

PROSPECTS OF SUSTAINABLE AGRICULTURE FOR DEVELOPING COUNTRIES

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Agriculture is perhaps the most outstanding issue and challenge for sustainability. To attain the 'sustainable development' goal requires urgent actions on three fronts - the ecological, the social and the economic. There is a looming crisis and possible calamity developing in this all-important sector that must be urgently addressed, as it impacts on the livelihoods of most of the world's people and everyone else's food needs.

In the past, agriculture, forestry, and infrastructure in developing countries often have had negative impacts on the environment. It is estimated that in the next 20 years, farmers in developing countries will have to nearly double their productivity to provide sufficient food for a healthy and active population. This will require effective management of natural resources for agriculture and an understanding of the patterns and processes that influence resource availability. If not, we may do irreversible harm to the ecosystem and threaten the long-term economic viability of many countries.

Agriculture is facing three major problems and choices:

- Ecology/Technology: Which technology to base the future of world agriculture on? As the chemical-based model is faltering, the private sector and global establishment are looking to genetic engineering as the way ahead. But all the signs are that ecological farming is superior, not only for the environment, but also for gains in productivity and farmers' incomes. It has not been given the chance to prove itself. It should be.

- The global economic framework: The economic environment has turned extremely bad for developing countries' small farmers. International Monetary Fund (IMF)-World Bank structural adjustment has put pressure on poor countries to liberalise food imports and abandon subsidies and government marketing boards. The World Trade Organization (WTO) Agreement on Agriculture (AoA) enables rich countries to raise their subsidies and set up astonishingly high tariffs, while punishing developing countries (which cannot increase their subsidies, and which have to liberalise their imports further). Commodity prices have slumped. These three factors are threatening the survival of developing countries' farms and farmers. The entire framework of global and national economic policies for agriculture has to be thoroughly revamped.

- Land for the farmers: Many small farmers are poor and some are becoming poorer. A main reason is unequal land distribution, where small farmers have little land security or access and lose a large part of their income to landowners. Land reform is urgently required and landless farmers are fighting for their rights. But the landowners in most countries have political clout and are resisting change.

All three issues have to be resolved, and in an integrated way, if sustainable agriculture is to be realised. Otherwise there will be an absolute catastrophe, especially if the wrong choices are made.

Sustainable agriculture in the context of development efforts has to meet production efficiency, sensitivity of ecosystems, appropriate technology, maintenance of the environment, cultural diversity and satisfaction of the basic needs. The green revolution increased significantly the productivity in developing countries, but it had also several negative ecological consequences such as depletion of lands, decline soil fertility, soil salinisation, soil erosion, deterioration of environment, health hazards, poor sustainability of agricultural lands and degradation of biodiversity.

Today agricultural research seeks new management strategies and technologies to reorient the current and future needs and constraints. The new options should be productive and cost-effective, but furthermore must be particularly ecologically sustainable. Precision Farming identifies the critical factors in production systems by determining the limiting and controllable components. The components often decrease yields and system efficiency because of their spatial variability. The variations occurring in crop or soil properties within a field are noted or measured and mapped. Management actions within PF are then taken as a consequence of this assessment of the spatial variability within that field. Development of geomatics technology in the later part of the 20th century has aided in the adoption of site-specific management systems using remote sensing, global positioning systems and geographical information system. This approach is also called site specific management. Site specific management of spatial variability of a farm is developed to optimise crop

production and to minimise environmental pollution and degradation, leading to a more sustainable development in general.

In the present context, maintenance of ecological balances through precise and site-specific management is highly desirable. The concept of Precision Farming may be appropriate to solve these problems, though it looks unsuitable to many local conditions. Agriculture in developing countries is often characterised by low usage and support for technologies. Precision Farming being a management approach not just a technology can equally be applied to developing countries as well as developed countries, but the implementation is different. If technology is needed they should be used to complement the traditional methods for enhancing productivity and quality, rather than to replace the local conventional methods.

Sustainable agriculture demands new efforts in research, development, and implementation. Dedicated stewardship is the first step toward sustainable agriculture. There must be a commitment at the highest levels of government, and this must be coupled with an action program that addresses the needs of farmers in the context of the environment.