

Sustainable Intensification in Agriculture

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**Anshuman Varma
Knowledge Management Coordinator
CAPSA-UNESCAP**

Background – Threat to Food Security

- **Demand for food** is ever increasing - Global population is expected to increase to 9 billion by 2050
- Production in developing countries must almost **double by 2050** to feed everyone
- **Other factors** affecting food security
 - Higher incomes levels
 - Changes in dietary patterns (more varied, resource-intensive diets)
 - Limits to arable land (v/s requirements for industry, forests etc.)
 - Increased competition for water, energy
 - Changing climate

What is Sustainable Intensification (SI)?

A new and still evolving concept

*Sustainable crop production intensification provides opportunities for **optimizing crop production per unit area**, taking into consideration the range of **sustainability aspects** including potential and/or real social, political, economic and environmental impacts (FAO)*

What is SI?

Other perspectives

Increase in food production from existing farmland in ways that place far less pressure on the environment and that do not undermine our capacity to continue producing food in the future (Garnett et. al.)

Producing more output from the same area of land while reducing the negative environmental impacts and at the same time increasing contributions to natural capital and the flow of environmental services (Jules Pretty)

Terminology

- **Conventional intensification:** Relatively straightforward, can be characterized as business-as-usual though there is little empirical support that this can meet productivity and environmental sustainability targets
- **Sustainable intensification:** Productivity increases while protecting the natural resource base (connotations range from industrial agriculture to conservation agriculture)
- **Ecological intensification:** Current usage emphasizes agricultural practices inspired by or which mimic, nature (organic agriculture)

Four premises of SI

- Need to **increase production**
- Increased production must be met through **higher yields** because increasing the area of land in agriculture carries major environmental costs or risk of GHG emissions
- Food security requires as much attention to increasing **environmental sustainability** as to raising productivity
- SI **denotes a goal** but does not specify how it should be attained or which agricultural techniques to deploy

Criticism of SI

- Perceived **dichotomy** between 'intensification ' and 'sustainable'
- Not an 'aspiration', but a description of **practices already in place**, endorsed by some interest groups
- Perceived focus on **increasing production** rather than options to manage demand (control food waste etc.)

→ Overall, SI can be regarded as a (pragmatic) **intellectual framework** to frame questions on sustainable agriculture

Some production practices relating to SI

- IPM
- Conservation farming
- Genetically diverse portfolio of improved crop varieties
- Low external input and sustainable agriculture (LEISA)
- Organic agriculture
- Precision agriculture
- Diversification of production as well as on-farm processes/activities

Examples of SI production practices from SATNET study tours

- Four study tours organized in Southeast and South Asia (Thailand, Cambodia, Nepal, India)
- Objectives:
 - To **expose smallholders to good practices** and technologies for sustainable agriculture
 - Support dissemination and adoption of these practices in their own communities
- Focus areas: crop production technologies, Integrated Pest Management (IPM), climate resilience, and post-harvest

Examples of SI production practices from SATNET study tours



Integrated Crop Production and Aquaculture (Cambodia)



Vegetable Production in Bag (Cambodia)



Simple Pest Control on Bean (Cambodia)



Off season Lemon Cultivation (Thailand)

Examples of SI production practices from SATNET study tours



Floating Vegetable Gardens (India)



Off-season Tomato Cultivation (Nepal)



Low-cost Vermicompost Pit (India)



Aquaponics and Vegetable Cultivation (Nepal)

Promoting SI: What influences farmer investment in Sustainable Agricultural Practices (SAPs)

Study from rural Tanzania:

- Rainfall, insects, disease shocks
- Household assets
- Tenure status of plot, social capital , plot location and size
- Government effectiveness in provision of extension services

>> Policies that target SAPs and are aimed at **organizing farmers** into associations, improving **land tenure security**, and **enhancing skills** of civil servants can increase uptake of SAPs in smallholder systems.

SI and Climate Smart Agriculture (CSA)

- SI and CSA are **both crucial** for global food and nutritional security
- Both approaches are **complementary**
 - SI is an essential means of adapting to climate change, also resulting in **lower emissions per unit** of output
 - CSA emphasizes **improving risk management**, information flows and local institutions to support adaptive capacity → provides foundations for incentivizing and enabling intensification
- SI and CSA should both be part of a **multi-pronged approach** to food security

Role of SI in Sustainable Food Security

- SI is **only part** of what is needed to achieve sustainable food security rather than an all-encompassing solution
- SI should be seen as part of a **multipronged strategy**
- Apart from changes in production, equally radical agendas required to reduce resource-intensive **consumption and food loss & waste**, and to improve governance, efficiency, and resilience

Policy Support to SI for Sustainable Food Security

- Policies and institutions must **increase synergies** between poverty reduction, agricultural production and environmental sustainability.
 - A **host of factors** condition poverty-environment interactions and outcomes in relation to agriculture
 - Macro policy has **diverse impacts on different groups** of poor, people, the environments they use and their scope for positive adaptation
 - **Context-specific approach** required

Policy Support to SI for Sustainable Food Security

- Policies should **internalize all costs and benefits in prices** of production inputs (eg. improving pricing mechanisms for irrigation water), facilitating land market development, eliminating distorting taxes and subsidies on agrochemical inputs
 - Input subsidies encourage excessive use
 - **electricity or fuel subsidies** can encourage groundwater depletion
 - **fertilizer subsidies** can adversely affect soil health and environment
 - **fuel or machinery subsidies** can discourage conservation tillage

Policy Support to SI for Sustainable Food Security

- **Secure property rights** and other policies required for offering farmers incentives for investing in resource management, as well as access to yield-increasing and resource-conserving technologies
 - Important for long term investments and asset building by farmers

Key takeaway:

- It's not about definitions but finding the right approach in context of a given location or situation → Intensification requires contextualization

Thank you!

Some Key References

- Campbell, et al. (2014)
- Garnett et al. (2013)
- Kuyper, T. W. and P. C. Struik (2014)
- Pretty_DFID (2004)