INVENTORY OF GRASSLAND HABITATS OF UKRAINE USING PHYTOSOCIOLOGICAL DATABASES

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INTRODUCTION

Analysis of the structure of the land fund of Ukraine over the past 20 years shows a steady trend towards a gradual reduction in the area of grassland habitats - meadows and pastures (National Reports on the State of the Environment in Ukraine 1999-2018). Instead, in many European countries, grassland habitats are of special conservation interest, recognized as biodiversity hotspots. Despite the fact that Ukraine is currently actively implementing of EU environmental legislation in accordance with the Association Agreement between Ukraine and EU, the lack of up-to-date information on areas and the current state of habitats to be protected throughout Europe makes it impossible to effectively apply European approaches to their protection.

AIM

To establish the current state of distribution of grassland habitats in Ukraine, to identify their floristic and ecological peculiarities, to develop measures to stop their losses and ensure their long-term existence.

RESULTS

According to the results of analysis of 23 746 vegetation plots 28 types of grassland habitats were identified (Table 1). Grid maps of their distribution based on georeferenced plots in the databases (Fig. 1) and maps of the predicted distribution based of Bayesian random forests (Fig. 2) have been created. The comparative analysis of the resulted types by values of ecological factors on the basis of Didukh ecological scales has been carried out (Fig. 3). An assessment of the conservation status of habitats according to IUCN criteria as well as assessment of the conservation value, impact of threats and risks of loss has been made. The habitat types that need protection at the national and pan-European levels have been identified. The results of the study will be used in the Atlas-Guide of Grassland Habitats of Ukraine and in the development of a draft Strategy for the conservation of grassland habitats in Ukraine.

Table 1. List of habitat types

Habitat Code	Habitat name	Number of plots
R11	Pannonian and Pontic sandy steppe	408
R12	Cryptogam and annual dominated vegetation on siliceous rock outcrops	78
R13	Cryptogam and annual dominated vegetation on calcareous and ultramafic rock outcrops	309
R15	Continental dry rocky steppic grassland and dwarf scrub on chalk outcrops	199
R16	Perennial rocky grassland of Central and South Eastern Europe	529
R18	Perennial rocky calcareous grassland of subatlantic submediterranean Europe	376
R1A	Semi dry perennial calcareous grassland	2390
R1B	Continental dry grassland true steppe	4557
R1C	Desert steppe	45
R1M	Lowland to submontane, dry to mesic Nardus grassland	581
R1P	Oceanic to subcontinental inland sand grassland on dry acid and neutral soils	138
R1Q	Inland sanddrift and dune with siliceous grassland	88
R21	Mesic permanent pasture of lowlands and mountains	976
R22	Low and medium altitude hay meadow	2635
R23	Mountain hay meadow	170
R35	Moist or wet mesotrophic to eutrophic hay meadow	644
R36	Moist or wet mesotrophic to eutrophic pasture	1093
R37	Temperate and boreal moist or wet oligotrophic grassland	324
R43	Temperate acidophilous alpine grassland	57
R44	Arctic alpine calcareous grassland	192
R51	Thermophilous forest fringe of base rich soils	219
R55	Lowland moist or wet tall herb and fern fringe	115
R56	Montane subalpine moist or wet tall herb and fern fringe	104
R62	Continental inland salt steppe	426
R63	Temperate inland salt marsh	96
R64	Semi desert salt pan	542
R65	Continental subsaline alluvial pasture and meadow	75
X36	Depressions (pody) of the Steppe zone	321

Fig. 1. *Examples of habitats distribution based on georeferenced plots in the databases*

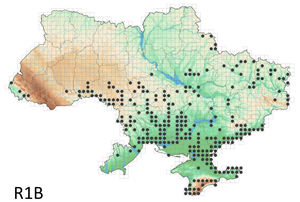


Fig. 2. *Predicted habitats distribution based of Bayesian random forests (examples)*

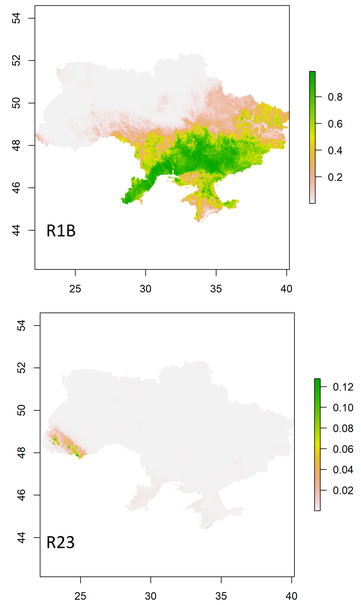


Fig. 3. *Examples of phytoindication diagrams for R15 habitats of biotopes with the designation of the ecological optimum (more intense color) and amplitude (less intense color) on ecological scales.*

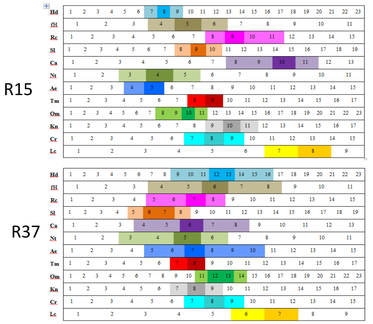
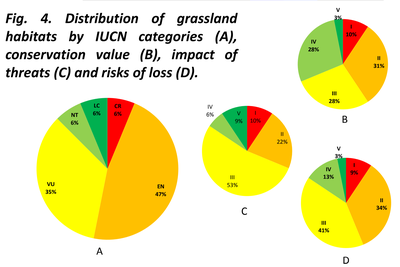


Fig. 4. *Distribution of grassland habitats by IUCN categories (A), conservation value (B), impact of threats (C) and risks of loss (D).*



METHODS

- Data from:
  - ✓ Ukrainian Grassland Database (EU-UA-001) – 11843 plots
  - ✓ Eastern European Steppe Database (EU-00-030) – 4125 plots
  - ✓ «Vegetation of Bukovyna+" (EU-UA-009) – 4283 plots.
  - ✓ UkrVeg (http://geobot.org.ua/about-ukrveg/) – 3174 plots
- Expert System – EUNIS-Esy (Chytrý et al. 2020);
- Distribution maps have been created using QGIS 3.16.10 (grid maps) and R (R Core Teams 2021) with 'embarcadero' package (Carlson 2020) (prediction maps);
- Phytoindication with Didukh Ecological Scales (Didukh 2012);
- Habitat assessment by the conservation value, impact of threats and risks of loss (Didukh et al. 2018) and to IUCN criteria (Janssen et al. 2016).

CONCLUSIONS

1. According to the analysis of 23746 vegetation plots with the EUNIS-Esy expert system and subsequent verification, 28 habitat types were identified.
2. Predicting the habitats distribution gave the most accurate results for those types whose distribution is caused by climatic factors, as well as both edaphic and climatic factors.
3. According to the results of the assessment of grassland habitats according to IUCN criteria, as well as the assessment of the conservation value, impact of threats and risks of loss, it was found that the most valuable and threatened types are R11, R1B, R41, and R44
4. The results of distribution, floristic and ecological peculiarities of grassland habitats will be used in the National Atlas of Grassland Habitats of Ukraine and in the development of a draft Strategy for the conservation of grassland habitats in Ukraine.

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