Monitoring flows of energy, matter and information in rural villages in Arusha, Tanzania

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To make breakthroughs on the Sustainable Development Goals (SDG) Labs, we are establishing the ‘Rural Systems Visioneering (RSV)’ SDG Lab in the Arusha region in northern Tanzania. ‘RSV’ SDG Lab will focus on clean water and sanitation (SDG 6), affordable and clean energy (SDG 7), sustainable cities and communities (SDG 11), responsible consumption and production (SDG 12) and life on land (SDG 15) by (1) co-creating innovative sustainability science & technology necessary for the renewable energy-based electrical, climate-smart agricultural, and resilience-based educational fields with the ‘Tanzania-Korea Innovative Energy Technology (IeT) Center’ through cooperation with the local ‘Nelson-Mandela African Institute of Science and Technology and (2) co-growing with rural villages in Arusha through visioneering - a triad of governance, management and monitoring for sustainable rural-urban systems.

To mobilize rural people and villages, the following applications will be supplemented to the already initiated Tanzania-Korea IeT Center: (1) the conceptual framework of ‘self-organizing hierarchical open systems with visioneering’, (2) sustainability education with focuses on nurturing the basic and key competences for sustainability (e.g., systems thinking, normative, strategic, and anticipatory competences), (3) climate-smart agriculture and its quantitative assessment based on biotic/network/thermodynamic indicators by monitoring and modeling energy-matter-information flows in and out of rural systems using (eventually inexpensive) flux measurement, computer modeling and remote sensing, (4) multiagent-based systems analysis for emergent solutions for better productivity and profit for heterogeneous smallholder farmers, and (5) linking the above-mentioned efforts to the rural communities with feedback loops (i.e., guided self-organization process) to create profit, to promote businesses, and to nurture entrepreneurship with stewardship that ensures sustainability.

Our objectives are to introduce our ‘RSV’ SDG Lab initiative, particularly the flux monitoring part to the FLUXNET community and to share critical information and potential resources for collaborations.