

## **Land degradation assessment in Ukraine within ERAPLANET Geo-Essential project**

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ERA-PLANET project is an effort of EU for reinforcement of EU role in Earth observation via development of European network for observing our changing planet. GEO-Essential strand of ERAPLANET is focused in particular on resource efficiency and environmental management, sustainable development goals (SDG) assessment, relevant indicators calculation and workflows development .

Further more Land Degradation Neutrality is one of the goals selected by UN Convention to Combat Desertification [1]. Within the Sendai Framework corresponding SDG is defined - 15.3.1 “Proportion of land that is degraded over total land area”. The indicator is based on “one out – all out rule” and rely on 3 subindicators (land cover (LC), land productivity dynamics (LPD ) and soil organic carbon stock (SOC)).

Within this paper results of Ukrainian use-case for LDN assessment via indicator 15.3.1 calculation are presented. For the territory of Ukraine several datasets are considered: (i) annual global LC data derived from the ESA CCI-LC (300 m spatial resolution), National LC data are provided by Space Research Institute of Ukraine (SRI) [2, 3]. LPD data are derived from JRC productivity map; SOC data are extracted from SoilGrids system.

Performed analysis showed that global datasets do not correspond to national statistics and surveys. Global LC highly overestimates cropland areas - actually it seems to be a mixture between grassland and cropland areas. Due to low spatial resolution it's not possible to capture transitions of artificial objects and bareland class to any other in reliable way. At the moment SRI has 10 m resolution maps for Ukraine (2016, 2017) and 30 m historical maps (1990, 2000, 2010). SRI plan to continue this activity in coming years.

According to global LDP dataset main agricultural regions have range of negative productivity trends. SRI plans to perform activities on estimation productivity over cropland areas within ERAPLANET Geo-Essential project.

Total area of degraded land according to the methodology of 15.3.1 indicator calculation (based on global data) is 150520 km<sup>2</sup> that results to 0.25 of the territory of Ukraine that could be considered as degraded in 2000-2015 interval. However, in the future it's reasonable to replace global datasets with national ones developed within ERA-PLANET GEO-Essential project.

## References

1. Kussul, N., Kolotii, A., Shelestov, A., Yailymov, B., & Lavreniuk, M. 2017. Land degradation estimation from global and national satellite based datasets within UN program. In *Intelligent Data Acquisition and Advanced Computing Systems: Technology and Applications (IDAACS)*, 2017 9th IEEE International Conference on (Vol. 1, pp. 383-386). IEEE.
2. N. Kussul, M. Lavreniuk, S. Skakun, and A. Shelestov, "Deep Learning Classification of Land Cover and Crop Types Using Remote Sensing Data," *IEEE Geoscience and Remote Sensing Letters*, vol. 14, no. 5, pp. 778-782, 2017.
3. A. Shelestov, M. Lavreniuk, N. Kussul, A. Novikov, and S. Skakun, "Exploring Google Earth Engine Platform for Big Data Processing: Classification of Multi-Temporal Satellite Imagery for Crop Mapping," *Front. Earth Sci.*, vol. 5, no. 17, pp. 1-10, 2017. doi: 10.3389/feart.2017.00017