

function. The major part of measuring results (~60 percent of total samples) is between 15 and 20 percent. Plant fading moisture level in heavy clayey soils is reached when moisture reserve in a soil drops down to 9.1-10.2 percent. Data consistency analysis shows that this value corresponds to Watermark instrument values of  $\geq 100$  cbar in a heavy clayey soil. Based on the completed analysis of the entire period values and the summarized results, it was determined that estimation of plant growth conditions period by HTK and actual soil moisture reserve (W, cbar) differ approx. 2-fold (according to HTK – 31 % wet and according to Watermark – 15 % wet).

## References

1. Dirsė A. 2001. Žemės ūkio augalų vegetacijos laikotarpių drėgmingumas. Žemės ūkio mokslai, 3: 51 – 56
2. Dirsė A., Taparauskienė L. 2010. Drėgmingumo kaita augalų vegetacijos metu ir jo vertinimo metodų palyginimas // Žemės ūkio mokslai. Nr. 1 – 2., 9 – 17.
3. Buitkuvienė M. S. Sausros Lietuvoje. Mokslinio tyrimo ataskaita. Vilnius: LHMT. 1998. P. 403 – 427.
4. Mannava V.K. Sivakumar . Agricultural Drought—WMO Perspectives. 22-34 psl. Agricultural Drought Indices. Proceedings of an expert meeting. 2–4 June 2010, Murcia, Spain. 205 psl. Editors: Mannava V.K. Sivakumar, Raymond P. Motha, Donald A. Wilhite, Deborah A. Wood

УДК 551.492

## ANALYSIS OF AGRICULTURAL DEVELOPMENT OPPORTUNITIES USING GIS TECHNOLOGIES

**Viktoras Cernenko, Mantas Dauksas, Edgaras Grigaitis, Gitana Vyciene**  
*Kaunas Forestry and Environmental Engineering University of Applied Sciences.*  
*Kaunas, Lithuania, viktoras.cernenko@gmail.com and mantas.dauksas98@gmail.com and edgarax@gmail.com*

**Student work supervisor - lect. Gitana Vyciene gitana.vyciene@gmail.com**

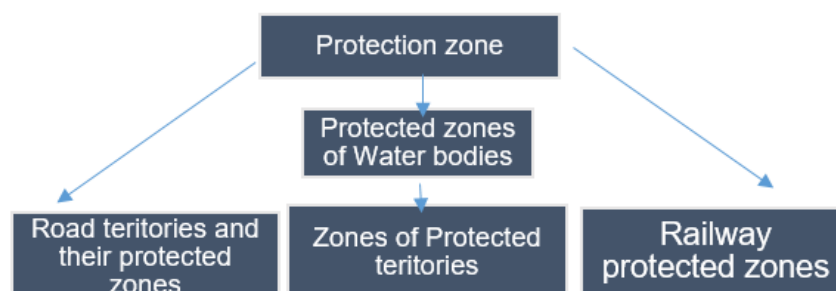
*Цель данной работы – продемонстрировать возможности применения ГИС-технологий для определения территорий выбранного района, где в соответствии с действующими в Литве правовыми нормами возможно органическое земледелие. Программное обеспечение ArcGIS и функции пространственного анализа были использованы для достижения цели работы. Сначала были установлены 5 критериев в соответствии с действующей в Литве правовой базой, в которой развитие экономической деятельности ограничено или невозможно, а затем была произведена оценка продуктивности земель.*

Since ancient times, Lithuania has been an agrarian country where agriculture occupies an important part of the economy. In order to improve traditional farming,

a new branch was formed - ecological farming [1]. After Lithuania became a member of the European Union, the popularity of organic farming did not overtake Lithuania either, the pace of this farming grew steadily until 2007, currently there are 2855 organic farms [2] throughout Lithuania, which deal with organic fisheries and complete organic production. recycling. All these activities are regulated by the EU Council Regulation (EC) No 834/2007 and its implementing rules laid down in Commission Regulation (EC) No 889/2008. National rules for organic farming have also been adopted to implement the regulations [3]. An important aspect of organic farming is the selection of a suitable location, which is closely dependent not only on the soil but also on infrastructure or environmental factors. The aim of the research is to demonstrate the possibilities of applying GIS technologies in determining the territories of the selected district, where, according to the legal regulations, organic farming is possible.

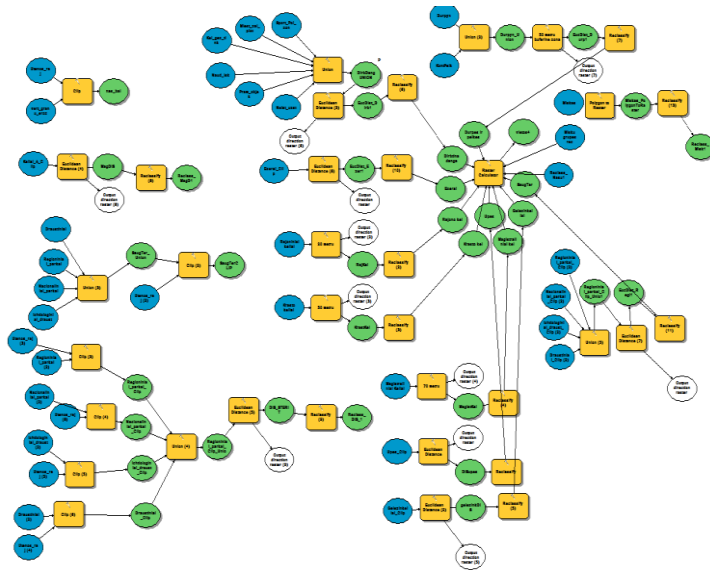
ArcGIS software and Spatial Analyst tools were used for the study. Using these tools, using the GDB200LT database, analyze existing and create new data. In determining the suitable areas for alternative farming in the selected area, the characteristics of infrastructure, geography, hydrology were taken into account, as well as the use of existing restrictions on these activities. During the work, the valid laws and resolutions of the Republic of Lithuania were followed.

In the first stage of the research, the criteria (objects) and their protection zones influencing the development of organic farming were singled out [5]. Protection zones around facilities are established to ensure proper human economic activity. For this work it was chosen to create protection zones (restricted areas) about 5 groups of objects (Figure 1). These areas have become criteria influencing the development of organic farms.



*Fig. 1 Schematic diagram of selected criteria*

The area occupied by roads in the analyzed area is -25005 ha. It has been established that this area together with their protection zones in the district is 2.1 % of the total area of the district. The performed steps of spatial analysis are presented in the developed model of ecological activity development (Fig. 2), in which all layers and actions used in the work are combined into one. This helped not only to save time (by changing criteria, adding additional ones), but also to look for errors or easily change the values of one data to another without using single actions. It was found that the unsuitable area for farming is 222.68 ha.



*Fig. 2 An analysis model for finding suitable areas for agricultural development*

This area will be rejected as unsuitable for economic development. Similarly, as for roads, a layer of railway was generated and then reclassified on the assumption that the track gauge and protection zones of 20 m are unsuitable for economic development. The next step is the demarcation of forest areas, as no farming activities can take place in them. The total forest area in the study area is almost 30% from the total area of the district. Land productivity score was also assessed.

In order to exclude areas for possible development of economic activity, it is also necessary to assess built-up areas, urbanized areas. It was found that the development of economic activity without assessing all the criteria described above is possible in about 57 % of total area of the district.

Water bodies are sensitive to chemicals, pollution or other damage, lakes and rivers are covered by a protection zone to avoid these problems. Lakes with their protection zones (50 m) occupy - 4.38 %, rivers and their protection zones (100 m) occupy 2.43% district area.

Applying the criteria singled out in the work, it was obtained that the areas possible for the development of economic activity occupy 55 % district area.

## References

1. Maskoliūnaitė, D. 2007. Ekologinio ūkininkavimo ypatumai Lietuvoje. Iš: Mano ūkis 2004. [interaktyvus] [žiūrėta 2021-02-07]. Prieiga per internetą: <https://www.manoukis.lt/mano-ukis-zurnalas/2004/05/ekologinio-ukininkavimo-ypatumai-europoje-ir-lietuvoje/>
2. Ekologinių ūkių žemėlapis [interaktyvus] [žiūrėta 2021-03-01]. Prieiga per internetą: <http://vartotojai.lt/zemelapis.html>
3. Ekoagros [interaktyvus] [žiūrėta 2021-01-15]. Prieiga per internetą: <https://www.ekoagros.lt/ekologiniai-ukiai-nepripazista-tolerancijos-pazeidejams>
4. Skurdienė, I., Ribikauskas, V., Bakutis, B. 2007. Ekologinio ūkio privalumai gyvulininkystėje. Kaunas: Lietuvos veterinarijos akademijos gyvulininkystės institutas, 2007.