

Loss of farmland biodiversity is currently one of the most important conservation problems in Europe and other parts of the world. Agriculture intensification, that is associated with reduction of valuable non-crop habitats and deterioration of crops' ecological value, has been considered the most important factor so far. For the last two decades an enormous scientific and conservation effort have been made to counteract the negative effects of agriculture intensification, yet farmland birds, pollinators and other taxa continue to decrease. One reason for this fail may be undervaluation of human rural settlements in the context of farmland biodiversity. Villages and their old farmsteads have been lately recognized as one of the most biodiversity-rich environments in agricultural areas. Human settlements are main environments for common species, such as house sparrow, tree sparrow, house martin and barn swallow. Importantly, a substantial part of farmland bird decline is associated with common species linked to rural human settlements. This is because economic development and current requirements for energy efficient buildings drive changes that result in substantial reductions of villages' ecological values, such as nesting sites in buildings. In our recent paper we showed that increasing share of new and renovated homesteads in rural settlements (i.e. village modernisation) may contribute more to farmland bird decline than agriculture intensification. We found that modernisation of villages is strongly negatively related with local abundance of bird species that are dependent on buildings in their breeding ecology.

Old settlements significantly contribute to global CO₂ emissions, therefore their modernisation is EU's priority to reduce energy consumption in rural areas. New requirements for energy efficient housing in EU include extra-insulated roof and walls which may make old renovated and newly emerged buildings biodiversity unfriendly (i.e. poor in nesting sites). The planned and ongoing changes to building architecture in rural landscapes apply to the developed and developing part of the world (expected costs up to USD 300 billion per year globally). Due to these changes several declining building-nesting bird species in Europe are at high risk of further population declines. This means that a conflict between two sustainability goals, reduction of greenhouse gas emission and biodiversity conservation, occurs extensively in rural areas all over the world. For this conflict to be solved, building modernisation must include measures effectively reducing its negative effects on biodiversity. Installing nest-boxes may be an efficient on-site restoration to compensate the loss of nesting sites for some building-nesting species.

At this moment human rural settlements are not included in any conservation program, despite being intensively developed through the EU's Common Agriculture Policy, program for rural development and strategy 'A Renovation Wave for Europe'. To our best knowledge there is no study that evaluated compensation for lost nesting sites in rural settlements in a comprehensive way, i.e. evaluated the losses associated with modernisation and gains from nest-boxes supply and accounted for background changes and temporal trends. It is therefore unknown whether nesting site supply is a sufficient countermeasure for village modernisation and what factors could interact with its effects.

The project is designed to implement and evaluate compensatory measures targeted to reduce the negative effect of rural building modernisation on bird diversity in farmlands. By using a robust study design we will explicitly evaluate (1) the effect of nesting sites supply on bird diversity in modern villages and their adjacent crops and (2) how this effect interacts with amount of habitat structures providing food and shelter for birds. By comparing gathered data with our existing data form 2017 we will also determine (3) how temporal changes in village structure relate with farmland bird population dynamics in villages and surrounding crops. This project will deliver much needed scientific evidence for an easy and cost-effective measure that has potential to greatly reduce loss of farmland bird diversity associated with village modernisation. The project directly captures and bond the both key components of sustainable development, biodiversity and society.