

SITUATIONAL ANALYSIS

on nature-based Carbon Offsets



CATALOGUE OF GOOD PRACTICES & MAPPING OF CARBON SINKS

**Świętokrzyskie (POLAND)
2023**

This Situational Study has been prepared by the Marshal Office of Świętokrzyskie Voivodeship on behalf of Świętokrzyskie region in the framework of Interreg Europe programme project Nature-based Carbon Offsets (NACAO). The Nature-based Carbon Offsets (NACAO) project receives financial support from the European Union (Interreg Europe/ERDF). This publication reflects the author's views only and the Interreg Europe programme authorities are not liable for any use that may be made of the information contained therein.

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1. Introduction

Climate change is one of the greatest challenges requiring urgent policy action. The climate crisis is dire. We pollute a lot. We have known that for a long time. What is new is that we are increasingly putting up resources: firstly, reducing emissions, individually and collectively; and, secondly, offsetting them by investing in clean projects.

The compensation of GHG emissions is, in general, a topic underdeveloped by the public administration and, when developed, very limited and traditional measures are entered into force.

In this sense, NACAO (Nature-based Carbon Offsets) project aims at being an accelerator for regional governments with competencies on climate change throughout Europe actively approaching the offsetting of carbon emissions, in this case by developing nature-based solutions and policies contributing to the offsetting of emissions through them.

During the project, regional governments with competencies on environment and climate change from the Northern, Southern, Eastern and Western of Europe will share green and blue carbon solutions and policies in force aiming at the preservation, restoration and improvement of natural sites acting as carbon sinks, such as forests, wetlands and other ecosystems, that compensate GHG emissions. Also, their experiences on carbon credits and emissions markets related to nature-based solutions.

The ultimate aim is for the partners to increase their knowledge and capacity to implement in their regions green and blue carbon initiatives and policies learned during the cooperation, regions thus contributing to the mitigation and adaptation to climate change.

The project brings together 6 partners from 6 countries (Spain, Italy, Poland, France, Finland and Germany) to improve their policy instruments addressed so that they develop the compensation of GHG emissions through the use of nature-based interventions.

Object and scope of Situational Studies

The aim is gathering all the good practices and experiences (successful and unsuccessful) developed in the field that will be shared as well as mapping the green and blue carbon sinks in the regions where the lessons learnt during the cooperation could be applied.

2.Regional context

The most important climatic conditions of the Świętokrzyskie region:

- significant variation of individual climate components: air temperature, precipitation;
- winds, insolation, and cloud cover, resulting mainly from the altitude and morphology of the terrain and the influence of the Świętokrzyskie Mountains;
- significant temperature amplitudes between summer and winter;
- the warmest area of the province is the region of the Sandomierska Basin and the Nidziańska Trough, and the coolest - the Świętokrzyskie Mountains;
- the area with the highest insolation is the Nidziańska Trough and the area around Sandomierz, the lowest insolation is in Kielce Upland; and
- westerly winds of 3 m/s prevail.

The average annual air temperature over the past three decades over most of the province was between 8-9 degrees C. It was cooler in the Świętokrzyskie Mountains region (the average temperature was 7-8 degrees C), while the warmer area was the south-eastern part of the province (the average temperature was about 9-10 degrees C, making this area one of the warmest in Poland in terms of annual averages). The maximum temperature of the last thirty years has ranged between 27-28 deg C over most of the province. Compared to the 2011-2020 decade, the average temperature over most of the province is projected to increase by about 0.1 degrees C in the 2021-2030 decade, while in the 2041-2050 decade perspective, it would be an increase of about 0.6 degrees C. Such a trend is in line with projections for other parts of the Central European region.

One of the main phenomena resulting from climate change is the occurrence of hot days. In the 2021-2030 decade perspective, the number of hot days is expected to increase by about 1.5 per year. In the 2041–2050 decade perspective, it is already expected to increase from about 2.5 days in the north of the province to nearly 4 in the south. The number of hot days is also expected to increase from 0.4 days in the north of the province to 1.2 days in the east and south. On an annual basis, the province is expected to experience about 40-50 such days in the 2021-2030 decade, with an increase of about 8-10 days in the 2041-2050 perspective.

Greenhouse gases, including CO₂, have been widely recognized as the main factors having a dominant impact on adverse climate change. This is also confirmed by an analysis of data on gaseous pollutant emissions from particularly troublesome plants, which showed that the increase in emissions compared to 2014 was specifically for carbon dioxide. Poland's greenhouse gas emissions, in 2014-2016, began to increase, driven by economic growth. Another larger increase in emissions in the next few years is primarily related to changes in the fuel market in Poland and an increase in the use of fossil fuels. Therefore, it is necessary to translate this relationship directly to the conditions of the province and point to the increase in emissions of gases, including greenhouse gases, from particularly troublesome plants as the cause. Data on carbon dioxide emissions from industrial sources were compiled for establishments classified

as causing significant pollution of individual natural elements or the environment as a whole (customarily referred to as onerous). In 2020, 85 establishments that were particularly burdensome to the environment were located in the province. An analysis of CSO data, conducted for 2018 - 2020, showed a systematic decrease in the level of carbon dioxide emissions from these facilities. The list of entities authorized to trade in CO2 emissions lists 33 installations, which are part of 29 plants. For the most part, these are fuel combustion installations (heating sources and combined heat and power and process).

Therefore, in the Świętokrzyskie voivodeship, in addition to legal mechanisms, concerning administrative decisions allowing investment (permits for the introduction of substances or energy into the environment, permits, concessions), environmental protection programs have been implemented for more than 20 years, as a tool guiding the directions of activities, which are the basic criterion for obtaining financial resources

under national as well as EU funds. In the current "Environmental Protection Program for the Świętokrzyskie Province for 2015-2020 with an outlook to 2025" includes priorities, strategic goals and specific corrective and compensatory actions to minimize greenhouse gas emissions on the one hand, but also tasks affecting CO2 assimilation. The ongoing monitoring of the implementation of this Program indicates a downward trend in greenhouse gas emissions. This is identified with the implementation of corrective measures by economic operators and environmental institutions, such as: modernization of fuel combustion facilities, construction of pollution capture systems, replacement of inefficient heat sources, improvement of energy efficiency, development of RES, greenery planting, increasing retention (forest and riverbed), renaturalization of watercourses. The flagship tasks in this area from the province, carried out in recent years, are included in Chapters 4 and 5. This program coordinates activities carried out by governmental units, local governments, establishments, institutions or individuals. Other documents in force in the region are Climate Change Adaptation Plans. This is the only initiative in Europe, where the Ministry of Climate and Environment supports local authorities and administrations by coordinating adaptation to the effects of climate change in dozens of cities simultaneously.

Within the province, the city of Kielce and the city of Ostrowiec Świętokrzyski have such a Plan, which allows the development of solutions that will lead to a reduction in CO2 emissions and adaptation to the effects of extreme phenomena.

On the territory of Ostrowiec Świętokrzyski, one of the actions described in the Plan is the creation of a plan for tree planting in municipal areas. It is recommended that the planning include the identification of possible climatic pressures that may have a future impact on tree canopy or carbon sequestration capacity.

The Climate Change Adaptation Plan for the City of Kielce, on the other hand, includes a characterization of climate change based on meteorological and hydrological data from 1981 to 2015. The analysis of climatic phenomena and their derivatives takes into account trends of future climatic conditions in the horizon to 2030 and 2050; climate projections were calculated for two greenhouse gas emission scenarios (RCP4.5 and RCP8.5).



Inherent in the whole process is environmental education, which is carried out at almost every level, from school programs through widespread media coverage, public consultations of programs, and others.

3.Regulatory and Policy framework for Climate Change

On December 11 of 2019, the European Commission has unveiled the **European Green Deal**, a package of measures aimed at enabling the European Union to achieve carbon neutrality by 2050. These measures, which are accompanied by a key action plan, include targets for reducing emissions, investing in advanced research and innovation, and protecting Europe's environment. It is assumed that all sustainable investment activities undertaken will strive for climate neutrality and implement green solutions related to blue-green infrastructure. The assumptions of this document are reflected in national and regional documents.

The European policy is reflected in a number of national documents containing directions for activities related to climate change adaptation and carbon dioxide emissions reduction, viz:

- **National Environmental Policy 2030;**
- **Polish Water Strategy to 2030 with an Outlook to 2040;**
- **Update of the Water Management Plan for the Vistula River Basin;**
- **Assumptions to the Water Scarcity Program for 2021-2027 with an Outlook to 2030;**
- **Plan to counteract the effects of drought;**
- **National Urban Policy 2030;**
- **Strategic Adaptation Plan for Sectors and Areas Sensitive to Climate Change to 2020 with an Outlook to 2030;**
- **National Energy and Climate Plan 2021-2030; and**
- **European Funds Program for Infrastructure, Climate, Environment 2021-2027.**

The National Energy and Climate Plan 2021-2030, which builds on the priorities and actions envisaged in national strategies, including the National Environmental Policy 2030 and the Strategy for Sustainable Development of Rural Areas, Agriculture and Fisheries 2030, includes a target for decarbonization through reducing emissions

and absorption of greenhouse gases. This goal responds to the issue of adaptation to climate change by ensuring sustainable management of environmental resources. Implementation of this Program will indirectly contribute to the reduction of greenhouse gas emissions (to the gradual decarbonization of the economy) through the construction of hydropower plants on reservoirs. The use of water, as a source of renewable energy, will help achieve the goal of climate neutrality.

Similar provisions were included in the document titled Long-term Program titled "**Management of Water Resources in Poland**". Implementation of the Program's activities will contribute to more effective implementation of the goals of modern climate and energy policy by increasing the level of security and stabilization of the national

energy system, limiting CO₂ emissions from coal combustion, among other sources. Construction of hydroelectric power plants is envisaged in the country on 7 reservoirs, including one in our Świętokrzyskie province on the Bzin reservoir (annual electricity production: 0.14 GWh/year).

On the other hand, the "Strategic Adaptation Plan for Sectors and Areas Vulnerable to Climate Change to 2020 with an Outlook to 2030" sets out adaptation goals and directions for the sectors most vulnerable to climate change. The actions envisaged in this document are among others:

- Investment support for farms, as well as training and technological advice that takes into account aspects of adapting agricultural production to increased climate risks and addressing climate change,
- Development of monitoring and early warning systems for the possible effects of climate change on crop and livestock production.

In turn, the primary tools responsible for creating development policy at the regional level are the **Strategy for the Development of the Świętokrzyskie Voivodeship 2030 and the Program for Environmental Protection for the Świętokrzyskie Voivodeship for 2015-2020 with an Outlook to 2025 (POŚ)**. These are the most important documents of the provincial government defining the areas, goals and directions of the region's development policy, which are the starting point for the preparation of other regional program documents.

The OPE identifies goals and courses of action to reduce greenhouse gases and climate change adaptation measures. Although climate change policies are mainly discussed at the international level, most of the impacts will be felt at the regional and local levels. It is local governments that will have to face the consequences of carbon emissions. In this regard, the international project NACAO - Nature-based Carbon Offsets - fits into the implementation of environmental policy in the region.

Since the need to pay more attention to climate change issues has been recognized, a new document called "Environmental Program for the Świętokrzyskie Region 2030" is currently being drafted, which will include issues related to climate and energy challenges, up-to-date information on promoting good climate protection practices and biodiversity in all components of environmental protection.



4. Catalogue of Good Practices on nature-based Carbon Offsets

Table 1.- Overview of the Good Practices on nature-based Carbon Offsets in Świętokrzyskie Region (POLAND)

ID	Title	Type ¹	Brief description	Source of Carbon Offsets ²	Level of application	Geographical scope	Status
1	Small-scale Retention Programme in Forests as nature-based climate change mitigation	Technical	The small retention program is designed to contribute to raising the level of groundwater, rebuilding hydrogenic habitats, protecting soils, increasing biodiversity and strengthening the function of the forest in the process of carbon absorption. The program has been implemented in 7 forest districts in the Świętokrzyskie Region. As part of the construction work, only natural materials were used.	Green carbon (forest habitats and hydrogenic habitats)	Regional	Regional Directorate of State Forests in Radom	Successful
2	Forest coal management and coal forest	Technical	Indicating the role of forest areas in mitigating the negative effects of climate change. Implementation of additional activities in forest management, supporting the absorption and accumulation of CO ₂ , and making carbon credits available for trading after obtaining certification.	Green carbon (forest habitats)	Regional	Regional Directorate of State Forests in Radom	On-going (in progress)
3	Renaturalisation of the inland delta of Nida River	Technical	The main subject of the project is to improve the water conditions of the of ca. 500 ha, restoration of the old riverbeds over a length of 16 kilometres, revitalization of eutrophic floodplains on 8 ha, active protection of the alluvial forests (ca. 145 ha.), and restoration of meadow habitats on over 200 ha. Stabilization of these ecosystems and improvement of their conservation status increases their potential for carbon accumulation. Also, peat-forming processes are being restored.	Green and blue carbon	National	Nida Valley, Swietokrzyskie Voivodeship	Non successful

¹ Technical, administrative, financial, promotion & participation, regulatory framework, collaboration, etc.

² Green carbon (projects based on carbon storage on plants & soils), blue carbon (projects based on carbon storage on ocean, coastal & wetlands), other (projects based on sustainable practices on agriculture, silviculture & building sectors)

ID	Title	Type	Brief description	Source of Carbon Offsets	Level of application	Geographical scope	Status
4	Implementation of the project entitled "Protection of habitats and species of non-forest areas dependent on water" in the Białe Ługi Reserve	Technical	This area of the Białe Ługi reserve, with an area of peat bogs, is one of the most rapidly disappearing ecosystems. There are 408 ha of peat bogs, which are an excellent absorber of atmospheric carbon dioxide. In the 1990s, the peat bog was drained as a result of melioration activities, and in 2017-2023 a project called "Protection of habitats and species of non-forest areas dependent on water" as a result of which the water outflow was stopped.	Blue Carbon	Regional	Daleszyce Commune, Cisowsko-Orłowski Landscape Park	Successful
5	Development of a document called the Climate Change Adaptation Plan for the city of Kielce	Administrative	The document called the Adaptation Plan to Climate Change for the City of Kielce contains the characteristics of climate change based on meteorological and hydrological data from 1981 to 2015. The analysis of climatic phenomena and their derivatives takes into account trends in future climatic conditions until 2030 and 2050; climate projections were calculated for two greenhouse gas emission scenarios (RCP4.5 and RCP8.5).	Green carbon	Local	The area of the city of Kielce	On-going (in progress)
6	Development of a document called the Climate Change Adaptation Plan for the City of Ostrowiec Świętokrzyski	Administrative	The city of Ostrowiec Świętokrzyski has developed a document entitled Climate change adaptation plan, which plans to create a tree planting plan in municipal areas. For this purpose, it is necessary to recognize possible climatic pressures that may have an impact on forest stands or carbon sequestration capacity in the future.	Green carbon	Local	The area of the city of Ostrowiec Świętokrzyski	On-going (in progress)

5. Mapping of Carbon sinks

Table 2.- Mapping on Carbon Sinks in Świętokrzyskie Region (POLAND)

ID	Type of area	Location	Type of project	Source of Carbon	Main characteristics of the Carbon sinks	Status	Tn CO ₂ captured or emitted by sink
1	Areas whose conservation and/or restoration provides not only environmental benefits but also other social benefits	Forest Districts: Barycz (51.224357, 20.418041), Kielce (50.89765, 20.60861), Daleszyce (50.80680, 20.81432), Łagów (50.76196, 21.07751), Staszów (50.56025, 21.15944), Stąporków (51.14548, 20.57910), Zagnańsk (50.97670, 20.65702), Western, central and eastern part of Świętokrzyskie Region (Annex 1)	Forest and wetlands	Green carbon	One of the main problems observed in forests in recent decades is the lowering of the groundwater level and the related disappearance of hydrogenic ecosystems. The small retention program is designed to contribute to raising the level of groundwater, rebuilding hydrogenic habitats, protecting soils, increasing biodiversity and strengthening the function of the forest in the process of carbon absorption.	In exploitation	During research
2	Areas whose conservation and/or restoration provides not only environmental benefits but also other social benefits	Forest districts within the reach of the Regional Directorate of State Forests in Radom. Total 12 forest districts will participate in the program for 10 years (Annex 2)	Forests	Green carbon	Increasing the carbon dioxide absorption potential of forests is a very important element in mitigating climate change. The following activities are planned in the program of coal forests: afforestation of non-forest and forest lands, introducing understories and plantings, promoting good practices in the process of preparing soil for planting, diversification of species composition, promoting natural renewal.	In exploitation	During research
3	Areas of special environmental richness of paramount importance to be preserved (Nadnidziański Landscape Park, Natura 2000 sites)	Location with cartography (Annex 3)	Renaturalisation of the inland delta of Nida River which includes restoration of wetlands,	Green and blue carbon	The main subject of the project is to improve the water conditions of the of ca. 500 ha, restoration of the old riverbeds over a length of 16 kilometres, revitalization of eutrophic floodplains on 8 ha, active protection of the alluvial forests (ca. 145 ha.), and restoration of meadow	Without exploitation	Reduced emission of 1247 tonnes of CO ₂ yearly from alluvial forests and 4120 tonnes of CO ₂ yearly from restored meadow habitats ³

³ Altogether, this results in a reduction of 5367 tons of CO₂ emissions annually! Calculations based on: Joosten H., Tanneberger F., Moen A. (red) Mires and peatlands in Europe. Status, distribution and conservation. Schweizerbart Science Publ., 2017.

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ID	Type of area	Location	Type of project	Source of Carbon	Main characteristics of the Carbon sinks	Status	Tn CO ₂ captured or emitted by sink
			grasslands and forest areas.		habitats on over 200 ha. Stabilization of these ecosystems and improvement of their conservation status increases their potential for carbon accumulation. Also, peat-forming processes are being restored.		
4	Areas of special environmental richness that are of great importance for preservation (e.g., natural parks, national parks, protected natural areas, etc.).	Geographic coordinates of the Białe Ługi Reserve, latitude: 50°45'N, longitude: 20°51'E in the communes of Daleszyce and Cisowsko-Orłowski Landscape Park	Swamps	Blue Carbon	Peat bogs are an excellent absorber of atmospheric carbon dioxide. It is estimated that on average a hectare of peat swamps accumulates about 300 kg of carbon per year (equivalent to 1.1 tons of CO ₂).	In exploitation	Accurate calculation of greenhouse gas emissions from drained peat bogs in Poland is currently impossible due to the lack of accurate data on the distribution of peat soils and the depth of drainage.
5	Areas whose protection and/or restoration provide not only environmental benefits but also other social benefits (reclaiming public space, developing the local economy, etc.)	Geographic coordinates of the city of Kielce: latitude: 50°52'13"N longitude: 20°37'39"E	Urban areas for nature-based solutions (green corridors, green architecture, etc.)	Green carbon	In the document called Climate Change Adaptation Plan for the City of Kielce, climate forecasts were calculated for two greenhouse gas emission scenarios (RCP4.5 and RCP8.5)	Without exploitation	not applicable
6	Areas whose protection and/or restoration provide not only environmental benefits but also other social benefits (reclaiming public space, developing the local economy, etc.)	Geographic coordinates of the city of Ostrowiec Świętokrzyski: longitude: 21°24'E, latitude: 50°56'N	Urban areas for nature-based solutions (green corridors, green architecture, etc.)	Green carbon	The city of Ostrowiec Świętokrzyski has developed a document entitled adaptation plan to climate change, which plans to create a plan for planting trees in the city, which will contribute to increasing the absorption of carbon dioxide.	Without exploitation	not applicable

6. Conclusions

The main reason for intensifying efforts to achieve climate neutrality is that the climate crisis has a significant impact on both the dynamics of economic development and the quality of life of residents. Recognizing the seriousness of the situation, the Swietokrzyskie Voivodeship is striving to realize the provisions of EU, national and regional documents related to climate change.

Since we will probably have to wait a few years for the results of the measures taken, it is extremely important to exchange experiences within the framework of the NACAO project - Nature-based Carbon Offsets - and to learn about the specifics of policy-making in green and blue carbon investments.

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Based on the experience gained from the project, we would like to develop appropriate educational and financial tools to enable beneficiaries in the province to implement eco-innovation and adaptation and mitigation measures.

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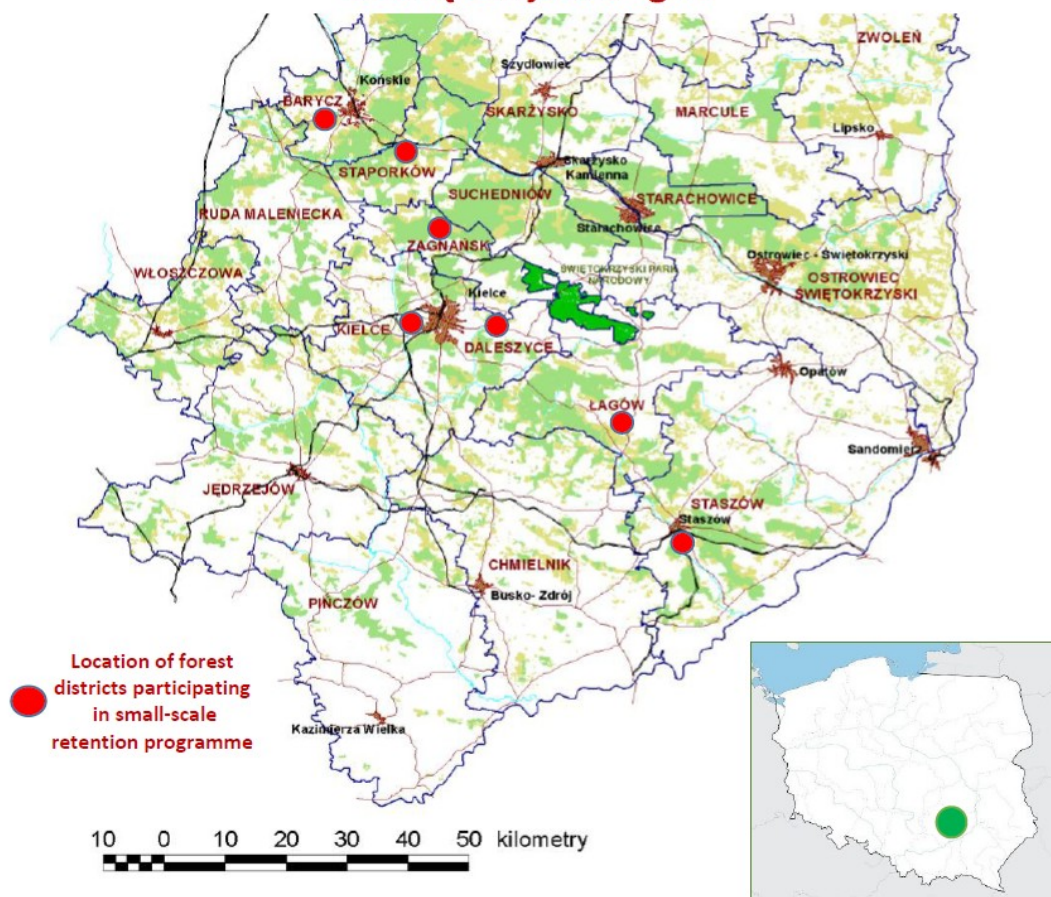
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7. Annexes

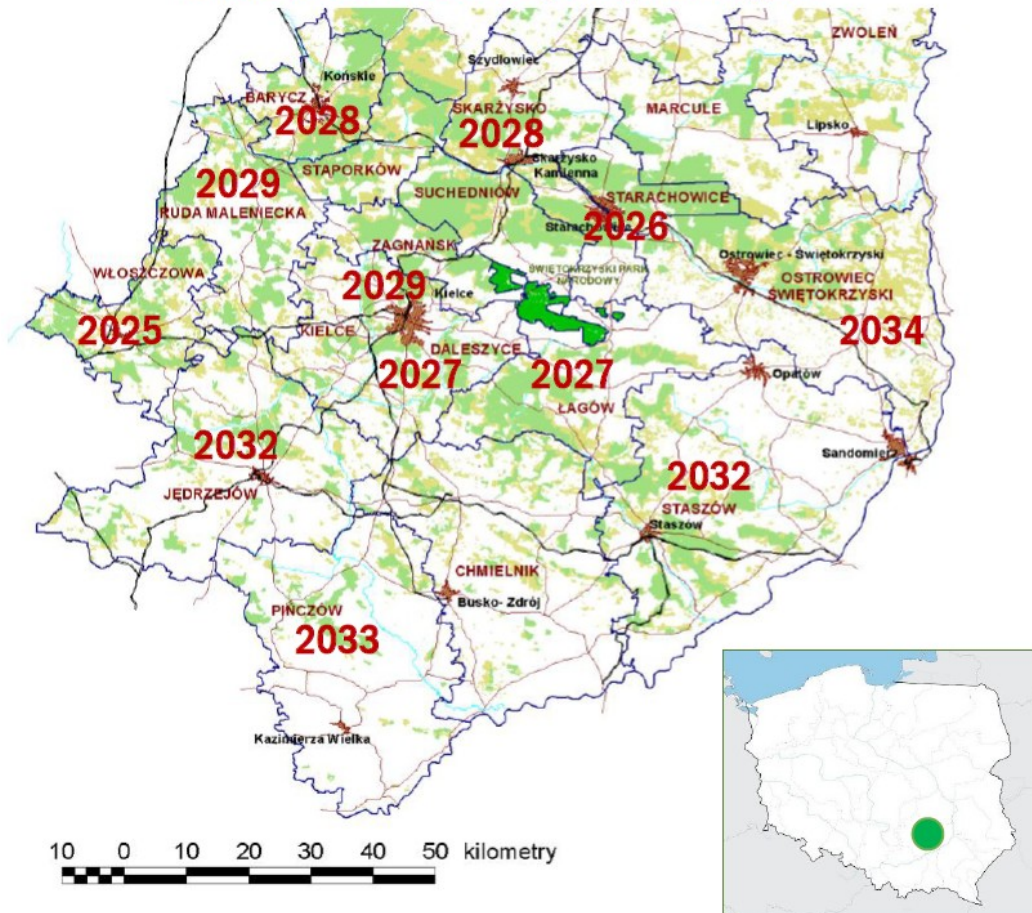
Annex 1. ID 1 map

Small-scale retention programme in forest districts of Świętokrzyskie Region

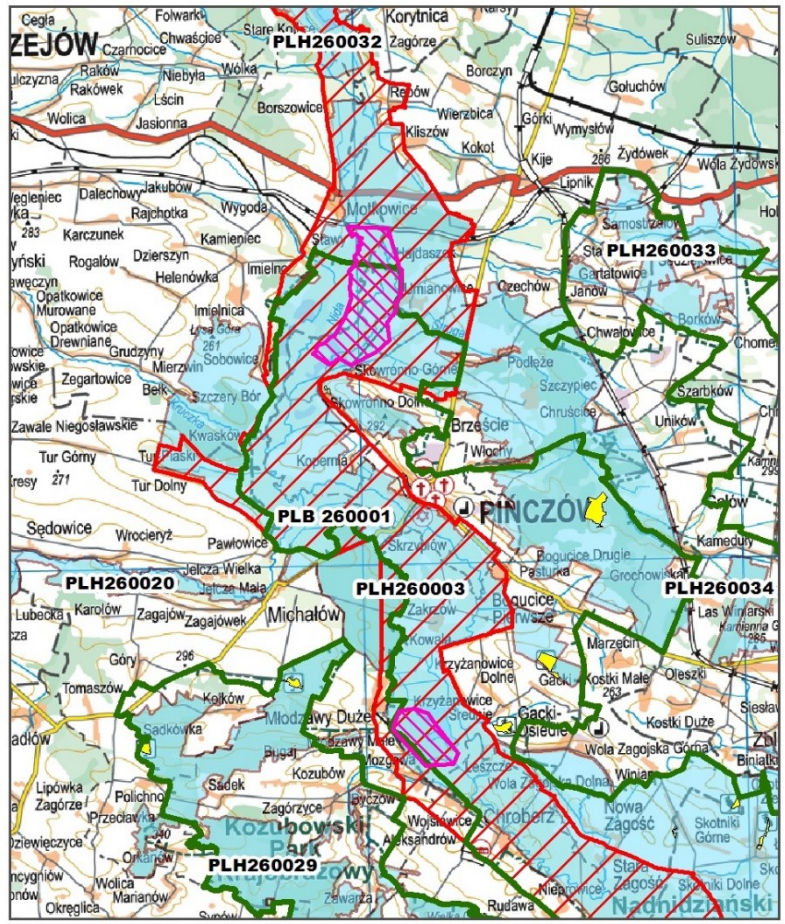


Annex 2. ID 2 map

**Planned schedule for implementing the coal forests project
in forest districts of Świętokrzyskie Region**



Annex 3. ID 3 map



Zasięg projektu w skali regionalnej

- zasięg projektu
- rezerwy przyrody
- obszary Natura 2000 SOO
- obszar Natura 2000 OSO
- granice parków krajobrazowych

1:120 000

