# TST Issues Brief: Sustainable Agriculture[1]

## I. Stocktaking

While significant progress has been made towards achieving the MDGs, critical environmental, social, economic and institutional challenges are still to be overcome. Two crucial connected challenges are: i) the persistently high levels of hunger and malnutrition (870 million people in 2010-2012 [FAO, 2012a]) and– particularly in the rural areas of many developing countries – only slowly declining rates of poverty; and ii) an unsustainable and increasing burden of human activities on the earth's carrying capacity. Greenhouse gas emissions (GHG), biodiversity loss, nitrogen and phosphorus overuse and ocean acidification have reached alarming levels. These, coupled with the decreasing availability of fresh water and increased land degradation and deforestation, as well as inadequate policies to respond to these issues, are undermining the livelihoods of ever growing numbers of people, especially those who live in extreme poverty.

These challenges are further exacerbated by the continuous growth of the world population. It has already surpassed the 7 billion mark and will grow to over 9 billion by the middle of this century. To meet the food demand of 9 billion people will require an increase in agricultural output of about 60 per cent (Alexandratos and Bruinsma, 2012) or a decline in food loss and waste. Increased food production will be a huge challenge, which will place ever-greater pressures on all natural resources, including scarce agricultural land, forests, water and the climate. Indeed, a number of influential studies have suggested that agriculture may not be able to produce the required food needed in order to sustain the growing world population with a healthy and active life (e.g. Foresight, 2011; HLPE, 2011; FAO, 2012b).

At the same time, agriculture broadly understood – including crop and livestock production, fisheries, and forestry – provides income, jobs, food, and other goods and services, to the majority of people now living in poverty. As a result, across countries overall GDP growth originating in agriculture is, on average, at least twice as effective in reducing poverty as growth generated in non-agricultural sectors, five times more effective than other sectors in resource-poor low-income countries (excluding sub-Saharan Africa), and 11 times more effective than other sectors in sub-Saharan Africa (FAO, 2012a). So going forward, agriculture needs not only to provide adequate nutritious food, income, and decent jobs, but also address a host of environmental challenges. To respond to these multiple challenges, there is need to shift to more sustainable forms of agriculture and to introduce comprehensive policies that support this shift.

The Green Revolution, based principally on a package of improved seeds, chemical inputs and irrigation, and supported by measures to strengthen agricultural policies and institutions, resulted in major increases in productivity and production of staple crops in a number of countries, especially in Asia. Arguably, the intensification of food production under the Green Revolution also did much to preserve fragile, marginal, and forest lands that would otherwise have been cultivated for food crops more extensively (Stevenson *et al*, 2011). Real per capita incomes almost doubled in Asia between 1970 and 1995, and poverty declined from nearly three out of every five Asians in 1975 to less than one in three by 1995. Much of this decline is attributable to agricultural growth – particularly in

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smallholder farming systems, with accompanying declines in food prices and rising rural incomes. At the same time, it has been associated with high levels of energy use; and in many areas over-use of agro-chemicals and reliance on intensive mono-cropping has resulted in environmental degradation, including unsustainable use of water and high levels of fertilizer run-off, pesticide impacts, loss of agro-biodiversity, soil contamination and land degradation. Thus agricultural intensification has been at the same time both a saviour and a threat, illustrating the importance of mainstreaming sustainability into a new intensification agenda.

Overall, over the past half-century, intensive agriculture has increased global food production and enabled higher average per capita food consumption in many parts of the world – even if in recent years rates of productivity growth have declined. At the same time, in other parts of the world agriculture has continued to perform below its potential due to low levels of use of external inputs. This is true in many parts of Africa in particular where, with some important exceptions, agricultural productivity has shown only little or no growth. Low rates of agricultural growth combined with high rates of population growth mean that many African countries have gone from being net food exporters to become net food importers.

Agriculture is, by its very nature, a major user of natural resources, although in different ways and to different extents depending on farming system. Thus livestock is the world's largest user of land resources, using almost 80 per cent of all agricultural land; while globally, some 70 per cent of the water used is consumed by the agriculture sector (Kabat, 2013). Of greater concern is the fact that some agricultural systems are drivers of environmental degradation and loss of biodiversity (FAO, 2009; IAASTD, 2009, UNEP, 2010). Over 60 per cent of the world's major ecosystem goods and services are being degraded or used unsustainably (MEA, 2005), while the genetic diversity of crops, breeds, trees and aquatic resources on which agriculture depends is at severe risk: this owing to global environmental change as well as the loss of knowledge associated with agricultural practices based on local varieties. Today, three crops only – wheat, maize and rice – supply more than half of humanity's calories. In addition, agriculture and land-use change (mostly bringing forest land under cultivation) is a major source of greenhouse gases, producing between a quarter and a third of all emissions; and more than any other sector, agriculture is already adversely affected by unpredictable and extreme effects of climate change. In the future, higher average temperatures are expected to reduce yield levels, particularly in the developing world; while increasingly unreliable weather conditions will likely undermine productivity growth everywhere.

At the same time, roughly one-third of food produced – 1.3 billion tonnes per year – is lost or wasted globally (FAO, 2011b). Food is lost or wasted throughout the supply chain, from initial agricultural production down to final consumption. In medium- and high-income countries there are high levels of food waste at the consumption stage. In low-income countries, by contrast, food is lost mostly on-farm – due to pests or lack of effective storage – or in transportation and processing. While increasing food production is vital to meet the future increase in final demand, food availability can also be increased and the environmental costs of agriculture production reduced by reducing the amounts of food lost and wasted.

The challenges facing agriculture – crop, livestock, fisheries and forestry – over the coming decades are complex. To meet the growing demand for food, feed, fuel and fibre, agricultural systems need to become more productive and less wasteful. They need to provide decent incomes for farmers, including the landless and waged agricultural workers, and create employment in the rural areas that respects labour standards. They must be more efficient and more sustainable, in terms of their use of, and effects on, the natural resource base. They need to be more resilient to shocks and changes, better able to withstand increased climatic shocks and rising temperatures. They have to reduce their levels of GHG emissions. They also have to provide other important ecosystem services, such as water provision, pollination, flood and disease control and maintenance of soil fertility. They need to reduce their dependence on fossil fuels: sustainable agriculture necessarily relies on clean, green, renewable energy and increased energy efficiency. And finally, less produce must be wasted

or lost post-harvest. All of these challenges require that food and agricultural systems are made more sustainable, not only from an economic perspective but also from environmental, social and institutional perspectives and at various scales, from the local to the global level.

This requires a consistent focus on production systems that draw more effectively on production ecology principles to improve their productivity and efficiency while reducing their negative environmental and social impacts. Sustainable agricultural systems are likely to be associated with a more targeted use of external inputs, a more integrated approach to managing natural resources, and more analysis at the landscape/eco-system level together with better management of ecosystem services. They are based on ecosystem approaches that conserve, manage and enhance natural resources and take advantage of the natural biological inputs and processes such as soil organic matter, natural predators of pests and pollination. These systems can reduce the negative impacts of agriculture on the environment and enrich the natural capital and the flow of ecosystem services, thereby contributing to increasing resilience of not only production systems but also of social organization.

Increased levels of investment in agricultural research are essential to develop appropriate technologies and practices. Biodiversity will even be more important in future, providing crop varieties and breeding stock that enable farmers, pastoralists and fisher folk to adapt to changing production and environmental and climatic conditions; and enhanced investment in conserving, using and developing genetic resources for food and agriculture and the ecosystem services they provide, will be crucial.

An associated set of requirements are consistent policies and prices that provide incentives to farmers and agribusinesses to adopt sustainable technologies and practices, and to discontinue unsustainable ones. So too are stronger institutional capacities to promote and implement such policies, and effective accountability mechanisms to monitor outcomes. Financial support to facilitate the transition towards sustainable practices may also be important in many contexts. Sustainable agricultural practices based on agro-ecological intensification are likely to be highly context-specific, and this requires recognition of relevant local and indigenous knowledge systems and practices in the development of technological solutions. Improved access and more secure rights to land and other productive resources for poor rural populations, as well as tenure arrangements that offer incentives for investment in the land, are preconditions for a move towards more sustainable practices. So too is capacity development for small-scale farmers – women and men alike – to enable them to increase their productivity, sustainability, and resilience.

A key observation of the 2009 International Assessment on Agricultural Science and Technology for Development (IAASTD) is that “agriculture operates within complex social, economic and environmental systems and so should be seen as multifunctional in its nature”. Agriculture’s multiple roles – which encompass not only food production systems but also issues such as social organization, issues related to access to land, resources and local markets, the continuum between rural and peri-urban environments, cultural identities and local and indigenous knowledge and sustainable tourism – call for an integrated approach to agriculture and food security. It also points to the need to involve multiple stakeholders in the process of ‘rethinking’ and re-designing our current approach to agriculture and food production. Multistakeholder dialogues must be promoted, involving food producing companies, representatives of civil society, representative of consortia for agricultural research, UN organizations, Governments and private companies involved in potentially controversial issues such as the use of genetically-modified organisms in food production, agricultural trade, and, more recently, biofuels.

Worldwide, there are already numerous examples of sustainable agriculture practices/approaches that have been taken to scale: e.g. crop rotation, conservation tillage, systems of rice intensification, integrated pest management, agro-forestry, integrated plant nutrient management, integrated crop

and fish/livestock systems, soil and water conservation measures. Equally there are many examples of policies that promote sustainable agriculture, or that work contrary to sustainable agriculture.

It is therefore time to rethink the roles of agriculture, forestry and fisheries in a sustainable development agenda. Though many may disagree on specific agricultural development strategies or technology solutions, a consensus seems to be emerging on objectives. Moving forward could build on existing commitments, including those contained in the outcome document from Rio+20 ("The future we want"), which: "*reaffirm[s] the necessity to promote, enhance and support more sustainable agriculture… that improves food security, eradicates hunger and is economically viable, while conserving land, water, plant and animal genetic resources, biodiversity and ecosystems and enhancing resilience to climate change and natural disasters*" (para.111). Indeed, much guidance was presented already in "Agenda 21", the outcome of the Rio Earth Summit of 1992, in which nations acknowledged: "*Major adjustments are needed in agricultural, environmental and macroeconomic policy, at both national and international levels, in developed as well as developing countries, to create the conditions for sustainable agriculture and rural development (SARD). The major objective of SARD is to increase food production in a sustainable way and enhance food security.*" That this statement is still true 21 years later indicates the scale of the challenge. But it is a challenge that we cannot afford to postpone any further.

## II. Overview of proposals

To address the challenges just presented, a number of attempts have been made by various actors to define objectives or priority areas for action. These broadly include the following:

- Increase agricultural productivity, close yield gaps, achieve maximum sustainable yield in farms and fisheries, and improve efficiency of resource use – e.g. more crop per kg of nutrients, more crop per drop of water, more crop per unit of energy, higher productivity per unit labour
- Increase incomes for agricultural households and decent rural employment opportunities
- Nurture healthy, sustainable and productive ecosystems and support integrated evidence-based planning and management of land and natural resources to reduce deforestation, land degradation, biodiversity loss, and the carbon footprint of agriculture and food systems
- Increase supply, nutritional value and safety, availability and distribution of food through support to diversified, gender and nutrition-sensitive, human rights-based, sustainable food systems
- Increase value addition of primary commodities and develop inclusive agri-food value chains, which reduce post-harvest losses and waste and ensure that agricultural commodity prices reflect social and environmental costs
- Make food production systems more resilient to shocks and changes, Promote food security concerns in trade regimes and trade policies, and Revisit agricultural policies to promote local and regional agricultural markets
- Recognize indigenous and local knowledge in the design and implementation of national and regional agricultural policies.

A comprehensive sustainable agriculture agenda will encompass all these areas, and its implementation will require incentives and other measures to achieve change in the behaviour of all the actors involved in the agriculture and food sector. Such measures may aim to:

- Facilitate participation of a wide range of stakeholders in an inclusive manner in identifying and designing measures to achieve more sustainable agriculture and food systems
- Promote secure, equitable, and long-term land tenure arrangements, particularly for women, to create incentives for (and de-risk) responsible agricultural investment

- Improve mechanisms and incentives for technology sharing
- Strengthen provision of public goods in support of sustainable agriculture
- Strengthen sustainability considerations and incentives in public planning, especially for hard (physical), natural (ecosystem) and soft (policy, regulation) infrastructure investments
- Build robust knowledge and improve monitoring, early detection and forecasting in agriculture, including through increased use of space-derived geospatial data, for informed decision-making on aspects related to yield prediction, weather forecasting, biodiversity, fisheries, water availability and environmental impacts of agricultural land management.
- Adopt an integrated approach to natural resource management, including consideration of the food-energy-water nexus, through cross-sector decision-making mechanisms
- Support sustainable consumption and production through market development, including use of international standards and certification as well as policy and regulatory measures, giving due consideration to women's empowerment and gender-equitable participation
- Expand payments for biodiversity and ecosystem services in agricultural landscapes, based on improved management of the resource base; promote improved valuation of the services provided; improve measurement, reporting and verification of these; slow down and ultimately stop the expansion of agriculture into sensitive ecosystems.
- Stop unsustainable withdrawal of water resources, land degradation, biodiversity loss, and soil nutrient depletion and establish frameworks for sustainable production systems
- Support universal access to renewable energy services, including a shift to renewable forms of energy and more efficient use of energy for sustainable agriculture
- Strengthen international and national governance for sustainable resource use, with particular emphasis on the capacity of developing countries to participate
- Avoid recourse to and eliminate trade-distorting support policies and protectionism in adopting national measures to achieve the goal of sustainable agriculture.
- Establish accountability mechanisms for damage to the environment and/or human rights violations and to provide remedies for those rights that are violated.

## III. Possible suggestions on the way forward

Commentary on lessons learnt from the MDGs stresses the need to integrate connected themes and say more about "how" to achieve the goals. The Zero Hunger Challenge, launched by the UN Secretary-General at Rio+20, reinforces this message with its emphasis on five priority areas for action, including three topics discussed in this issues brief: making food systems sustainable; reducing food waste and losses; and increasing smallholder productivity and income. With respect to sustainable agriculture, a first recommendation is to ensure that the SDG framework recognises its critical role as a driver of poverty eradication and development. A second recommendation is to connect sustainable agriculture, food systems and agri-food value chains with the eradication of hunger, food insecurity and malnutrition – for instance, in a single goal that may also include the access dimension of food security (e.g. rural poverty, income, social protection). However, there are many issues connected to food security, nutrition and sustainable food systems (e.g. energy access, education, health) and it may not be practical to cluster all of these together. Thus a third recommendation is to ensure that thematic interlinkages are articulated through i) indicators; and ii) principles, which could form part of a narrative associated with each goal as well as with cross-cutting issues. These principles could be used to guide the national development of action plans for achievement of the SDGs, in which capacity needs assessments and cross-sectoral, multi-stakeholder partnerships would be critical.

A fourth recommendation is the provision of a platform whereby stakeholders with different aspirations would be in a position to discuss to define common goals in relation to food security. Sustainable agriculture should be able to contribute to the attainment of not only MDG 1 but also goals related to reducing child mortality and improving maternal health (MDGs 4 and 5, respectively), ensuring environmental sustainability (MDG 7) through sustainable food production and consumption patterns and empowering women (MDG 3) in light of the important role women have in this sector. Hence all stakeholders concerned with the multiple dimensions of agriculture should be involved in defining the agriculture of tomorrow. The Committee on World Food Security (CFS) and its high level panel of experts could play an instrumental role in such a process.

Another major issue to address in the formulation of SDGs is how to ensure that they meet the criterion agreed by countries in Rio+20 that they be "global in nature and universally applicable to all countries while taking into account different national realities, capacities and levels of development and respecting national policies and priorities". One proposal has been to imagine a set of global goals complemented by a menu of indicators for selection at the country level, with a common core definition (in the form of a set of principles and indicators to assess synergies and trade-offs), to which countries can add in light of national circumstances. It would be crucial to identify global and national goals/ targets and indicators through free, active and meaningful participation of all stakeholders, taking into account existing power imbalances.

In accordance with the above recommendations and considerations, the following options arise:

- *How to ensure that inter-linkages between thematic clusters – or goals – are adequately articulated and taken into account in implementation of the SDGs*

  Agricultural sustainability is intimately linked to water and energy security and an integrated approach to these issues is essential. The food-energy-water or climate-land-energy-water-development nexus should be acknowledged in the formulation of the SDGs. This can be done through including in a goal on sustainable agriculture indicators relating to energy and water and through principles outlining the value of and options for the implementation of integrated decision-making processes to achieve synergies and adequately address trade-offs. Besides water, energy, land and climate, almost all priority themes identified by Rio+20 are also of relevance to sustainable agriculture, including employment, education, health, biodiversity and sustainable consumption and production, gender equality and women's empowerment, and the special concerns of Africa, LDCs and SIDS. For each of these topics, Member States may wish to consider whether to articulate inter-linkages through indicators and principles or through explicit targets.

- *How to incorporate the principle that the SDGs "should be global in nature and universally applicable to all countries while taking into account different national realities, capacity and levels of development and respecting national policies and priorities"*

  The SDGs could contain global targets, but in order to reflect the different national circumstances, these targets and timelines for their achievement may need to be established and monitored at the country or regional level. One way of fulfilling the condition agreed in Rio+20 with respect to sustainable agriculture might be to have a common target and core set of indicators, but timelines and additional indicators (chosen from a menu) adaptable to national circumstances. In addition, as the SDGs will apply to all countries, there will arise choices regarding the extent to which a country prioritises sustainable development within its borders or supports sustainable development in other countries. To this end, global minimum thresholds, such as the eradication of hunger and respect for critical ecological thresholds, need to be established as a priority and achieved through global partnership.

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