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## Sustainability criteria for food security

India today continues to witness both protests and suicides by farmers. These appear to be the only ways to confront rural agrarian distress by a majority of farmers, facing unviable agricultural livelihoods and unsustainable futures, despite their best efforts to manage climate change, as reflected in the vagaries of the monsoon, and unpredictable markets. While for the first, scientific solutions can be found, price volatility and market instability are increasingly shaped by political decisions and policies linked to global trade and industry. The immediate responses to both farmer suicides and protests have been farm loan waivers. These are, however, short-term measures, and do not address the longer-term sustainability of the farm sector. Here, we propose six key principles for ensuring sustainability in relation to food and nutrition security.

The year 2015 marked the transition from the UN Millennium Development Goals (MDGs) to the Sustainable Development Goals (SDGs). Known popularly as the Global Goals, SDGs are a 'universal call to action to end poverty, protect the planet and ensure that all people enjoy peace and prosperity' (<http://www.undp.org/content/undp/en/home/sustainable-development-goals.html>). The 17 goals, with 169 targets, while building on the successes of the MDGs, include new areas such as climate change, economic inequality, innovation, sustainable consumption, peace and justice, among other priorities. While the goals are clearly interconnected, without transparent and reliable measures of the cross-cutting principles underlying them, actions are once again likely to be fragmented and sector-specific, not taking account of the larger, cumulative effects. More so, given that we are in the Anthropocene era, wherein human action or inaction plays a critical role in shaping outcomes. While the principles we outline below are applicable across the Global Goals, we illustrate these with examples focusing specifically on Goal 2, namely 'end hunger, achieve food security and improved nutrition and promote sustainable agriculture'. There are at least six major principles – ecology, economics, energy, equity, employment and ethics – and groups of action needed for sustainable development, and we discuss each of them briefly.

First, ecological and environmental factors, which have a bearing in harmonizing the long and the short term in a mutually reinforcing manner, are central to sustainable development. In the area of ecology, we need to promote the concept of 'do ecology' rather than only suggest what should not be done (don't ecology). 'Don't ecology' can

be done through ordinances and legislative action, a ban on plastics, for instance, but unless alternatives are provided, the problem will persist. On the other hand, 'do ecology' requires research and development to identify viable options; it also involves education, social mobilization and essential regulation. If we take the need to improve soil fertility, for example, in order to improve agricultural production and productivity, one method is to use more fertilizers and pesticides. The other method is to actively encourage the development of biofertilizers, vermiculture, biopesticides and cereal – legume crop rotation, which can achieve the same purpose in an ecologically sustainable manner.

Several examples can be provided, but the key point is that for every problem there are multiple solutions; hence it becomes essential to examine them from an ecological lens. Rigorous environmental impact assessments are required for analysing the ecological risks of any new intervention, taking account of socio-economic costs and benefits as well. These need to move beyond being seen as merely bureaucratic approvals, but rather as actions with lasting impacts on human beings. In this sense, they are positive ecological development tools, helping to find ecologically sound alternatives to development problems.

The second area is ecologically sound economics. While economics seeks to enhance short-term gains, ecological economics has a time dimension of infinity. Today, subsidies are being given in a wide range of development programmes, including to the farm sector, such as the waiving of farm loans, and provision of free electricity for groundwater extraction. While in the short term, over-exploitation of groundwater can enable an increase in yield, a shift from one to two crops a year, in the long run it will result in the depletion of water in the aquifer. By encouraging over-exploitation of a natural resource through the provision of free electricity, one may be heading towards ecological suicide in the future. It could instead be useful to subsidize the use of solar, wind, hydro and other forms of renewable energy. Ultimately, major changes take place through the interaction between technology, public policy and people's participation, and ecological economics can contribute towards the generation of sustainable policies, technologies and opportunities.

The third factor is energy, central to human life and well-being. Apart from the sources of renewable energy mentioned above, biogas (from animals) and biomass

(from crops) utilization are important sources of energy that have received inadequate attention. It is well established that biomass-based energy is cheaper than electricity; every farm can therefore have biogas production and a few trees to fix nitrogen both in the soil and atmosphere. At the same time, each crop's biomass can be fully utilized, not just the grain or straw.

Further, every activity needs energy; so we also need to consider human energy and how it is distributed, when developing a concept of sustainable energy. While tools and equipment often help save male energy, many of the tasks done by women continue to involve drudgery, and are both effort- and energy-intensive. In fact, if we recognize that nutritional status depends not just on diets and consumption, but on the claims on this energy through the activities one engages in, then there is a clear case for conserving human energy, especially amongst the poorest and most marginalized, often women.

This brings us to the fourth principle of social and gender equity, which has to be integral to the planning of all programmes and action interventions; it cannot be added on as an afterthought. One needs particularly to be aware of the intersections of economic, social and gender disadvantage. For example, if the new seeds, which led to the green revolution in the 1960s, were not available to all farmers irrespective of their size of holding, the green revolution would not have taken place within a few years. Yet, the consequences for women were mixed, given their differential access to land, labour and money. In fact, the lack of adoption of many new technologies is not because these are inherently flawed, but because they do not address the key needs, priorities and issues confronting the 'target' populations. With many rural men now migrating for survival in India, agricultural work is feminised, yet women lack access to resources and institutions such as child-care and health-care services, which can free up time from domestic and care responsibilities; membership in agricultural cooperatives and farmers groups which can enhance access to information, amongst others, that can enable them to adopt new technologies and enhance production. The demand for recognizing women as farmers in their own right and securing their entitlements is hence rising.

Across the world, there is discussion today of equality and diversity. While important from the lens of social justice, it is equally important for bringing on board diverse perspectives and knowledges, as these have the potential to improve understanding of global problems in innovative, holistic and nuanced ways. In its absence, policies will remain partial and flawed, creating winners and losers, and contributing to growing unrest and violence. Young people have aspirations to build and lead a good life; yet when they are thwarted in their efforts due to their social positioning as rural, or poor, or from a lower caste, they become resentful and seek justice through whatever means at their command. Technical solutions do exist for most of our problems today, but without placing social and gender equity at the centre of all our programmes, we are unlikely to make progress in achieving the Global Goals.

The fifth area of employment is the key to provide meaning to life. Jobless growth is joyless growth; therefore, every attention should be paid to providing both reliable and remunerative opportunities to all members of the human family – women and men. Employment, however, should not only involve physical or manual work. Knowledge and technology-based employment will help promote innovations and attract youth who are looking for outlets for their creativity and energy. Within agriculture, this implies not just mechanization, which can potentially reduce chances of employment, but engagement with new technologies and skills such as in breeding, developing ecological options (including bio-fertilizers and biopesticides), and so on.

The final principle, often overlooked, refers to ethics as an important component of sustainable development. Ethics is particularly important in deciding on the choice of new technologies. Patenting, for instance, can enrich the inventor of the patent; yet it can impede access to resource-poor and women farmers. In the case of basic crops, or basic vaccines, universal rights are often more important than individual inventions, and there will have to be mechanisms in place to ensure this. Yet if innovations need incentives, then collectives or Trusts need to be created to purchase these patents and make them available to the farmers. Their free availability will encourage pre-breeding and participatory breeding, wherein farmers are no longer dependent on the institution for seeds. Technologies which are likely to promote unemployment and the degeneration of natural resources should be avoided. Controversial issues such as genetically modified foods should be discussed in a transparent manner having human nutrition, health and well-being as the basic goals.

Sustainable development, especially for achieving the goal of food security, then involves concurrent attention to ecology, economics, energy, equity, employment and ethics. These principles should be asked of any intervention, across sectors, if sustainable development is to become a reality rather than a desirable objective. In all cases, whether in agriculture or other sectors, measurement tools must be both efficient and affordable, and able to highlight the trade-offs involved in particular choices. A decentralized and context-specific approach, which is both multi-disciplinary and multi-institutional, and is based on these key principles, is essential for achieving sustainability. Ad hoc solutions and generalized procedures will no longer work. Within agriculture such an approach has been termed 'evergreen revolution', which implies productivity improvement in perpetuity without ecological and social harm.

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