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IML-CZO: Critical Zone Observatory for Intensively Managed Landscapes

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Intensively managed landscapes, regions of significant land use change, serve as a cradle for economic prosperity. However, the intensity of change is responsible for unintended deterioration of our land and water environments. By understanding present day dynamics in the context of long-term co-evolution of the Critical Zone comprising of the landscape, soil and biota, IML-CZO aims to support the assessment of short- and long-term resilience of the crucial ecological, hydrological and climatic services provided by the Critical Zone. An observational network of three sites in Illinois, Iowa, and Minnesota that capture the geological diversity of the low relief, glaciated, and tile-drained landscape will drive novel scientific and technological advances. IML-CZO will provide leadership in developing the next generation of scientists and practitioners, and informing management strategies aimed at reducing the vulnerability of the system to present and emerging trends in human activities. IML-CZO, one of the nine observatories funded by the United States National Science Foundation (NSF), consists of two core sites: the 3,690- sq. km. Upper Sangamon River Basin in Illinois and 270-sq. km. Clear Creek Watershed in Iowa, along with the 44,000- sq. km. Minnesota River Basin as third participating site. These sites together are characterized by low-relief landscapes with poorly drained soils and represent a broad range of physiographic variations found throughout the glaciated Midwest, and thereby provide an opportunity to advance understanding of the CZO in this important region.

Through novel measurements, analysis and modeling, IML-CZO aims to address the following questions:
• How do different time scales of geologic evolution and anthropogenic influence interact to determine the trajectory of CZ structure and function?
• How is the co-evolution of biota, consisting of both vegetation and microbes, and soil affected due to intensive management?
• How have dynamic patterns of connectivity, which link across transition zones and heterogeneity, changed by anthropogenic impacts?
• How do these changes affect residence times and aggregate fluxes of water, carbon, nutrients, and sediment?

IML-CZO will use historical data, existing observational networks, new instruments, remote sensing, sampling and laboratory analyses, and novel sensing technologies using open hardware and unmanned vehicles to study a number of variables related to climate and weather, hydrology, geology, geomorphology, soils, water chemistry, biogeochemistry, ecology, and land management.

Additional details are available at imlczo.org.