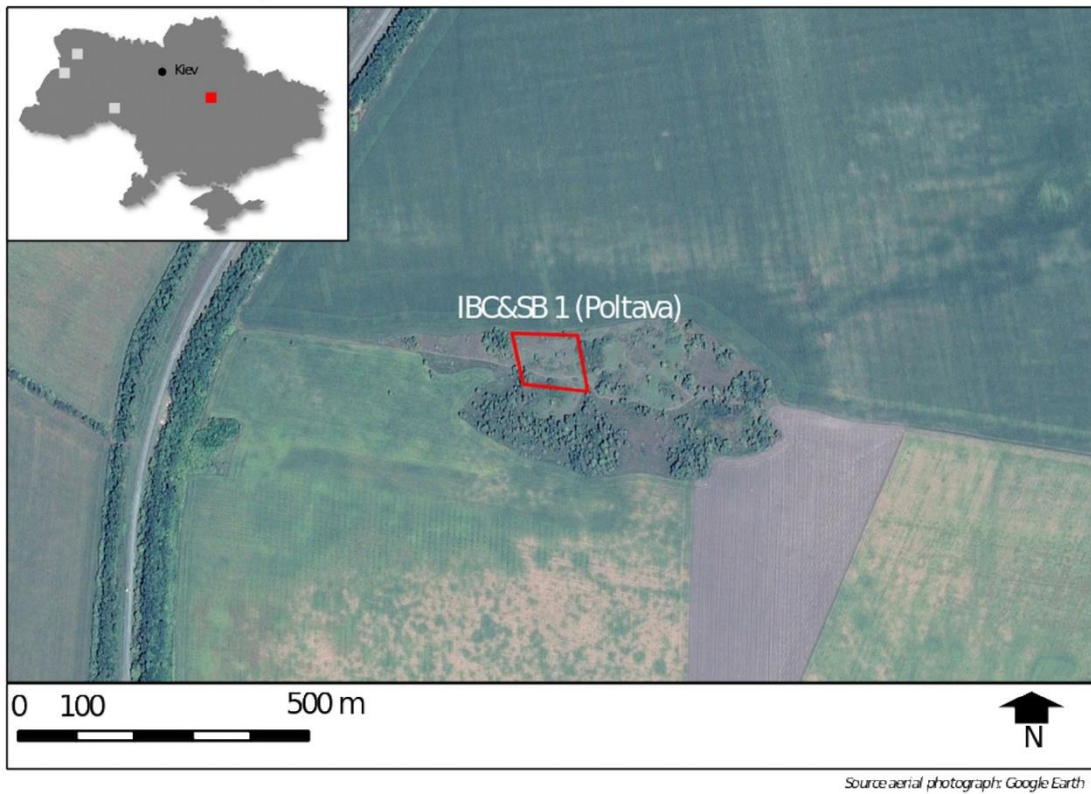


Fig. 4: Location of case study site IBC&SB 1 in the Poltava region with preliminary boundaries

3.2 Vinnitsa Region (IBC&SB)

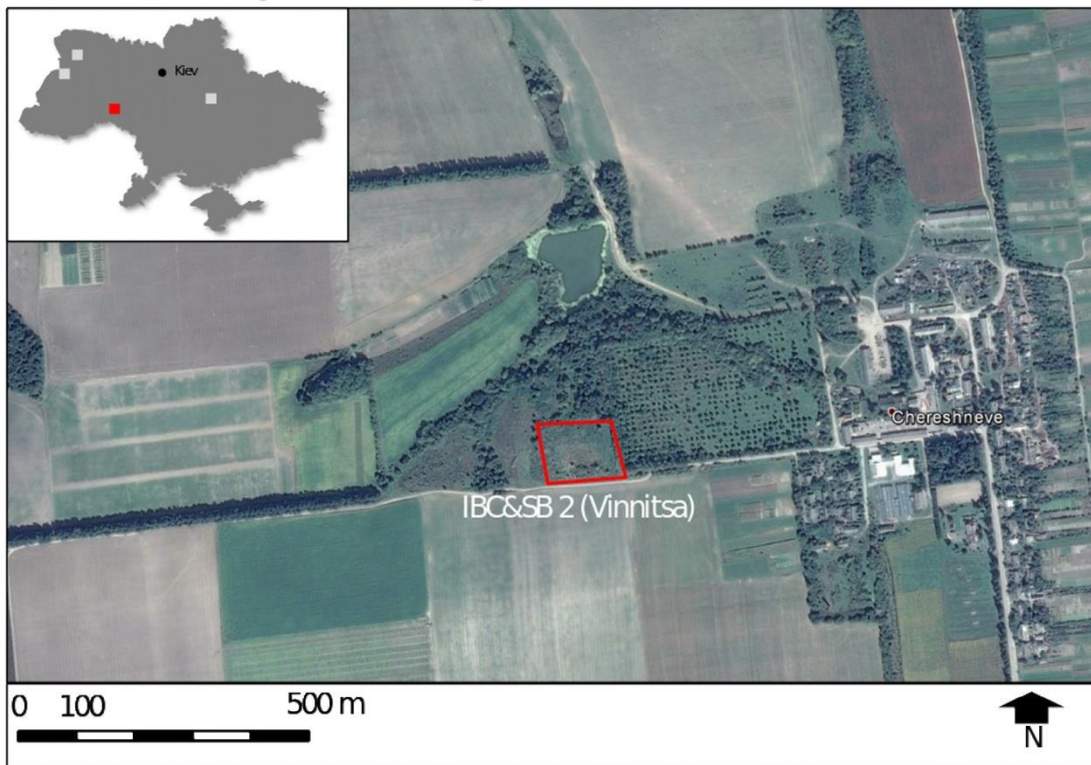
The study case of the Vinnitsa region is located southwest of the city of Bar (Fig. 5). Case study site IBC&SB 2 is located here (Fig. 6). This pilot case site with an area of 1.5 hectares presents low productive MagL with a slope of more than 10 % until the 1980ies. In 1984 the slope was partially lined or cut for building a planned football stadium. This building was not completed and the land was used as a solid waste dump (paper, plastic, glass, polyethylene, etc.). In 2015 the site was cleaned of wastes. The site has low fertile gray soils and partly a steep slope. The pilot case site will be used for growing energy willow and miscanthus.

Ukraine - location of case study sites (Vinnitsa region)



Fig. 5: SEEMLA study case “Vinnitsa” in Ukraine

Ukraine - case study site (Vinnitsa region)



Source aerial photograph: Google Earth

Fig. 6: Location of case study site IBC&SB 2 in the Vinnitsa region with preliminary boundaries

3.3 Volyn Region (SALIX)

The study case “Volyn region” is close to the city of Luzk in the western part of Ukraine (Fig. 7). In this region it is selected three pilot sites with total land area about 4.4 ha for growing energy willow and energy poplar (Fig. 8 and 9). These sites are abandoned lands which are used as pastures and hayfields. Because of low productivity the regular cultivation was stopped 20 years ago. These sites are characterized by poor organic matter content and nutritional status, high moisture content (frequent flooding after rains and snowmelt) and shallow soil depth. Soil texture is sandy with gleyic features. Groundwater table is within 0.5-2 m, pH – 5.5-7.

Ukraine - location of case study sites (Volyn region)

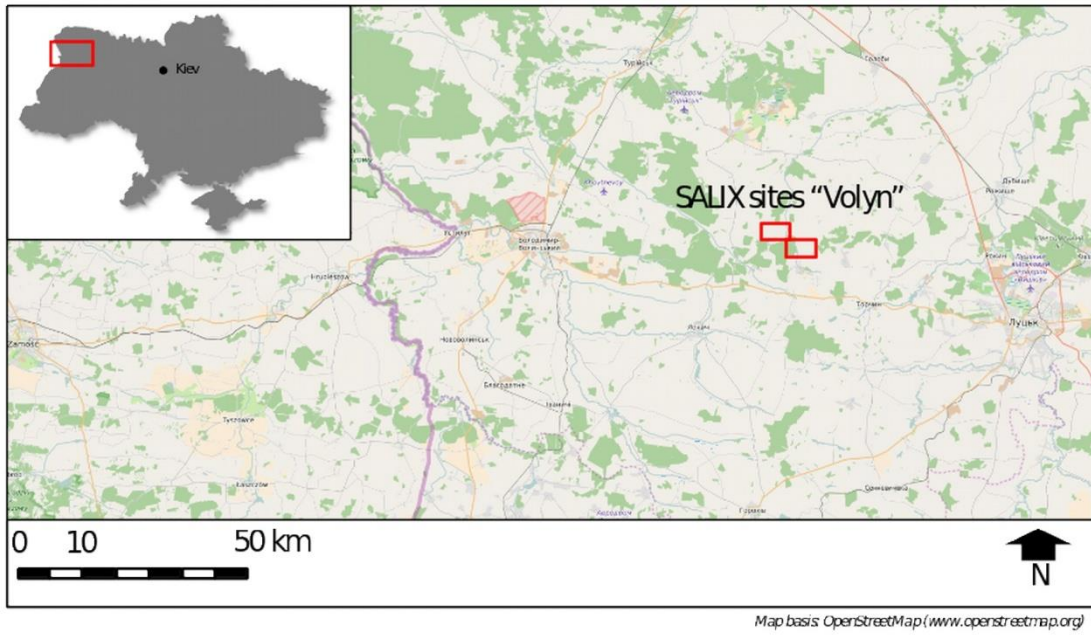


Fig. 7: SEEMLA study case “Volyn” in Ukraine

Ukraine - case study site (Volyn region I)

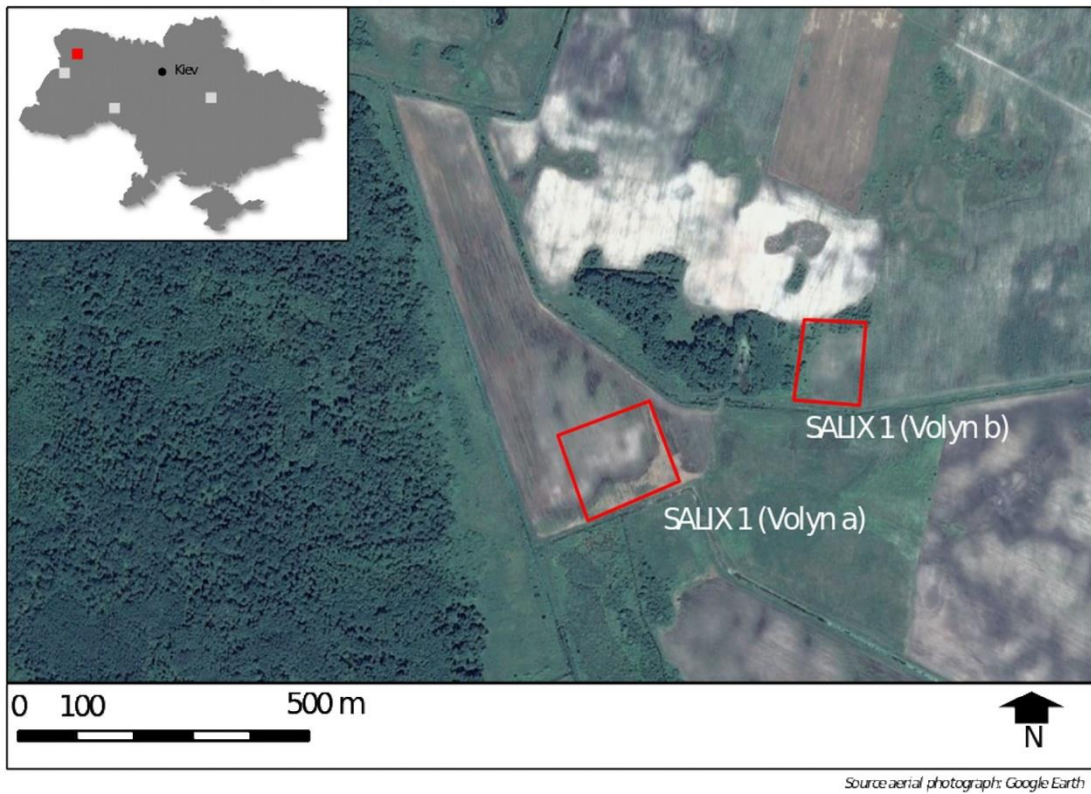
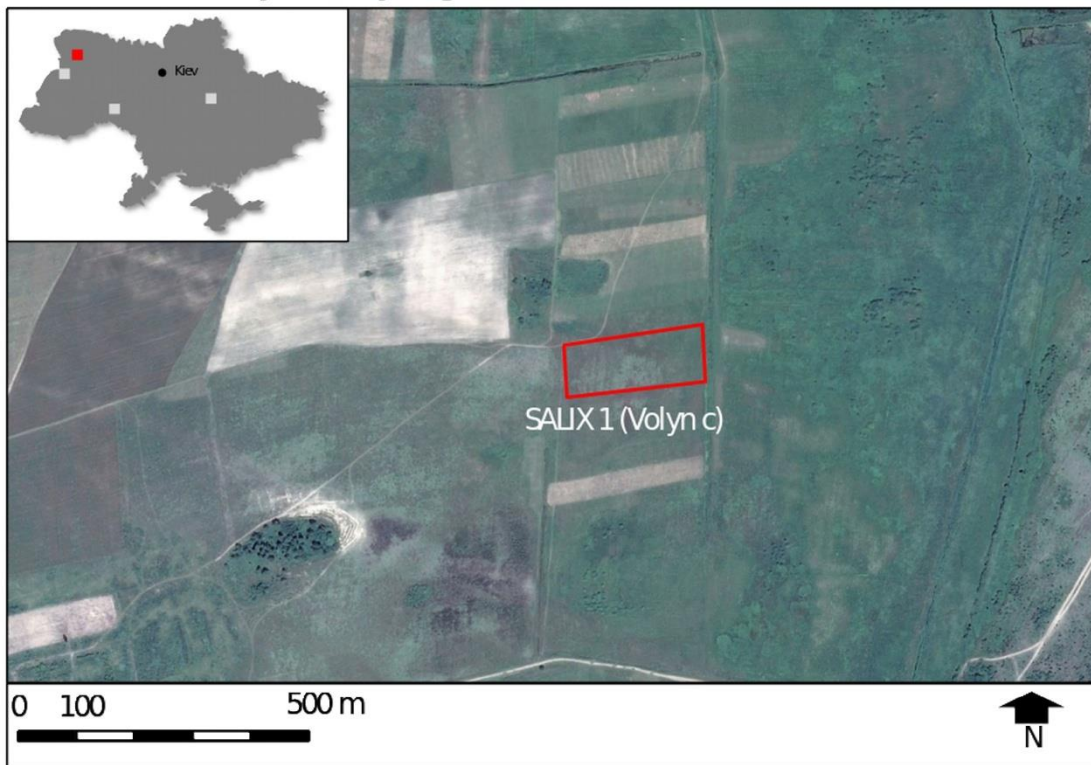


Fig. 8: Location of case study sites SALIX 1 (a and b) in the Volyn region with preliminary boundaries

Ukraine - case study site (Volyn region II)



Source aerial photograph: Google Earth

Fig. 9: Location of case study sites SALIX 1 (c) in the Volyn region with preliminary boundaries

3.4 Lviv Region (SALIX)

This region is located north from the city of Lviv close to the border between Ukraine and Poland (Fig. 10). In this region four pilot sites were selected with a total area of about 7.5 ha (Fig. 11 and 12). Similar to sites of the Volyn region these sites are abandoned former agricultural lands. The characteristic features of this area are poor/medium organic matter content and nutritional status, high moisture content (frequent flooding after rains and snowmelt) and shallow soil depth. Soil texture is sandy or sandy-loam with gleyic features. Soils are partly and strongly compacted; groundwater table – within 1-2 m, pH – varies between 5-7.3. The pilot case site will be used for growing energy willow.

Ukraine - location of case study sites (Lviv region)

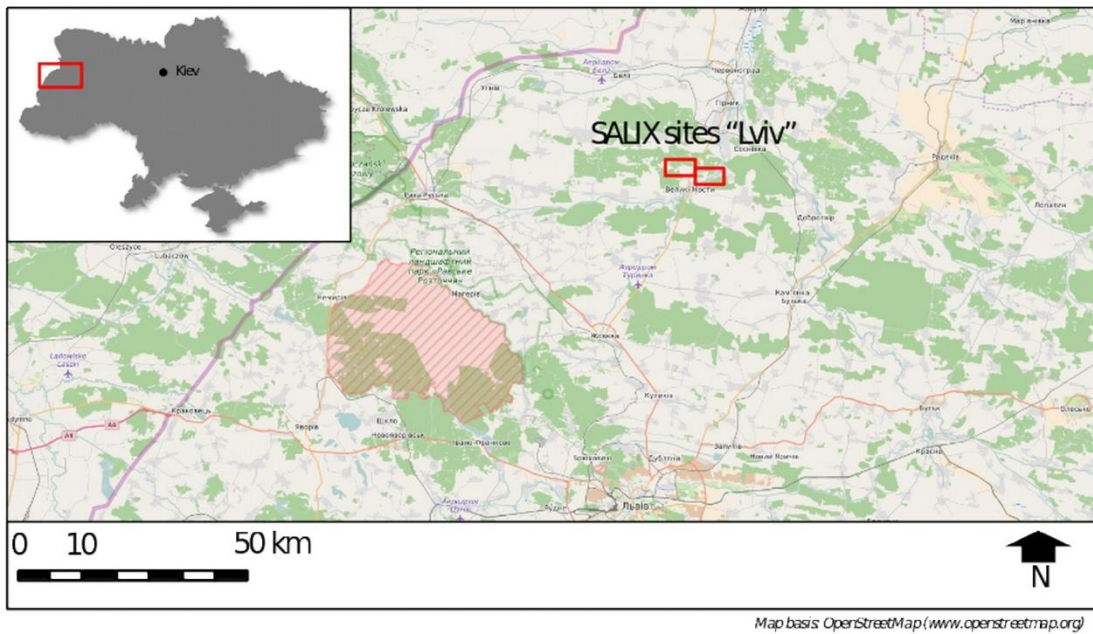


Fig. 10: SEEMLA study case “Lviv” in Ukraine

Ukraine - case study site (Lviv region I)

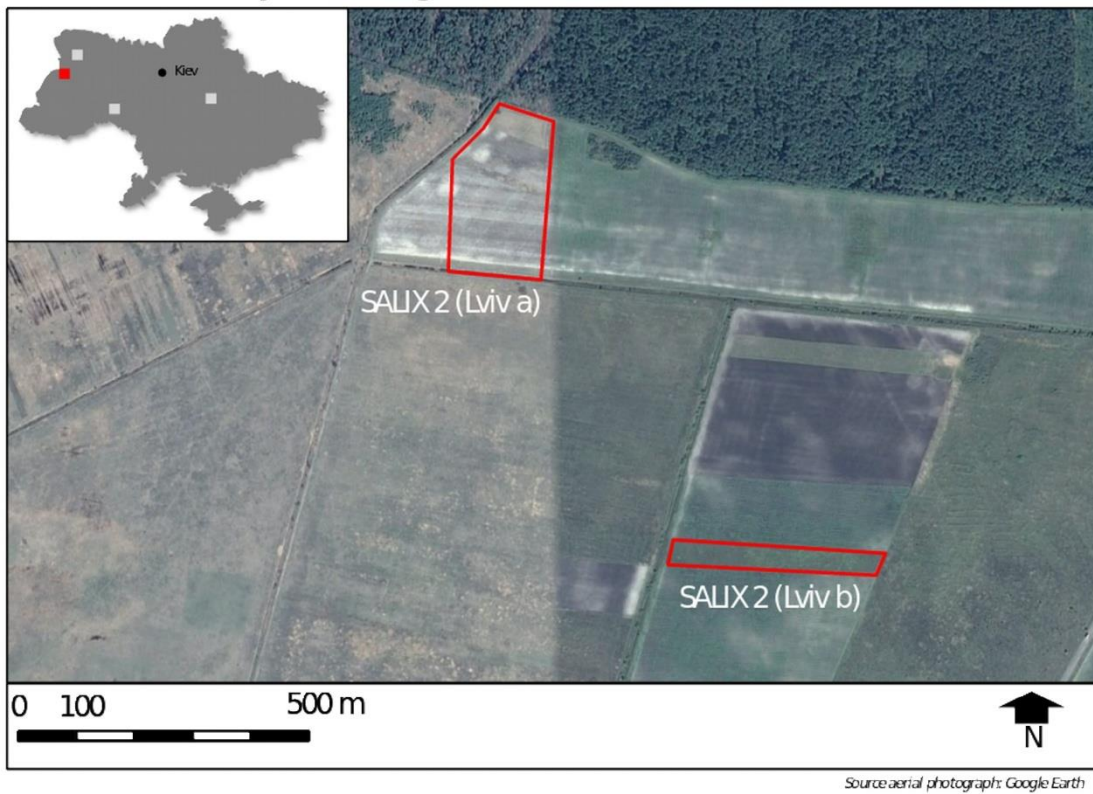
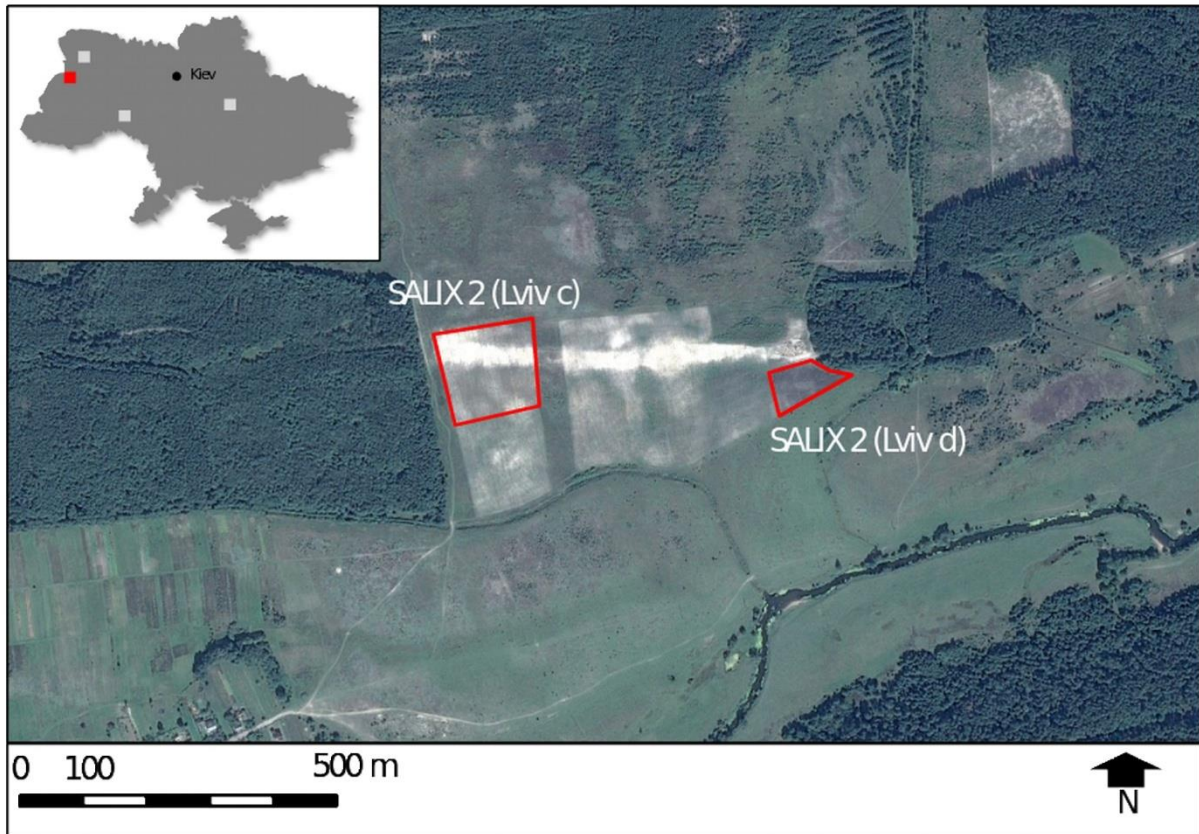


Fig. 11: Location of case study sites SALIX 2 (a and b) in the Lviv region with preliminary boundaries

Ukraine - case study site (Lviv region II)



Source: aerial photograph: Google Earth

Fig. 12: Location of case study sites SALIX 2 (c and d) in the Lviv region with preliminary boundaries

4. Case study sites in Greece

The map in Fig. 13 gives an overview of the selected study cases with case study sites in Greece. All SEEMLA study cases in Greece are located in the region on Macedonia and Thrace in the northeastern part of Greece around the city of Komotini (Fig. 14). The region is characterized by a mountainous topography and Mediterranean climate conditions.

The winds blowing in the area vary depending on topology and season and the ones that predominate are northeastern, usually mild to moderately strong and rarely strong, except in June and September, when blow mostly south-southwestern winds. Storms may occur throughout the whole year, more frequently from May to July and less frequently in February and March. Days of frost are rare. The first ones are observed in October and the last ones in April. Snowfalls are not common in our region, as the days with snowfalls reach to an average of only 0.5 day per year, mainly in December, January, February and March. During winter and mainly in areas with greater altitude, snowfalls are more frequent and snow cover on north-northeast sites lasts longer, depending of course on the duration and the intensity of snowfall. The most difficult period for vegetation and the growth of plantations is May till September with low quantities of precipitations and high temperatures.

Greece - location of case study regions

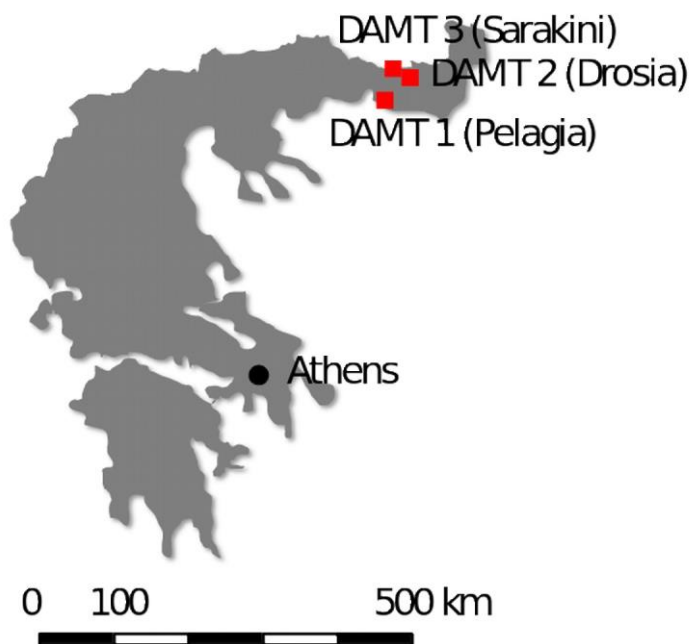


Fig. 13: Location of SEEMLA study cases in Greece

Greece - location of case study sites

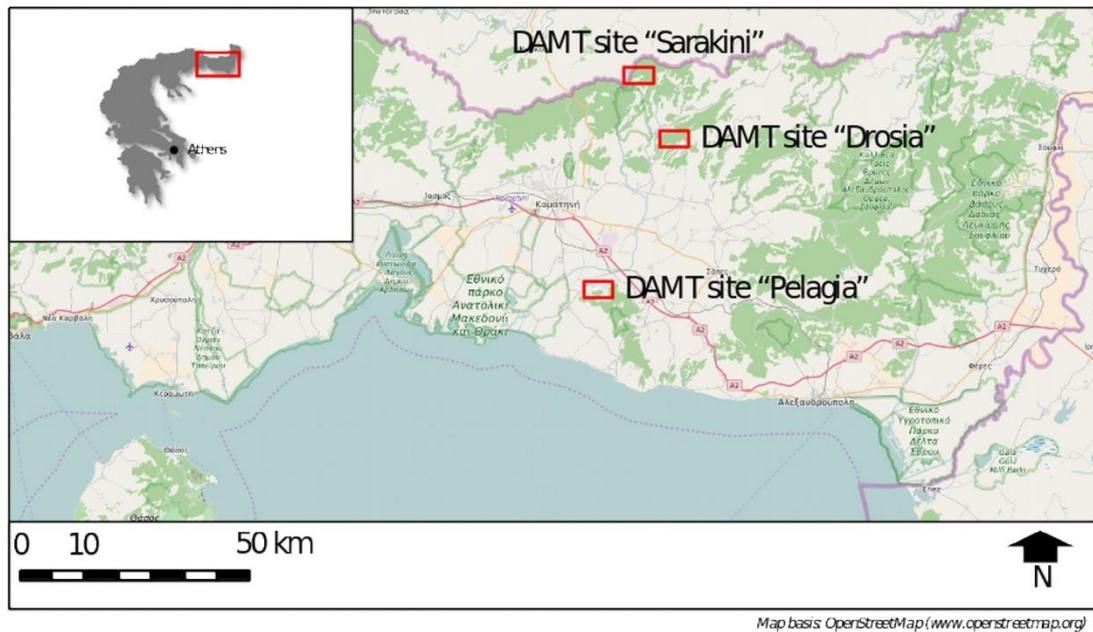


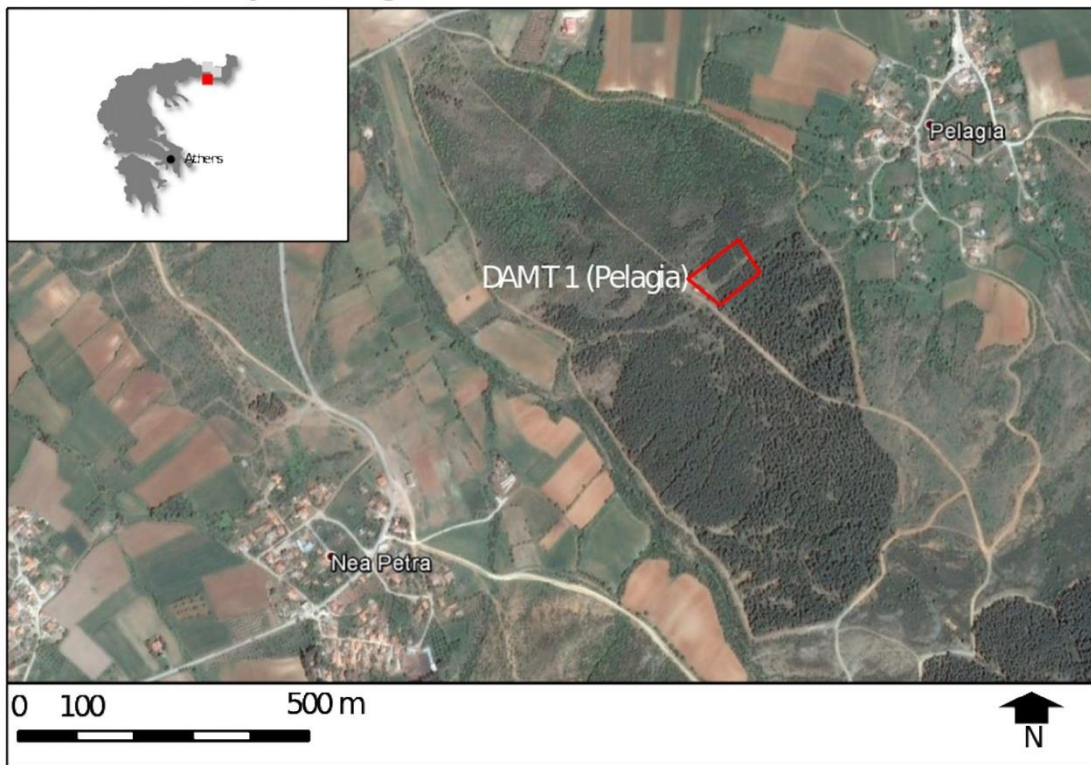
Fig. 14: SEEMLA study cases in Greece

The duration of the vegetation period depends on weather conditions and topology (altitude, exposure, etc.). It usually starts in the last days of March or the first days of April and lasts till the last days of October, sometimes the first days of November (max. 234 d – min. 193 days).

All sites will be used to establish new plantations with common forest tree species. However, it will not be possible to measure production and quality of biomass within the short lifetime of the SEEMLA project. To solve this basic problem, the following methods will be used to get an assessment of both quantity and quality of biomass: For all case study sites nearby productive ecosystems (including forests etc.) or successional sites will be used as references for estimating the potentials of MagL. Further existing plantations of energy crops on similar MagL will be used to assess potential crop yields.

The site number one is located in the public forest of Ismaros, near to Pelagia village. The site lies 22 km (south east) from Komotini (Fig. 15), in an altitude of 98 m. The size of the plot is - 0.1 ha and the current land use is forest land (*artificial forest plantation - Pinus brutia*) and the former land use was shrubs, bushes and grasslands. Soils are of clayey texture. In this pilot case site, it is planned to proceed with woodcutting at existing artificial forest plantations of *Pinus brutia*.

Greece - case study site (Pelagia)

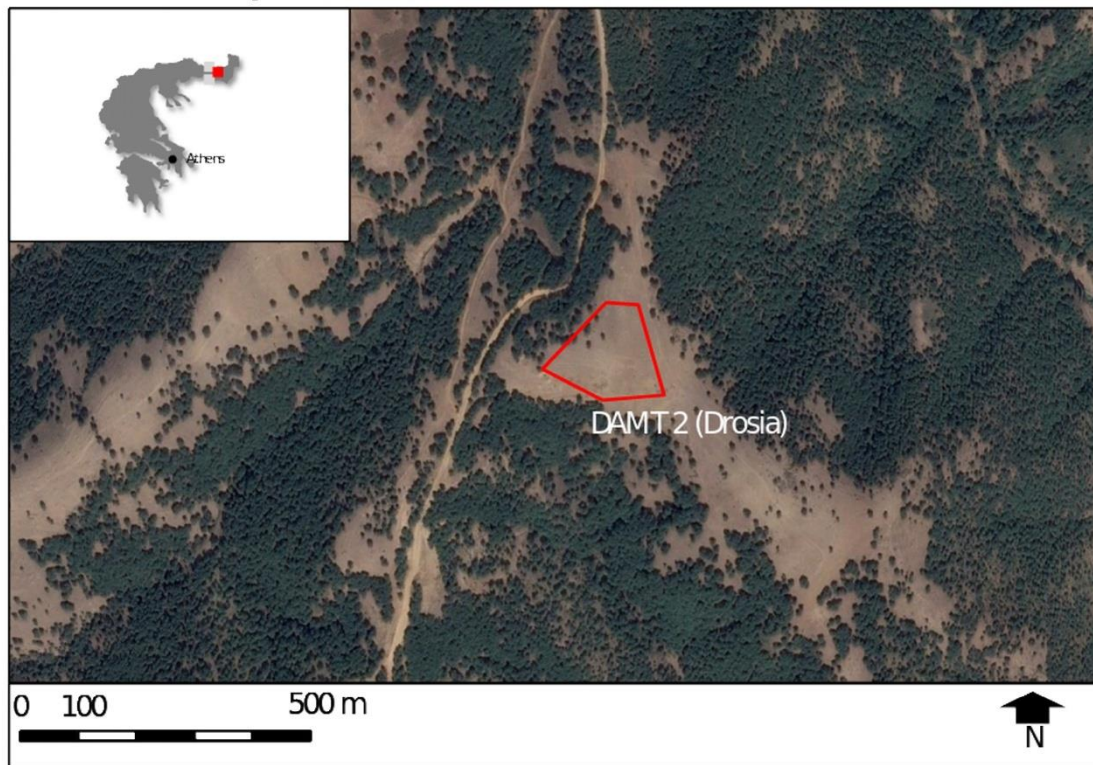


Source aerial photograph: Google Earth

Fig. 15: Location of case study site DAMT 1 at Pelagia with preliminary boundaries

The site number two is located in the public forest of Fillyra, near to Drosia village. The site lies 33 km (north east) from Komotini (Fig. 16), in an altitude of 590 – 600 m. The size of the plot is - 0.1 ha and the current land use is grassland and the former land use was grassland, pasture and occasional, limited cultivation. Soils are of sandy or sandy-loamy texture. The pilot case site will be used for planting and growing pine trees such as *Pinus nigra* (*establishment of a pine (Pinus nigra) plantation*). In this pilot case site, for biomass assessment, instead of just planting we also will proceed with woodcutting in nearby clusters of existing artificial forest plantation of *Pinus nigra*.

Greece - case study site (Drosia)

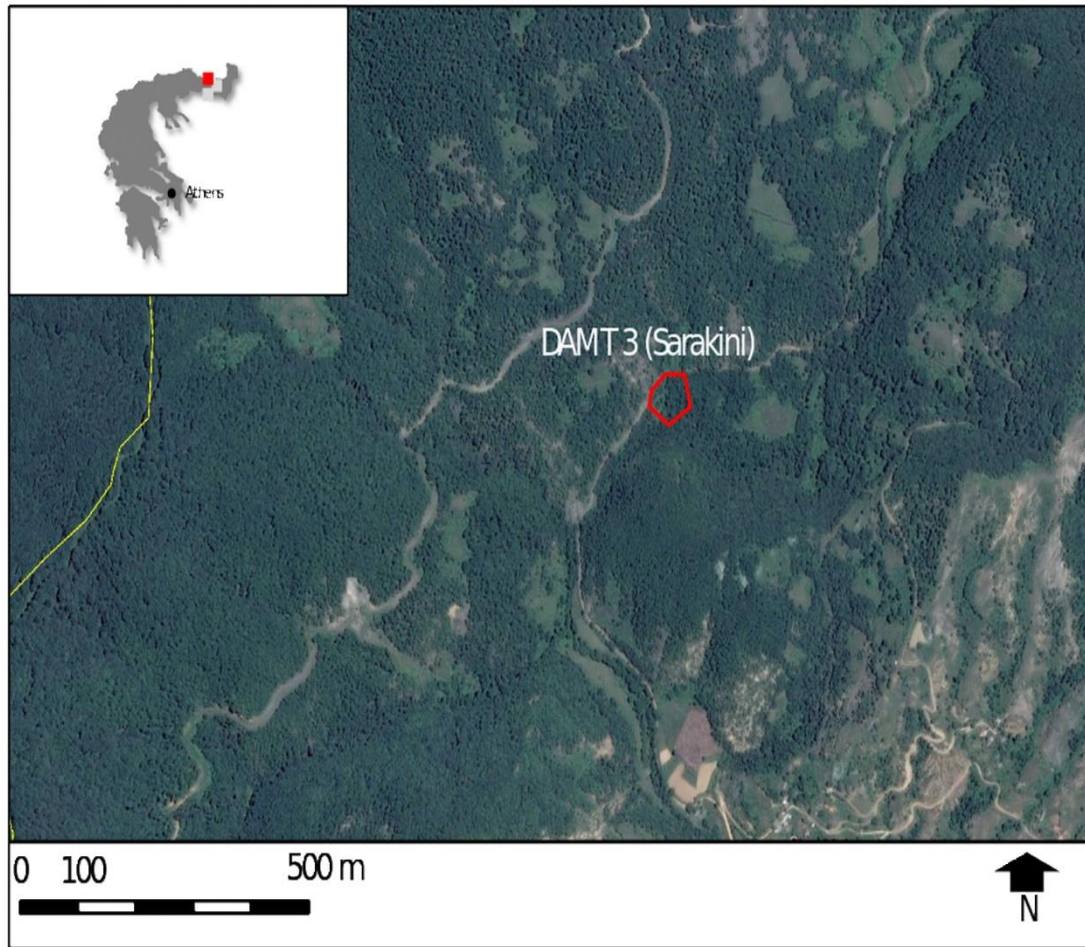


Source aerial photograph: Google Earth

Fig. 16: Location of case study site DAMT 2 close to Drosia with preliminary boundaries

The site number three is located in the public forest of Kalhantas, near to Sarakini village. The site lies 42 km (north) from Komotini (Fig. 17) in an altitude of 500 m. The size of the plot is 0.1 and the current land use is artificial plantation (*Robinia pseudoacacia*) and the former land use was grassland, pasture and occasional, limited cultivation. Soils are of sandy or sandy - loamy texture. In this pilot case site also, we will proceed with woodcutting at existing artificial forest plantation of *Robinia pseudoacacia*.

Greece - case study site (Sarakini)



Source aerial photograph: Google Earth

Fig. 17: Location of case study site DAMT 3 at Sarakini with preliminary boundaries

5. Case study sites in Germany

The map in Fig. 18 gives an overview of the selected study cases with case study sites in Germany. All study cases are located in the southeastern part of the State of Brandenburg (Lower Lusatia) around the city of Cottbus, about 150 km southeast from Berlin (Fig. 19). The State of Brandenburg is characterized by sub-continental climatic conditions with cold winters and warm summers. The average annual temperature is 8.9°C and total rainfall 563 mm (data from DWD weather station Cottbus for normal period 1961-1990). Maximum precipitation is received during the summer months. Soils in the southern part of Brandenburg are mainly sandy and of lower fertility. Natural vegetation would be mixed oak-pine forests. Today about 30 % of the area is used for agriculture.

Germany - location of case study regions



Fig. 18: Location of SEEMLA study cases in Germany

Germany - location of case study sites

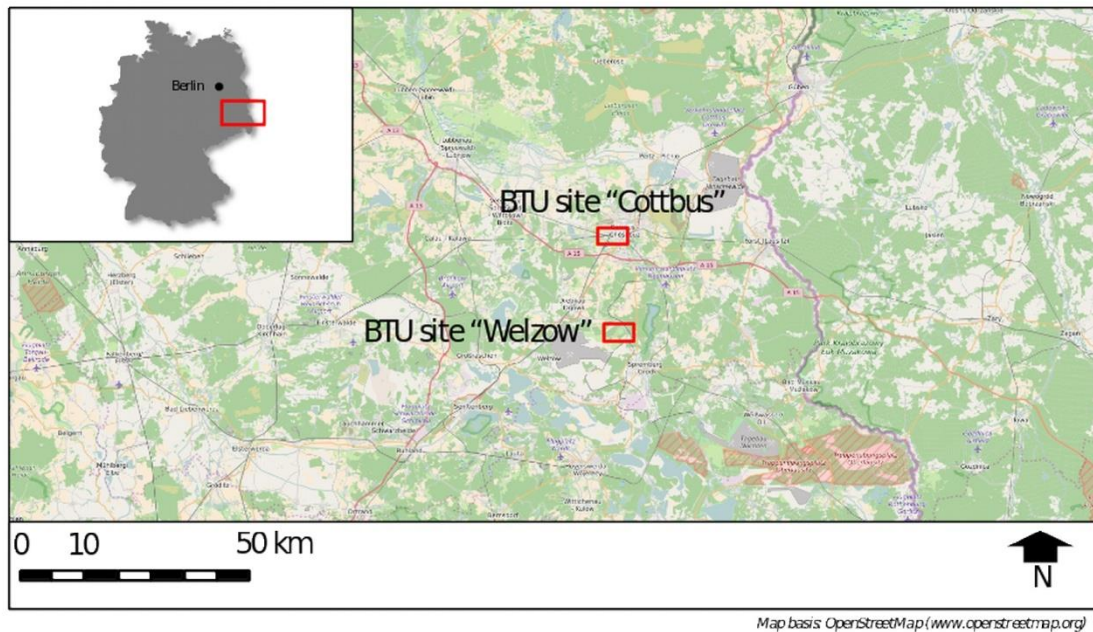
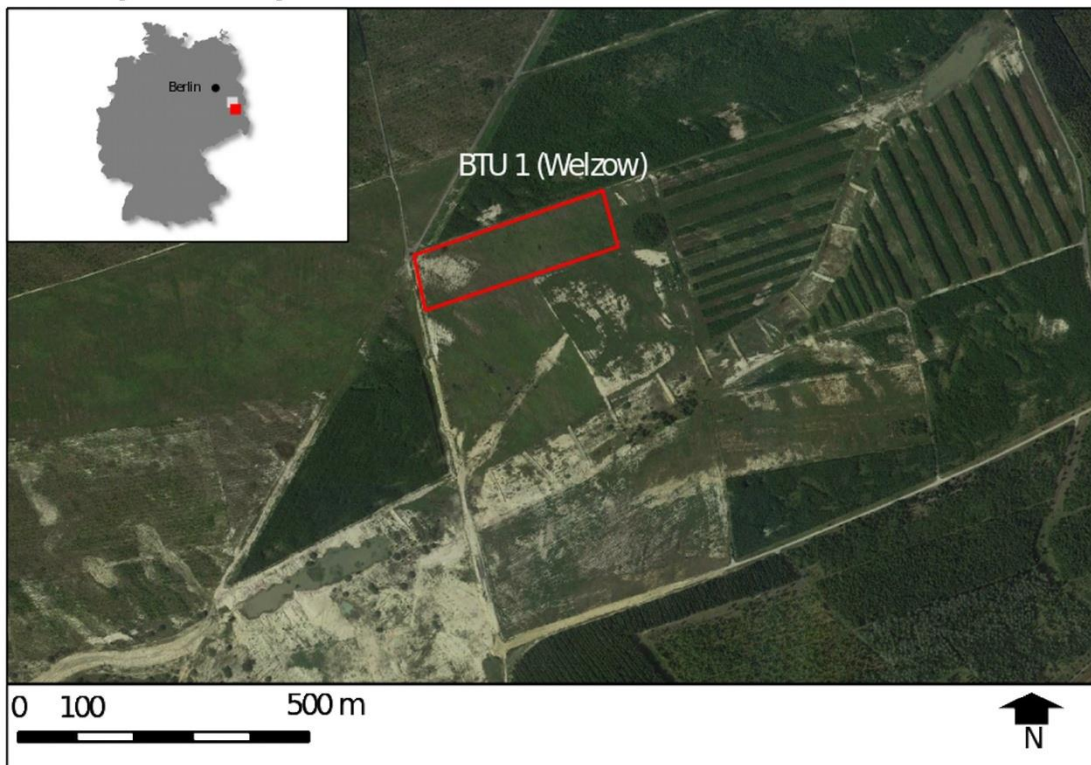


Fig. 19: SEEMLA study cases in Germany

Of great importance are the ongoing mining operations in Lusatia. Lignite is produced in large open cast mines which disturb the ecological systems significantly on a large scale. The sites have to be reclaimed after mining. However, soils of these reclaimed sites are generally undeveloped with poor initial and often unfertile conditions. The selected study site "Welzow" represents this type of MagL (Fig. 20). The still active lignite mine named "Welzow Süd" plus additionally affected lands for operations and active and former dump sites covers an area of about 50 square kilometers in size. The site selected for the SEEMLA project is situated in the north part of the Welzow mine in a former dump area of approximately 170 ha in size, which was initially projected for renewable energy production from biomass. The actually chosen case study site Welzow may have a size of approximately 4.5 ha. Soils at that area are commonly degraded due to the mining activities and can be characterized as unfavorably to poorly structured, compacted, low in nutrient and humus content and partly highly acidic. Initial investigations at the designated SEEMLA site revealed that soil texture is sand to weakly loamy sand, with pH values ranging between 3.0 and 6.0, indicating partly high acidity. The electric conductivity in saturation extract (EC_{SE} calculated from 1:2.5 water extract) ranges between 0.1 and 30 $mS\ cm^{-1}$ indicating partly highly saline conditions. The site is generally flat and the groundwater table is situated deep below surface (more than 10 m) due to the ongoing mining activities which require for regional lowering of the groundwater table below the lignite seam (about 100 m). The pilot case site will be used for growing black locust which was already successfully cultivated in the energy forest. The selected plot is surrounded by experimental sites for different types of biomass production so that potential biomass yields can be directly estimated based on crop yields.

Germany - case study site (Welzow)

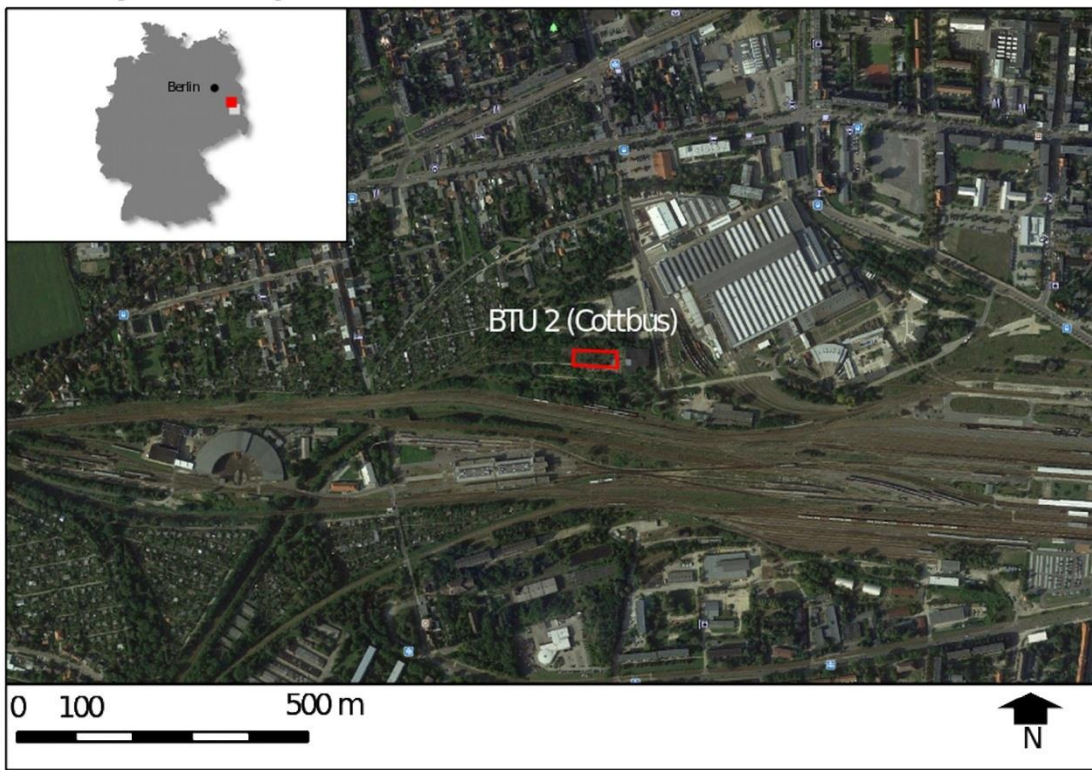


Source aerial photograph: Google Earth

Fig. 20: Location of case study site BTU 1 in the open cast mine Welzow-Süd with preliminary boundaries

Further, a large amount of former industrial sites were closed after the German reunification and were set aside. These sites are characterized by anthropogenic substrates often with different types of contamination. Uncontaminated parts of these areas are seen as potential sites for biomass production. Thus, an abandoned railway area in the city of Cottbus was selected as representative case study site for this type of MagL. The size is approximately 1 ha. The major part of the site was used for wagon repair and maintenance. Part of the site hosted a manufactured gas plant. In 2009 Brandenburg University of Technology Cottbus – Senftenberg (BTU) in cooperation with Deutsche Bahn AG (DB AG) started to plant the area successively in order to stabilize and revegetate the former production facilities and to produce renewable energies from biomass. Species planted are hybrids poplar and black locust. Generally, the site can be classified as a brownfield and thus as marginal land, particularly in terms of soil properties. The site is generally flat and the groundwater table is located approximately 9.3 m below surface. Soils have a sandy texture, are of low nutrient and humus content and more over contain gravel and construction debris to significant amounts (about 50% weight). Soils are not contaminated and electric conductivity (EC_{SE} electric conductivity in saturation extract, calculated from 1:2.5 water extract) and pH levels are in a normal range and do not indicate any hazards ($EC_{Se} \sim 1.0 \text{ mS cm}^{-1} - 2.0 \text{ mS cm}^{-1}$, $\text{pH} \sim 5.0 - 7.5$). The pilot case site will be used for growing poplar and black locust.

Germany - case study site (Cottbus)



Source aerial photograph: Google Earth

Fig. 21: Location of case study site BTU 2 in the city of Cottbus with preliminary boundaries

6. Summary and Conclusions

- Three sites in the Komotini region of Greece, two sites in the eastern part of Ukraine (Poltava and Vinnitsa region) and four sites in the western part of Ukraine as well as two sites in and around Cottbus, Germany have been selected
- Final selection of pilot case sites based on SEEMLA approach for marginal lands.
- The differences of the preselected and final selected pilot case sites is regarded to the purpose of a profitable biomass production.
- Data of the questionnaires and mapping data, for plant characteristics, biology, ecology & maximum biomass productivity for all preselected case study sites become a basis of SEEMLA approach development.

7. Outlook

The characterization of marginal lands in pilot areas (D5.2), will test the operability of the first version of the SEEMLA approach and to provide feedback for its further development. The identification of specific exploitation practices (D5.3), will be used to identify the most suitable practices in terms of site preparation, plantation, harvesting, and potential utilization pathways for each specific region. The developing, the implementing and the monitoring of pilot cases (D5.3), will improve the SEEMLA approach.

8. Reference

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