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USE OF GIS TECHNOLOGIES IN THE STUDY OF THE EFFECT OF POWER LINES ON BIOLOGICAL ORGANISMS AND AGROCHEMICAL CHARACTERISTICS OF SOILS

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Abstract: This thesis examines the influence of electromagnetic waves emitted by power lines (PTL) on biological organisms and soil resources. Special attention is paid to the integration of geographic information systems (GIS) and soil agrochemistry for the analysis and mapping of impact zones. GIS technologies are used to visualize the results of agrochemical analyses, which makes it possible to identify changes in the chemical composition of soils and assess the impact of EMC on the Ecosystem. An integrated approach that combines well logging and agrochemistry facilitates more accurate and detailed research, as well as the development of measures to minimize negative impacts.
Keywords: electromagnetic waves, power lines, biological organisms, GIS technologies, soil agrochemistry, mapping, ecosystems, EMC impact.

Introduction. Electromagnetic waves (EMWs) emitted by power lines (PTLs) are of increasing concern due to their potential impact on the environment and biological organisms. In recent years, considerable attention has been paid to the study of the impact of EMR on ecosystems and soil resources. GIS technologies (geographic information systems) and soil agrochemistry are powerful tools for investigating and mapping these impacts. This article discusses the integration of GIS technologies and agrochemistry in the study of the impact of power lines on biological organisms and soil resources.

GIS technologies (geographic information systems) and soil agrochemistry are powerful tools for investigating and mapping these impacts. GIS technologies provide a wide range of tools for analyzing spatial data, allowing you to map the areas affected by power lines and model potential risk areas. Soil agrochemistry can identify changes in soil chemistry due to EMV, which affects soil fertility and the ability to support plant growth.

The integration of GIS technologies and soil agrochemistry opens up new opportunities for an in-depth and comprehensive analysis of the impact of power lines on the environment. An integrated approach allows not only to identify potential risks, but also to develop effective strategies to reduce them, which is an important step towards sustainable management of natural resources [1-5].

Influence of electromagnetic waves on biological organisms. Electromagnetic waves emitted by power lines can have a different effect on biological organisms. Among the main impacts are changes in animal behavior, reproductive disorders, as well as effects on plant growth and development. Biological organisms located near power lines can be exposed to EMC for a long time, which necessitates a detailed study of this issue.

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The role of GIS technologies in the study of the impact of power lines. GIS technologies provide a wide range of tools for analyzing spatial data, making them indispensable in environmental research. With the help of GIS, it is possible to map the zones of impact of power lines, analyze the spatial distribution of various parameters and model potential risk areas for biological organisms.

Agrochemistry of soils and its importance in the study of power lines. Soil agrochemistry plays a key role in assessing the impact of power lines on the environment. The chemical composition of soils can be altered by EMV, affecting soil fertility and the ability to support plant growth. Analysis of soil samples and their agrochemical mapping can reveal changes in the content of nutrients, trace elements and other key indicators.

Integration of GIS technologies and agrochemistry. The integration of GIS technologies and soil agrochemistry makes it possible to create an integrated approach to studying the impact of power lines on the environment. With GIS, you can visualize the results of agrochemical analyses, create thematic maps, and identify areas with the greatest impact. This contributes to a more accurate and detailed analysis, as well as the development of measures to minimize the negative impact of EMC [6-10].

For example, we can consider one of the districts of the Fergana region (Fergana district) when using an online module on the OneStreetMaps platform to determine the location of power lines with more than 500 kW of power in the territories of agricultural lands of Fig-1.

Rice. 1 – OneStreetMaps online module, a power line that affects the agrochemistry of the soil in the territories of agricultural land.

Electromagnetic waves emitted by power lines can have a significant impact on the agrochemical properties of soils, which in turn affects their fertility and ability to support plant growth. Let's consider the main aspects of this influence:

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1. Changes in the chemical composition of soils:

- Mineralization of organic matter: EMC can accelerate the mineralization of organic matter, which leads to changes in the content of humus and other organic compounds in the soil;

- Changes in nutrient content: EMC can alter the content of key elements such as nitrogen, phosphorus and potassium. This can affect the nutrient value of the soil for plants;

- Micronutrients: The effects of EMC on the concentration of trace elements such as copper, zinc, and iron can have significant effects on plant growth and health [11-15].

2. Effect on microbiological activity:

- Activity of soil microorganisms: EMCs can alter the activity and composition of the soil microbiota, which affects the decomposition of organic matter and nutrient cycling;

- Pathogens: EMC can alter the number and activity of pathogens, which can lead to increased plant disease.

3. Changes in the physical properties of the soil:

- Soil structure: EMC can affect soil structure by changing soil porosity and water permeability, which in turn affects root formation and plant growth;

- Moisture and aeration: EMC can alter soil moisture and aeration, which is critical for plant health [16-30].

Conclusion. Electromagnetic waves emitted by power lines can have a significant impact on the agrochemical properties of soils, which in turn affects plant health and growth. The integration of GIS technologies and soil agrochemistry allows for a comprehensive analysis and mapping of these changes, which contributes to the development of effective measures to reduce negative impacts. An integrated approach to the study of the impact of power lines on the environment is an important step towards sustainable management of natural resources.

The study of the effect of electromagnetic waves of power lines on biological organisms and soils is a complex and multifaceted task. The integration of GIS technologies and soil agrochemistry opens up new opportunities for in-depth and comprehensive analysis of these impacts. An integrated approach allows not only to identify potential risks, but also to develop effective strategies to mitigate them, which is an important step towards sustainable management of natural resources.

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