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QUANTIFICATION OF CROPPING PATTERN AND PRODUCTIVITY OF AGRO-ECOSYSTEMS IN CENTRAL ASIA

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ABSTRACT:

Agricultural production systems in Central Asia have been evolving in response to changes in climate, land use and policies. The cropping pattern and productivities of irrigated and rainfed agro-ecosystems as well as grazing lands are highly variable in both spatial and temporal domains. Accurate and up-to-date information of these production systems on regular intervals (inter- and intra-annual) along with ever changing climate, land use/land cover, its pattern, etc. are important for understanding the food security and sustainability of agro-ecological systems in the region. The present study provides an overview of satellite and in-situ based observations, mapping and modelling of land-use dynamics, coupled with edaphic and climatic factors in dryland production systems. Our efforts highlight recent advances in satellite-based characterization of the agricultural production systems across the scale from fields, basin and the regions. We take advantage of three operational satellite remote sensing systems such as Rapid Eye (5m), Landsat (30m) and MODIS (250-500m). Secondly, the satellite-based Vegetation Photosynthesis Model (VPM) was used to estimate gross and net primary production of croplands, grasslands and tree-based systems. The study also analysed the dynamics of the land degradation to identify prioritization hotspots for intervention and the design of improved adaptation strategy across the scales. Finally, study discusses the role of community remote sensing and citizen science in the participatory monitoring of grasslands and croplands in the dry areas. This is an ongoing study, and initial results show the annual dynamics of the vegetation flux across the study region in response to climate and extreme events. The vegetation trend analysis seems to be providing a clear predictor of the productivity in response to degree of land degradation. The vegetation index, the LSWI is much more sensitive to productivity and droughts than does NDVI and EVI. The resultant data products are also adopted for the design of spatial decision support systems for rural advisory and policy analysis towards climate-smart villages and agriculture.