EUROPEAN IMMIGRATION FOOD INSECURITY: Lessons from Localized Food System Pathway Modeling and Agroforestry

G. Toth, P.K.R. Nair, T. Reynolds

School of Forest Resources and Conservation and School of Natural Resource Economics; University of Florida

Introduction

- More than 1 million migrants and refugees entered Europe in 2015 and hundreds of thousands more immigrated within Europe (18).
- Rapid urbanization creates potential for “Food Deserts”: poor access to healthy and affordable food which may contribute to social and spatial disparities in diet-related health outcomes (17); likely in low-income, predominately minority areas (18).
- To create a framework for identifying and treating food deserts in the European migration context we combined tools used in: GIS Food System Pathways (FSP) mapping; Agroforestry adoption institutional analysis
- GIS is now being applied to model food insecurity in developing regions (19).
- Agroforestry has developed measures of sustainability for components of agroforestry systems but these cannot be realized without some level of adoption; a primarily sociological decision shaping institutional environment (Fig. 1), the survey-based measurement of which can be used as a proxy for sustainability potential (20).
- Combined this information can guide limited funding to areas with both greatest need and potential for success (20).

Objectives

- Prioritize targets of rural sustainability and peri-urban production efforts
- Strengthen logistical connections between these areas and urban centers
- Examine further relief through homegardens*

Materials & Methods

HYPOTHETICAL STUDY AREA

- Nairobi’s pop. grew 260% from 1980 – 2010; representative of immigration issue (21)
- Nairobi has near largest percentage of high-net-worth individuals in Africa (22), while 80% reside in slums (18); this disparity creates food deserts

METHODS – FSP Mapping

- Use available GIS map for land-use, roads, transportation, and building density (23) (Fig. 2A)
- Develop new layers for segments of local food system (Fig. 2B) to predict insecurity hotspots
- Collect new FSP data for layers using primary sources (e.g. direct observation via GPS) or secondary sources (e.g. remote sensing, aerial photography) (24) (Fig. 2C)
- Create x,y map coordinates for features and associated attribute tables to graphically map evidence of location-specific food insecurity

METHODS – Sustainability Prioritization

- A sense of potential for sustainability can be gained by surmising primary factors identified through agroforestry adoption studies (Table).
- Survey of the policy, cultural, and socioeconomic elements (institutional environment) provide understanding of how drivers of sustainable agriculture are perceived by a community.
- Results can be calibrated against biophysical-sustainability measurements to refine the process and produce acceptable parameters.

Sustainability Potential

- Target optimal FSP locations for enactment of urban/peri-urban agroforestry efforts (i.e. food deserts with high agroforestry adoption potential)
- Target Homegarden initiatives in FSP distant locations to optimize efficient resource use
- Allows determination of actual (vs. theoretical) FSP impediments for long-term planning
- Allows for alleviation of demand on overburdened rural producers
- Increases nutrient variety and availability for urban residents
- Provides supplemental income potential
- Adds value of ecosystem services (e.g. water and air purification, microclimate amelioration, and biodiversity promotion)
- Provides a natural platform for monitoring and evaluating programmatic success

*Homegardens

- Integrated tree – crop – animal production systems, often in small parcels of land surrounding homesteads, especially in highly populated areas dominated with smallholder farming systems. These systems evolved over time under the influence of resource constraints including population pressure and consequent reduction in available land and capital. Hailed as the epitome of sustainability, these integrated systems have the potential to mitigate environmental impacts while providing economic gains, as well as food and nutritional security to owners. Food production is the primary function of homegardens; shade-tolerant food crops that can grow with relatively less care and attention are the dominant species (25).

Figure 1. Schematic presentation of how institutional environment affects smallholder farmer perceptions. Institutional environment, which is the nexus of policy, culture, and socioeconomic conditions, affects farmers’ perception (dotted arrows) of factors influencing adoption of sustainable agriculture (solid arrow) such as financial ability and incentives, benefits of biodiversity and ecosystem services, and their relationships to well-being (20).

Figure 2. A) Nairobi Kenya Current Land Use (B) Nairobi Kenya Example FSP Data Overlay

- Results can be calibrated against biophysical-sustainability measurements to refine the process and produce acceptable parameters.

Expectation: Model framework provides a timely inquiry into problem of urban food insecurity applicable to various urbanization scenarios.

References

- Ajayi OC et al. (2006) Adoption, profitability, impacts and scaling-up of agroforestry technologies in Southern Nigeria: A sense of potential for sustainability represented by stated policies but in perceptions (good/bad, disconnected) is common). Often quantified on a Likert scale using ordinal measures.
- Liu J et al. (2008) Environmental and social impacts of food deserts: Caused by lack of food access in low-income, predominately minority areas. (17); likely in low-income, predominately minority areas (18).
- PC (2000) Toward a coherent theory of environmentally significant behavior.
- Pattanayak SK et al. (2002) Taking stock of agroforestry adoption studies. (18); likely in low-income, predominately minority areas (18).
- Place F et al. (2012) Improved information, communication, and technology can guide limited funding to areas with both greatest need and potential for success (20).
- Stern norm plasticity. (20)
- Critical to understanding of how drivers of sustainable agriculture are perceived by a community
- Policy, culture, and socioeconomic conditions, affect farmers’ perception (dotted arrows) of factors influencing adoption of sustainable agriculture (solid arrow) such as financial ability and incentives, benefits of biodiversity and ecosystem services, and their relationships to well-being (20).

Figure 1. Schematic presentation of how institutional environment affects smallholder farmer perceptions. Institutional environment, which is the nexus of policy, culture, and socioeconomic conditions, affects farmers’ perception (dotted arrows) of factors influencing adoption of sustainable agriculture (solid arrow) such as financial ability and incentives, benefits of biodiversity and ecosystem services, and their relationships to well-being (20).

Figure 2. A) Nairobi Kenya Current Land Use (B) Nairobi Kenya Example FSP Data Overlay

- Results can be calibrated against biophysical-sustainability measurements to refine the process and produce acceptable parameters.

Expectation: Model framework provides a timely inquiry into problem of urban food insecurity applicable to various urbanization scenarios.

References

- Ajayi OC et al. (2006) Adoption, profitability, impacts and scaling-up of agroforestry technologies in Southern Nigeria: A sense of potential for sustainability represented by stated policies but in perceptions (good/bad, disconnected) is common). Often quantified on a Likert scale using ordinal measures.
- Liu J et al. (2008) Environmental and social impacts of food deserts: Caused by lack of food access in low-income, predominately minority areas. (17); likely in low-income, predominately minority areas (18).
- PC (2000) Toward a coherent theory of environmentally significant behavior.
- Pattanayak SK et al. (2002) Taking stock of agroforestry adoption studies. (18); likely in low-income, predominately minority areas (18).
- Place F et al. (2012) Improved information, communication, and technology can guide limited funding to areas with both greatest need and potential for success (20).
- Stern norm plasticity. (20)
- Critical to understanding of how drivers of sustainable agriculture are perceived by a community
- Policy, culture, and socioeconomic conditions, affect farmers’ perception (dotted arrows) of factors influencing adoption of sustainable agriculture (solid arrow) such as financial ability and incentives, benefits of biodiversity and ecosystem services, and their relationships to well-being (20).

Figure 1. Schematic presentation of how institutional environment affects smallholder farmer perceptions. Institutional environment, which is the nexus of policy, culture, and socioeconomic conditions, affects farmers’ perception (dotted arrows) of factors influencing adoption of sustainable agriculture (solid arrow) such as financial ability and incentives, benefits of biodiversity and ecosystem services, and their relationships to well-being (20).

Figure 2. A) Nairobi Kenya Current Land Use (B) Nairobi Kenya Example FSP Data Overlay

- Results can be calibrated against biophysical-sustainability measurements to refine the process and produce acceptable parameters.

Expectation: Model framework provides a timely inquiry into problem of urban food insecurity applicable to various urbanization scenarios.