

# Where The Wind Blows Finding Sites For New Wind Farms in Mittelfranken, Bavaria

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## BACKGROUND

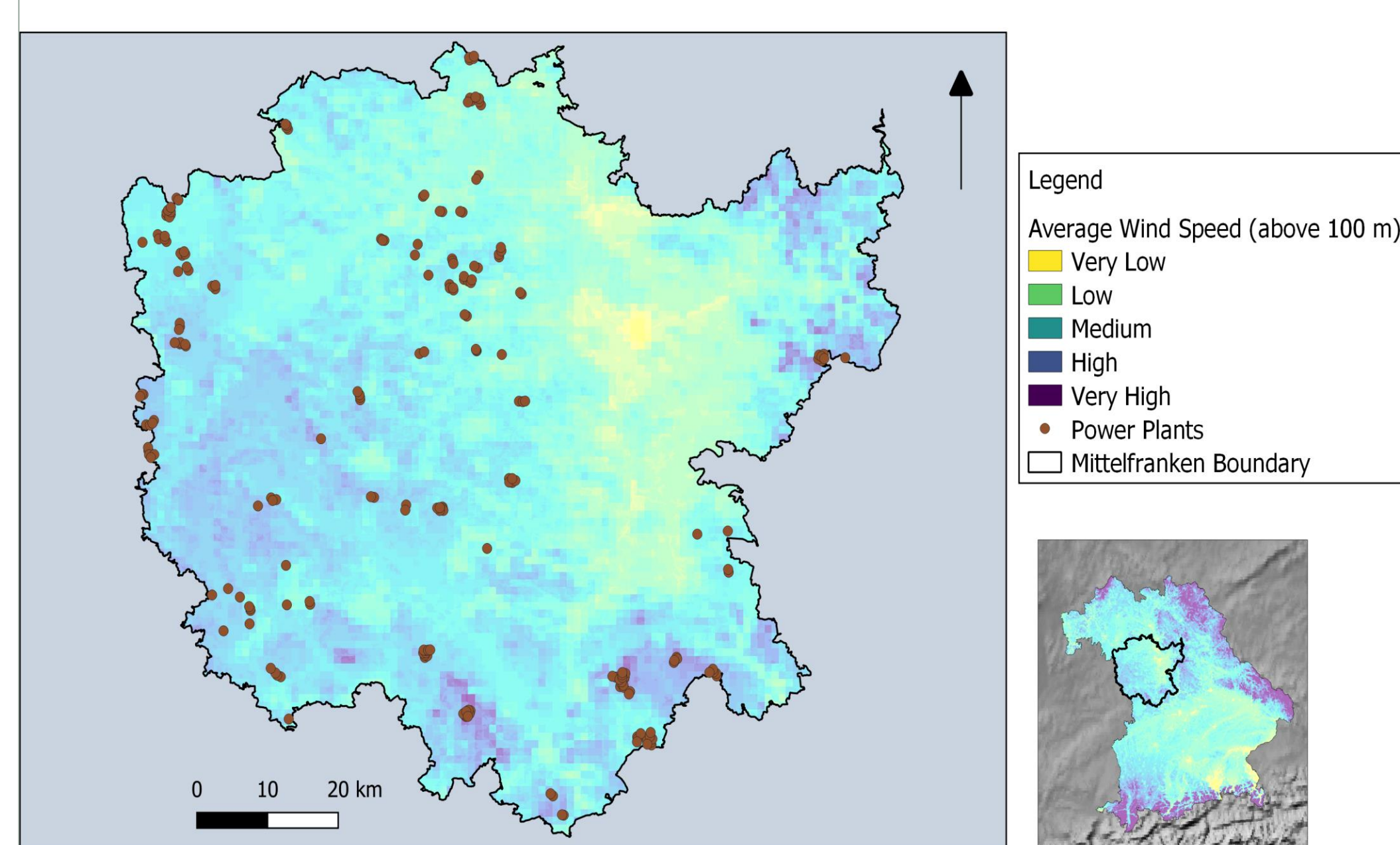
One of the major causes of climate change is our dependence on fossil fuels. In Germany itself, per capita electricity usage is 6,487.70 kWh. As fossil fuels decline further with an increase in population and a rise in life standards; it is wise to invest in renewable energies. About one third of the gross electricity generation in Germany comes from renewable energies. In Bavaria, these even reach a share of over 40 percent. In total, around 35 billion kWh of electricity were generated from renewable energies in Bavaria in 2016 out of which Wind Energy accounted for around 9%. For a long time it was said that wind energy in Bavaria was not worth it. However, the advances in technology also make it possible in this country more and more wind farms that provide profitable consumption-related electricity.

## OBJECTIVE

- To create a GIS study about wind energy harvesting in Bavaria; document the current situation and find potential sites for future wind farms.
- Mittelfranken was chosen as the study region in Bavaria.

## CURRENT SITUATION

Fig 1. Current Wind Farms In Mittelfranken



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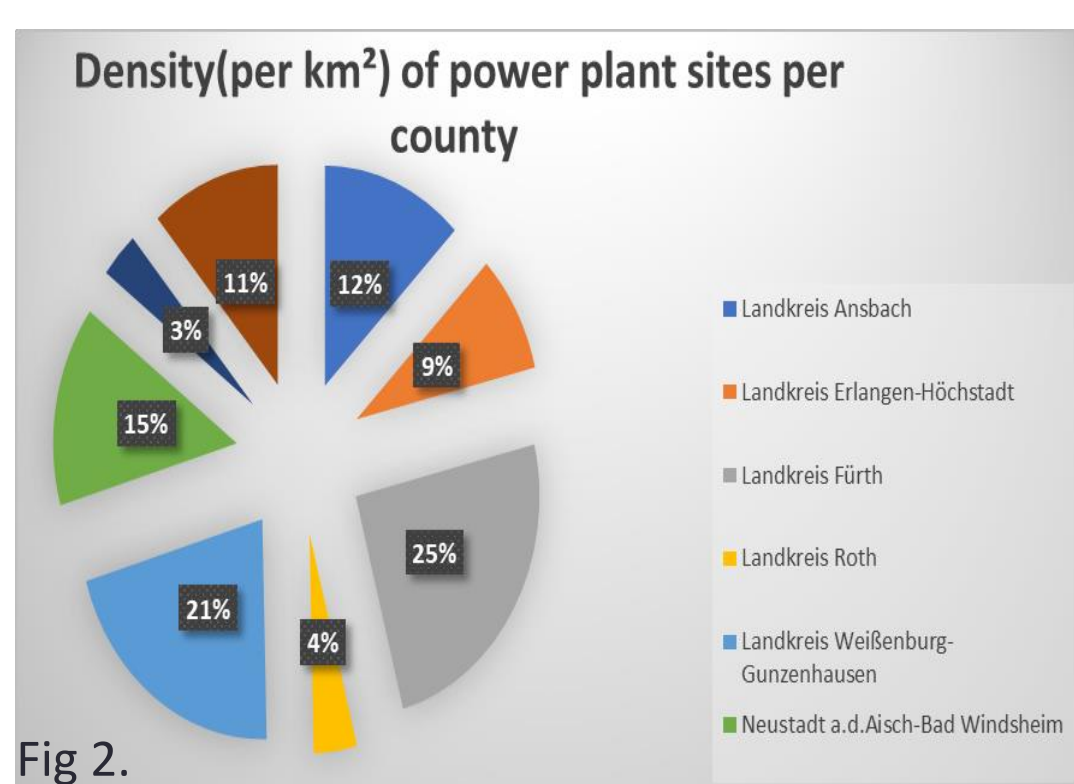


Fig 2.

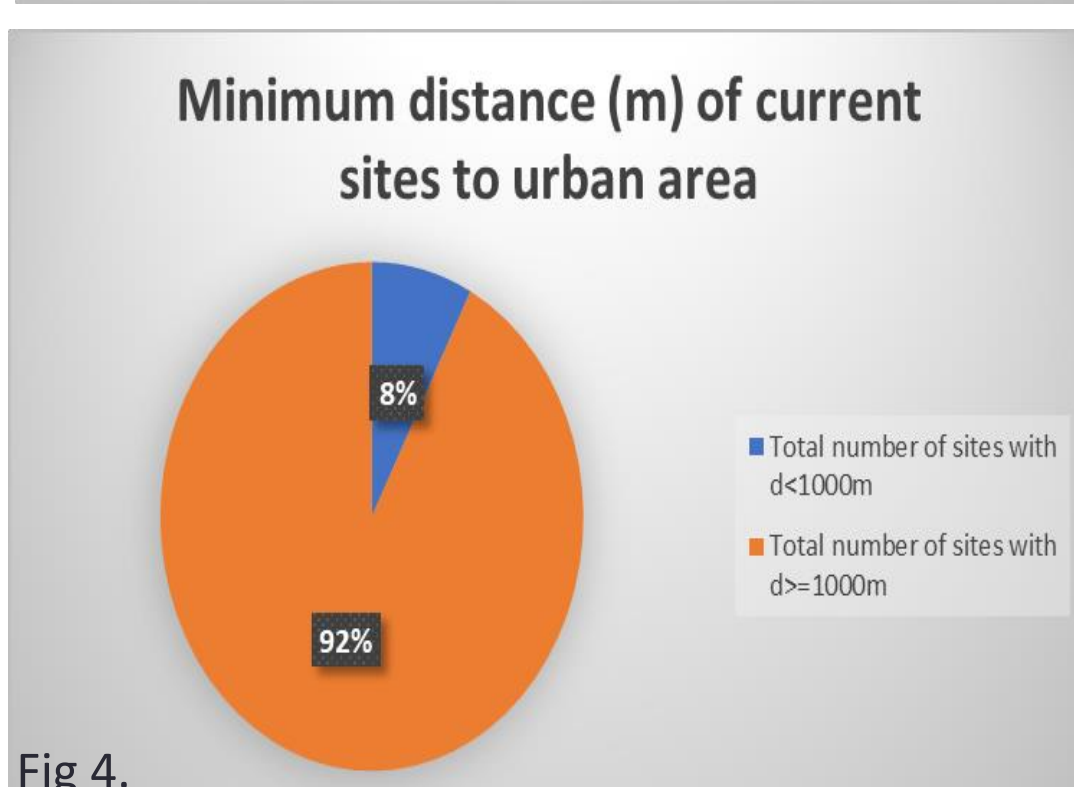


Fig 4.

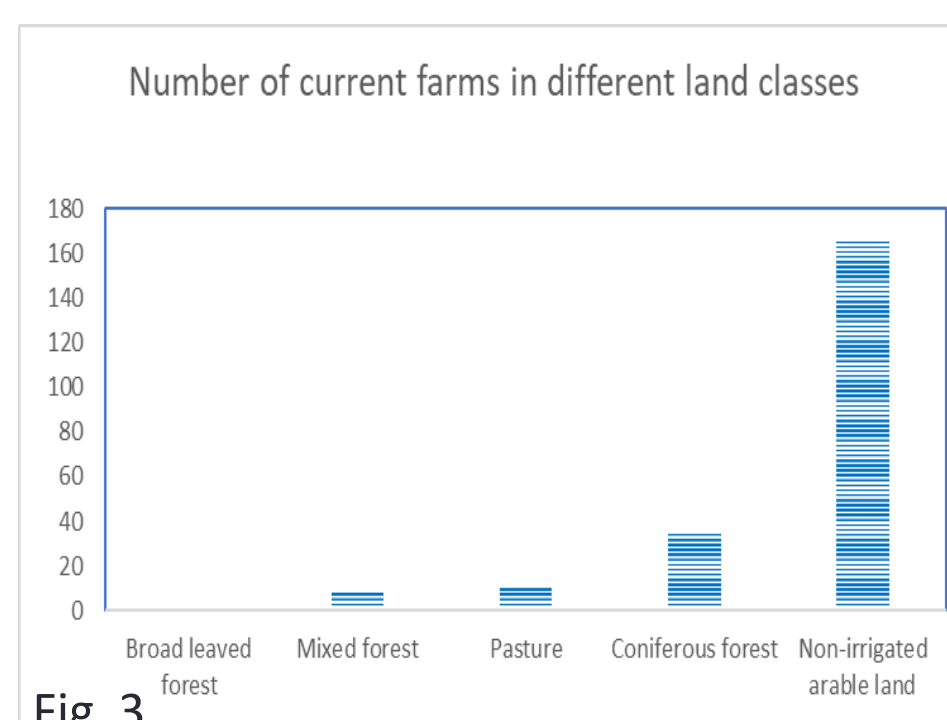


Fig 3.

Fig.1: Current wind farm locations in Mittelfranken.  
Fig.2 : Distribution of number of wind farms per county in Mittelfranken.

Fig.3: Distribution of number of wind farms in different land use classes Mittelfranken.

Fig .4 : Percentage of wind farms according to their distance from the nearest urban area.

## METHODS

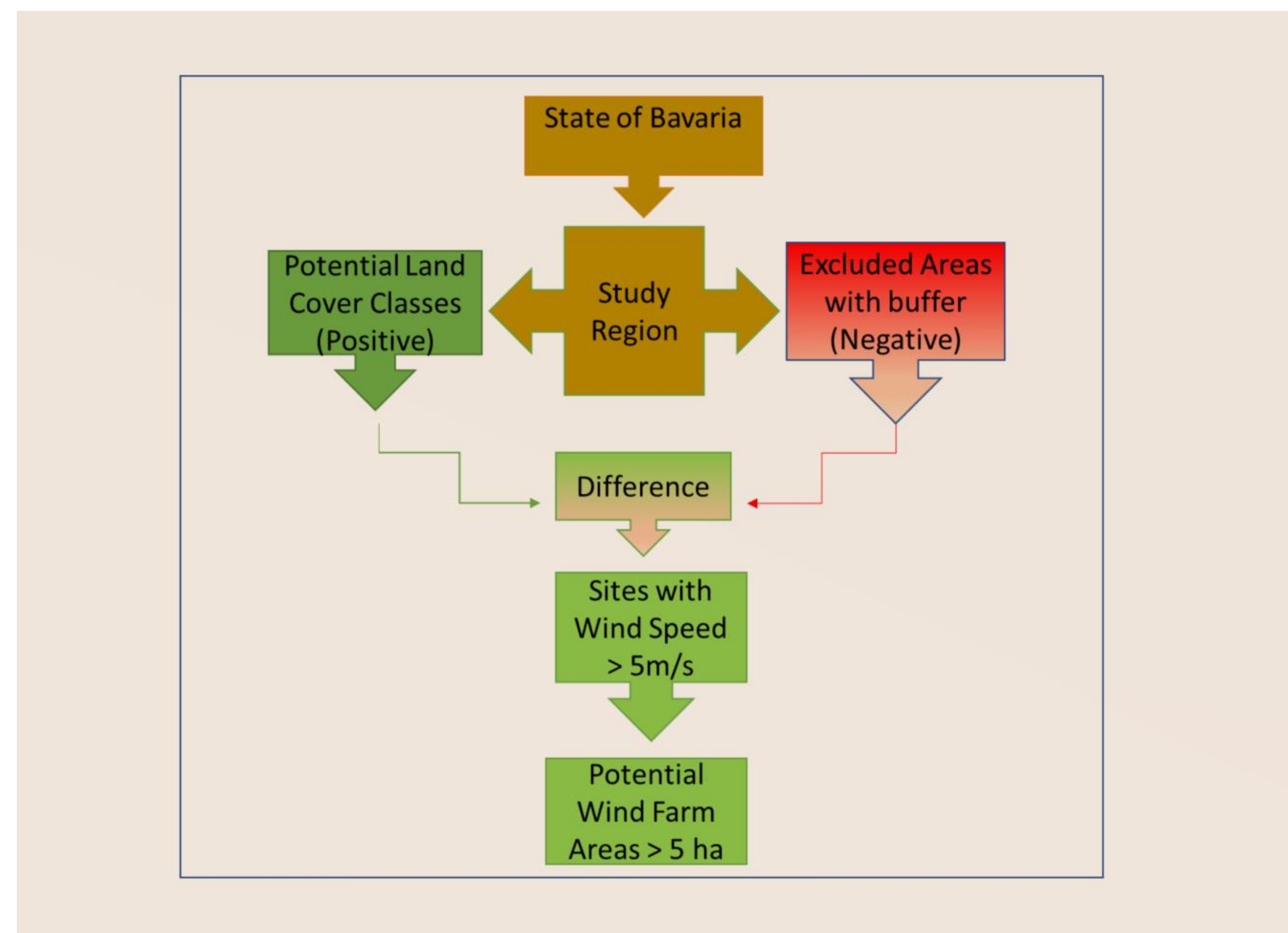


Fig. 5: A generalized workflow process in QGIS, where the study region is chosen from the State of Bavaria.

- According to the given state guidelines for a suitable area to set up wind turbines, the land use layers which are included are termed as Positive (Potential Land Cover Classes) and the areas to be excluded are termed as Negative (Excluded areas with buffer).
- The negative areas are also buffered in accordance to guidelines for preservation of natural areas and other environmental aspects.
- The areas generated when we erase negative areas are then classified according to wind speed.
- Lastly, only areas with wind speed more than 5m/s and area of more than 5ha are considered as potential site areas for future wind energy farms.

## FUTURE SITUATION

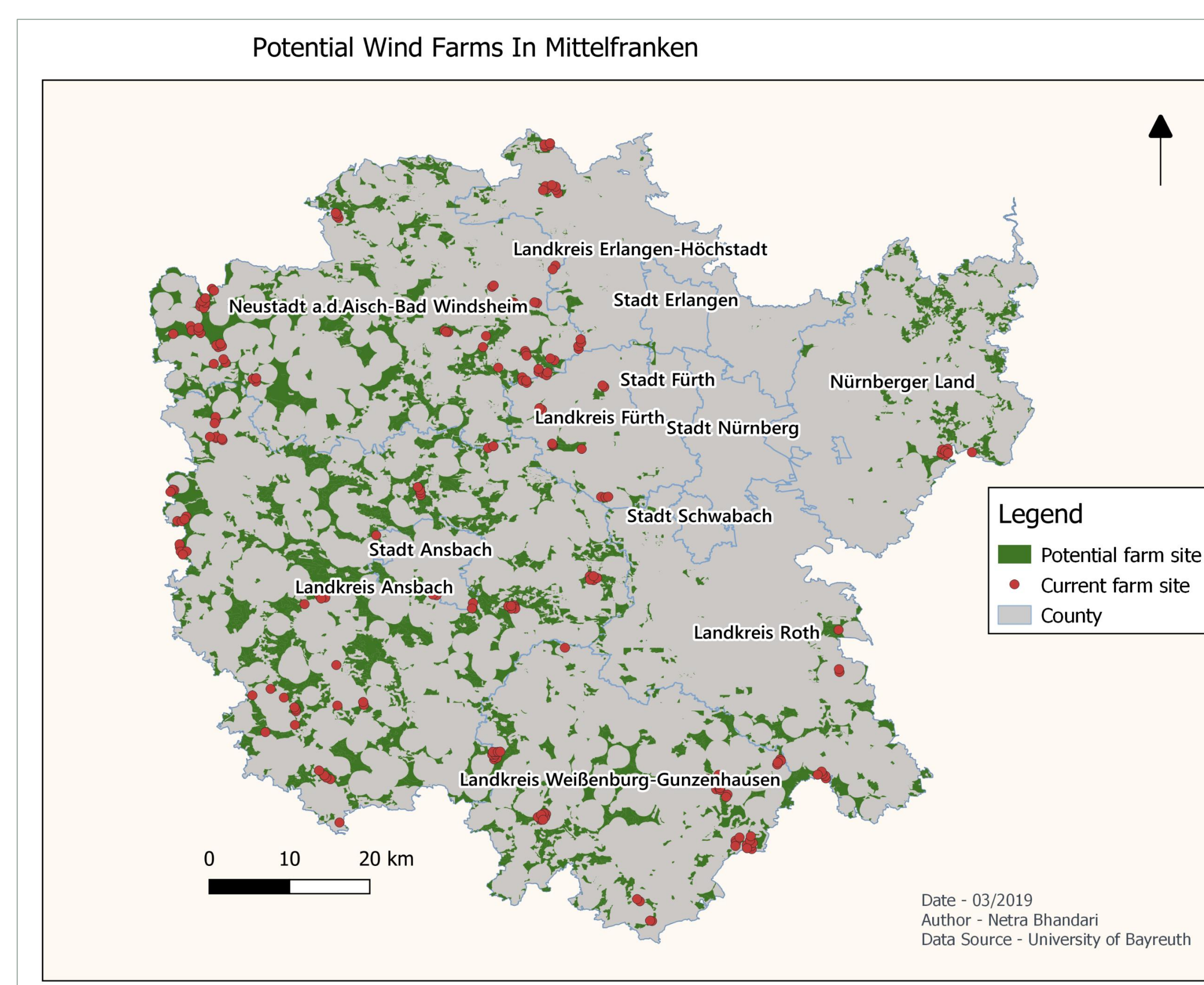


Fig. 6: Map of potential sites for future wind farms in Mittelfranken

## RESULTS

- A total area of 102901 hectare has the potential to be future wind farm site in the region of Mittelfranken.
- Landkreis Ansbach came out to be the most suitable counties of the 12 counties in Mittelfranken.
- Stadt Schwabach and Stadt Nürnberg are heavily urbanised area and thus possess no suitable area for a wind farm.

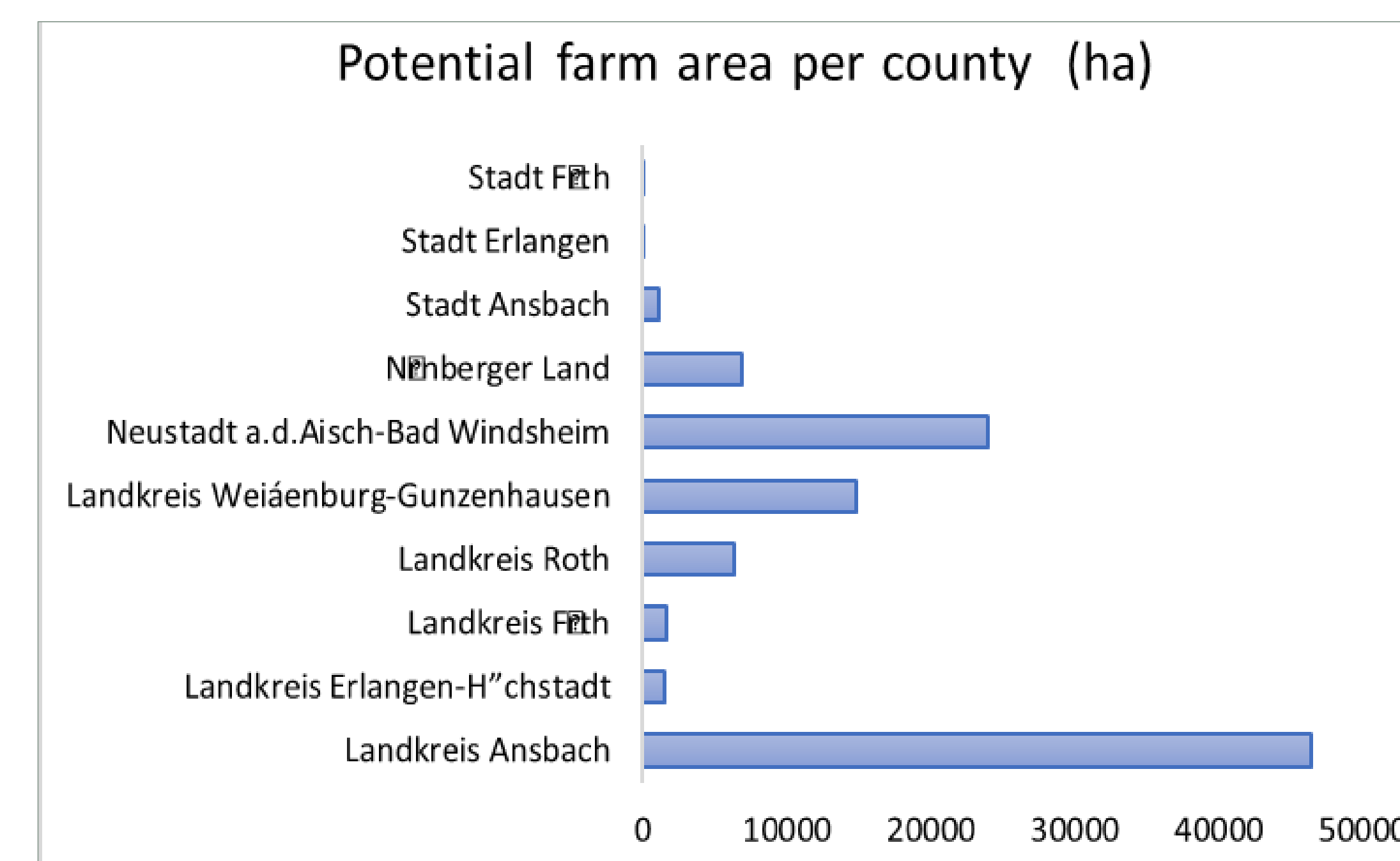


Fig. 7 : Potential area calculated from the qgis workflow for each county in Mittelfranken

## CONCLUSION

- A successful implementation of wind farm is based on many factors like, wind speed suitability, appropriate land size, distance from urban areas, economic viability, acceptance among people of the region, potential risk to natural flora and fauna etc.
- The results of this study are sufficient for appropriate first decision making on a regional scale.
- The suggested next step would be a more critical ground-based survey to finalize areas for future wind farms in the study region.

## REFERENCES

- Langer, Katharina, et al. "A qualitative analysis to understand the acceptance of wind energy in Bavaria." *Renewable and Sustainable Energy Reviews* 64 (2016): 248-259.
- Energie atlas Bayern ([https://www.energieatlas.bayern.de/thema\\_wind/daten.html](https://www.energieatlas.bayern.de/thema_wind/daten.html))
- Data source for the maps – University of Bayreuth