

Chapter 22

Human Overpopulation and Food Security: Challenges for the Agriculture Sustainability

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ABSTRACT

World population is rapidly growing and expected to reach in between 8.5 to 12 billion by 2100. More than 75% of the population is expected to inhabit in the African and Asian countries having most of the developing nations. The overpopulation leads to a state of food insecurity that induced the evolution of resource-exhaustive agriculture causing irreparable environmental damages. Now the challenge is to feed more with less environmental damages. Adoption of technologically-sound, traditional knowledge inclusive, socio-economically sensible recommended agricultural practices can be the basis for achieving future dietary demands. However, before wider recommendation, their environmental impact assessment at various sustainability issues is necessitated for a holistic understanding of the future agriculture. The challenges of overpopulation and food security can only be managed by identifying the core areas of research and development under different agricultural sectors. The present chapter will provide a brief dimension on some of these key issues.

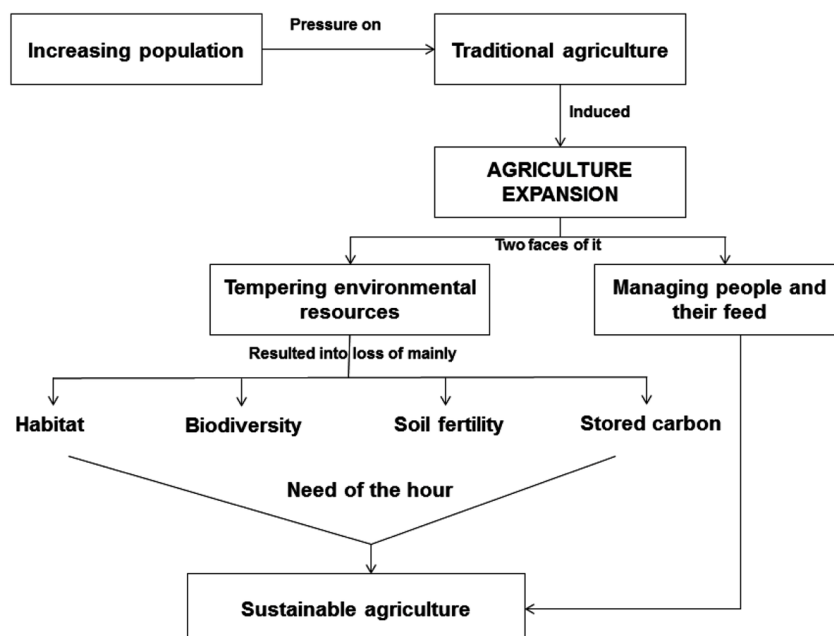
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INTRODUCTION

Agriculture is the oldest way where humans interact with natural systems for crop and livestock production by alteration of natural resources (land, water, nutrients, biomass and energy) for their well-being (Dale et al., 2013). It is the world's largest industry occupying about 38% (including cropland and pasture land) of the Earth's terrestrial surface (Robertson & Swinton, 2005; Ramankutty et al., 2008; FAOSTAT, 2011; Foley et al., 2011). In addition, it utilizes about 70% of global water withdrawals from freshwater bodies (FAO, 2011). It involves various interrelated activities like land management, settlement patterns, crop selection and livestock production throughout its span (Dale et al., 2013). It supports basic human needs and is governed by human activities (Figure 1) (Robertson & Swinton, 2005). For example, the interrelationship of human and agriculture can be visualized by the present growth of human population (during Industrial Revolution, 1750) followed by increased agricultural production (during Green Revolution, 1950) (Eikelboom, 2013). The present human population of more than seven billion is impending pressure on the capacity of agriculture to fulfil the food requirements without compromising the natural resources for their ability to nourish future generations (Robertson & Swinton, 2005). Moreover, the relative increase in urban population (about 55% of total population) is of more concern in this regard (Figure 2) (Eikelboom, 2013; Milder et al., 2014). A 2/3rd increase in urban population is expected by the year 2025 (Hamlett, 2011; Eikelboom, 2013). It would cause a pressure on agriculture due to mass transition from producer to consumer category, thus loss of agricultural workforce and production. It may have severe consequences as the present overpopulated world is already facing twin challenges of food security and environmental degradation.

The environmental degradation has been regarded as the prime cause of collapses of several past civilizations (Ehrlich & Ehrlich, 2013). Therefore, to satisfy the basic demands (food, fibre and fuel) of

Figure 1. General overview of the population growth, agriculture and its imperative effects



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