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Resources for policy making

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A Multiplication of green concepts in Agriculture:

Building the path towards wide up-scaling

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Building the path towards wide up-scaling

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FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS

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EASYPol is a multilingual repository of freely downloadable resources for policy making in agriculture, rural development and food security. The resources are the results of research and field work by policy experts at FAO. The site is maintained by FAO's Policy Assistance Support Service, Policy and Programme Development Support Division, FAO.

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1 SUMMARY

This paper attempts to sketch a wide panel of "green" concepts that has been launched as of late trying to build a long term perspective in a new green paradigm.

The paper starts by summarizing the historic evolution of paradigms around sustainable development, development of green economics and agriculture. Furthermore, the paper demonstrates the recent switch from green agricultural farm-based approaches to sector-level and global approaches. In addition, the work addresses, from a general and macro perspective, what is presently upcoming with regards to the private sector, country based initiatives and the rethinking around project appraisals.

2 INTRODUCTION

Objectives: The purpose of this paper is to highlight the main concepts encountered by policy makers and provide some clarification on the background of these concepts.

Target audience: Climate Smart Agriculture, EX-ACT tool, Policy makers

Required background: Readers can follow links included in the text to other EASYPol modules or references[1]. See also the list of EASYPol links included at the end of this module.

3 BACKGROUND

The food crisis that dominated 2008 and was replicated in 2011 has to be managed. Meanwhile, the economic crisis in 2009 has and is presently affecting the world, adding to other emerging issues such as the current fossil energy supply crisis. Further, the growing threat of climate change consequently presents emerging impacts due to the multiplication of weather shocks driving to natural disasters, which in turn affects the global economic state. Inversely, climatic changes are caused by human practices. Among others, the climate has been exposed to decades of long neglect concerning the agricultural sector across the globe and has recently elucidated the essential links between food production and environmental stewardship, social development and economic stability (UNCSD, 2009[2]).

Global warming has the potential to damage irreversibly the natural resource base on which agriculture depends. Such risk does not improve the prognosis concerning global food security and time is becoming the most important scarcity factor regarding climate change adaptation and mitigation. Climate change could also significantly constrain

[1] EASYPol hyperlinks are shown in blue, as follows:
a) training paths are shown in **underlined bold font**
b) other EASYPol modules or complementary EASYPol materials are in ***bold underlined italics***;
c) links to the glossary are in **bold**; and
d) external links are in *italics*.

[2] UNCSD, A "GREEN" GREEN REVOLUTION — SUSTAINABLE SOLUTIONS FOR AGRICULTURE, United Nationjs Commission for Sustainable Development, 2009

economic development in developing countries that largely rely upon agriculture. Therefore, firstly, meeting the dual challenge of achieving food security and other developmental co-benefits, and in second, mitigating and adapting to climate change, requires political commitment at the highest level (CSA, FAO, 2010[3]).

With recently emerging issues, such as limited fossil energy resources, carbon emissions and climate change, recurrent food crises have questioned the prevailing "development paradigm" and more specifically current modalities or paths followed to achieve development. It drove partners to revisit the way to conceive development, taking into account a wider and increasingly concrete perspective including Economic, Sustainable and Territorial development (Bellu, 2011[4]).

Chapter 4 starts with the historic evolution of paradigms around sustainable development, green economy and agriculture, going from the start of sustainable development towards green growth and green economy, introducing agriculture as a multi-functional concept. Chapter 5 explains and describes the switch from green farm-based approaches towards "Greening the economy with agriculture" and Climate Smart Agriculture. Further, chapter 7 explains new trends and how the dynamics between institutions, the private sector and policy makers is changing and what is upcoming with regards to Sustainable Development. Chapter 8 provides the concluding remarks followed by the references of this paper.

4 HISTORIC EVOLUTION OF PARADIGMS AROUND SUSTAINABLE DEVELOPMENT, GREEN ECONOMY AND AGRICULTURE

4.1 From Sustainable Development towards Agenda 21 and Green Development: A progressive maturation of driving concepts

In 1987, the United Nations released the Brundtland Report, which defines sustainable development as *'development which meets the needs of the present without compromising the ability of future generations to meet their own needs.(OCF, 1987[5])'*

The definition was enriched in the United Nations 2005 World Summit Outcome Document by introducing the four interdependent and mutually reinforcing pillars of sustainable development, i.e. economic development, social development, and environmental protection (WHO, 2005[6]).

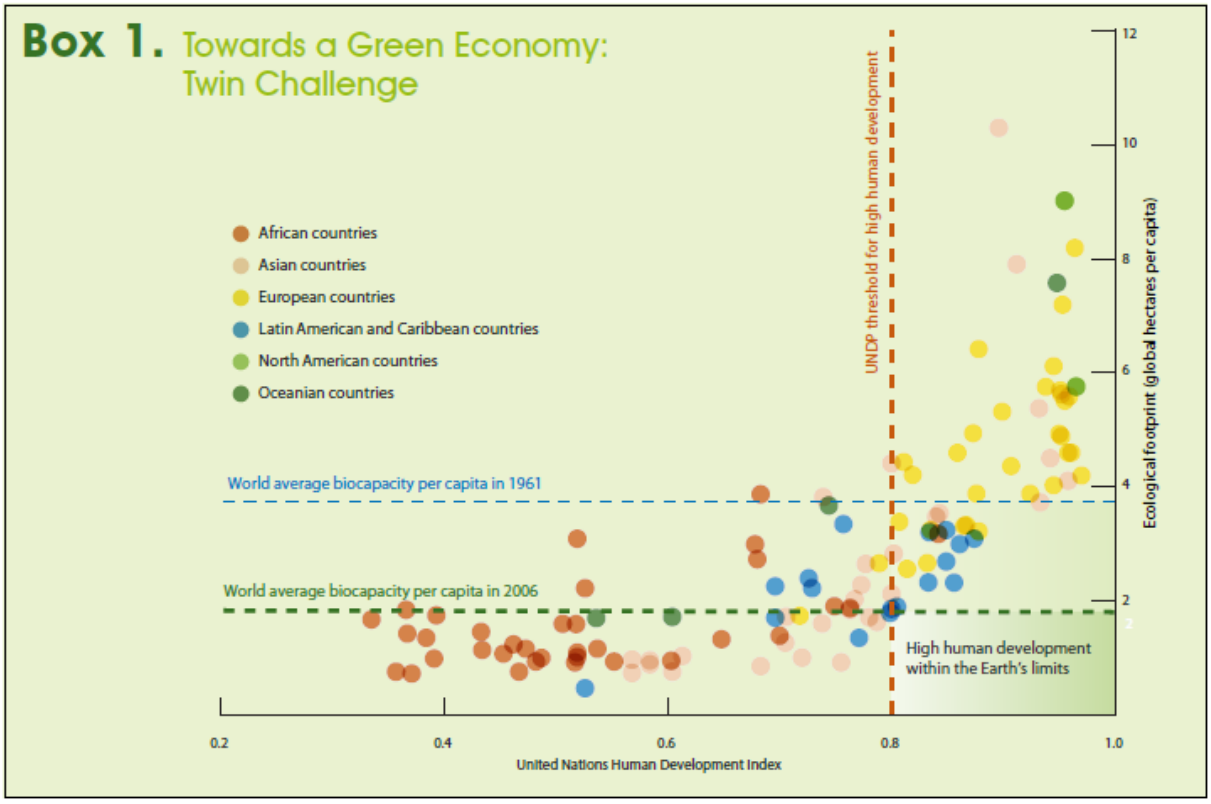
In between, an action plan called Agenda 21 was proposed by the United Nations in 1992. It should be considered as a comprehensive blueprint of action to be taken

[3] CSA, FAO 2010: "Climate-Smart" Agriculture, Policies, Practices and Financing for Food Security, Adaptation and Mitigation, FAO, 2010.
[4] Bellu L, Development and Development Paradigms- a review of prevailing Visions, Easypol Issue paper,2011
[5] OCF, 1987: Our Common Future, 1987, Oxford: Oxford University Press. ISBN 0-19-282080-X
[6] WHO, 2005: 2005 World Summit Outcome Document, World Health Organization, 15 September 2005. Available at http://www.who.int/hiv/universalaccess2010/worldsummit.pdf

globally, nationally and locally by organizations of the UN, governments, and major groups in every area in which humans directly affect the environment.

The previous sentence can be put into relation to the Human Development Index (HDI) and the Ecological footprint. As mentioned in the *Ecological Wealth of Nations (2009): "As populations expand, the total demand for ecological resources typically increases, while the bio-capacity available to support each individual's consumption shrinks." (UNDP, 2009[7]).*

A world population is increasing at 1.3 percent per year which implies that the population doubles every 50 years. It equally implies that the per capita Footprint threshold for sustainable development is decreasing, making it consequently more intricate to reach. Figure 1 illustrates where countries stood in 2006 relative HDI and the Ecological Footprint. Countries meeting both criteria's should be located in the right-down-corner quadrant. Despite international recognition of the need for sustainable development almost 20 years ago, not a single country can be found in the quadrant, nor on average was the world as a whole (UNDP, 2009).



Source: *The Ecological Wealth of Nations: Earth's Biocapacity as a New Framework for International Cooperation. Global Footprint Network (2010), p. 13; Human Development Index data from Human Development Report 2009 – Overcoming Barriers: Human Mobility and Development.* UNDP (2009).

Figure 1: Towards a Green Economy: Twin Challenge

With this said, we now know what our challenge is. The question is how and where to begin. Agenda 21 was proposed in 1992, which until 2006, is a total amount of 14 years. With regards to figure 1, even if the action plan clearly identifies information,

[7] UNDP 2009: The Ecoligical Wealth of Nations: Earth's Biocapacity as a New Framework for International Cooperation. Global Footprint Network (p. 12-13), 2009.

integration and participation as key building blocks to help countries to achieve development that recognizes the four interdependent pillars, we still have a way to go. Furthermore, Agenda 21 emphasizes that in sustainable development everyone is a user and a provider of information. The plan stresses the need to change from old sector-centered ways of doing business to new approaches that involve cross-sectoral co-ordination and the integration of environmental and social concerns into all development processes. In addition, Agenda 21 emphasizes on broad public participation in decision making, which is a fundamental prerequisite to achieve sustainable development. Sriskandarajah et al (1991) defined sustainability as *"Sustainability, is better seen as a measure of the relationship between the community as learners and their environments, rather than an externally designed goal to be achieved* [8]*"* (Sriskandarajah et al, 1991).

The expression *"Sustainable"* is presently a commonly used term, associated with several topics and situations. Nonetheless, due to its broad and relatively abstract concept *"Sustainable"* causes confusion. Depending on papers, expressions such as sustainable growth, sustainable economies and sustainable agriculture can easily be promoted hiding the operationality of sustainability, everything being asked to be sustainable (Sriskandarajah et al, 1991). The sustainable development debate is based on the assumption that societies need to manage three types of capital (economic, social, and natural), which may be non-substitutable and whose consumption might be irreversible (figure 2).

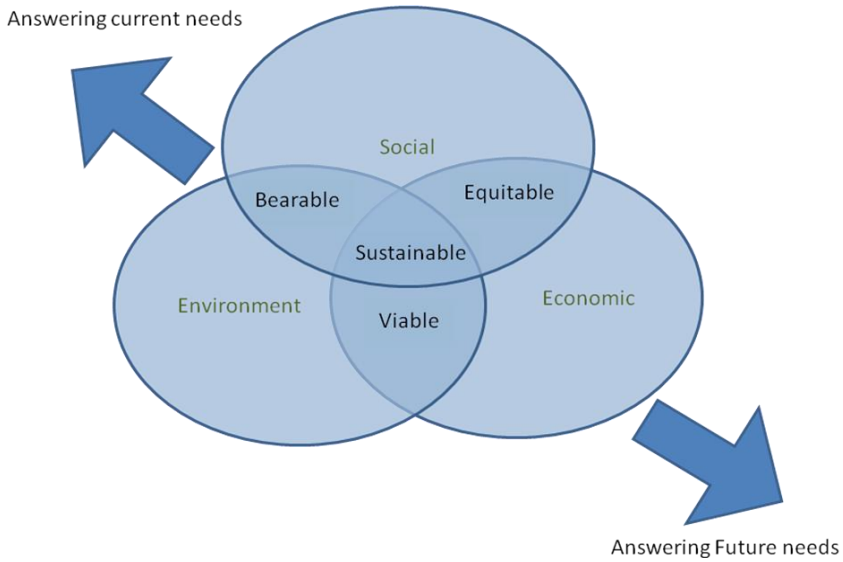


Figure 2: Sustainable development concept (Wikipedia[9], 2011)

Natural capital can not necessarily be substituted by economic capital. It is possible to find ways to replace certain natural resources but it is much more unlikely that they will ever be able to replace eco-system services, such as the protection provided by the ozone layer, or the climate stabilizing function of the Congolese forest. natural capital, social capital and economic capital, which often are complementarities and inter-linked.

[8] Sriskandarajah et al, 1991: Sriskandarajah, N., Bawden, R.J. & Packham, R.G., "Systems agriculture: a paradigm for sustainability", *Association for Farming Systems Research-Extension Newsletter, 1991,* 2(3):1-5
[9] Wikipedia, 2011: http://en.wikipedia.org/wiki/Sustainable_development

A further obstacle to substitutability lies also in the multi-functionality of many natural resources. Forests, for example, do not only provide raw material for paper, they also maintain biodiversity, regulate water flow and quality and has the capacity to absorb CO2 emissions (Wikipedia, 2011).

Green development is somewhat differentiated from sustainable development. Green development prioritizes what is considered as environmental sustainability over economic and social considerations. Intercessors of Sustainable Development argue that the concept provides a context in which to improve overall sustainability, i.e. social, economic and environmental, where cutting edge Green development is unattainable. For example, a cutting edge treatment plant with extremely high maintenance costs may not be sustainable in regions of the world with fewer financial resources. An environmentally ideal plant that is shut down due to bankruptcy is obviously less sustainable than one that is maintainable by the community, even if it is somewhat less effective from an environmental standpoint (Wikipedia, 2011).

4.2 Green Economy and Green Growth

UNEP defines a green economy *as one that results in improved human well-being and social equity, while significantly reducing environmental risks and ecological scarcities*. In its simplest expression, a green economy can be thought of as one which is low carbon, resource efficient and socially inclusive, which may be observed in figure 3 (UNEP, 2011[10]).

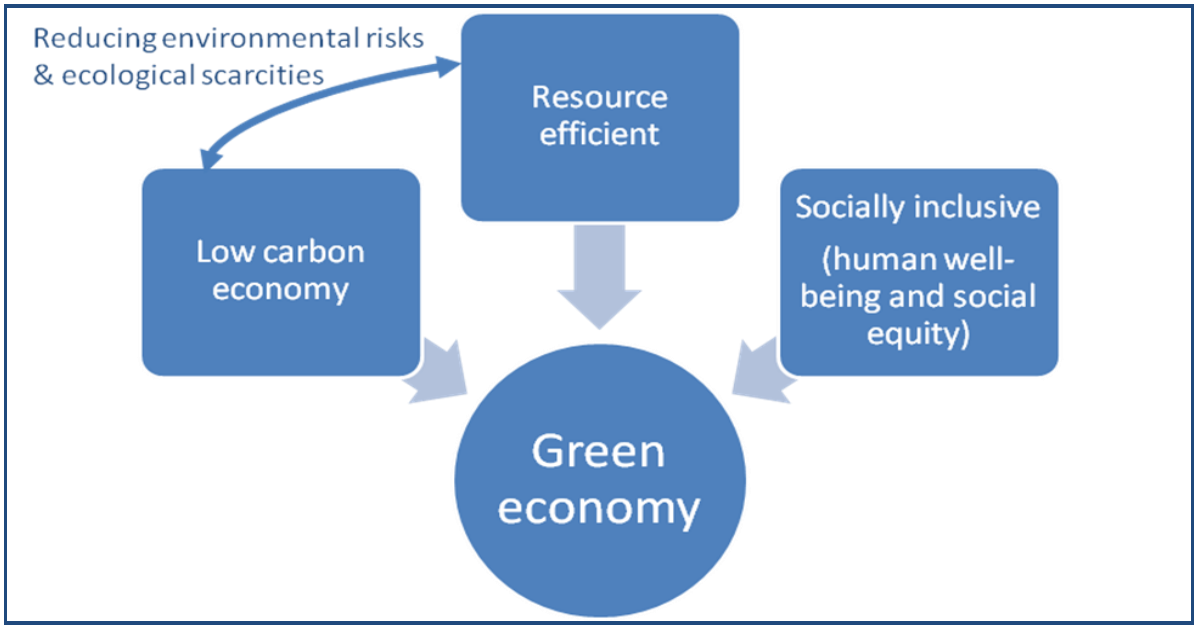


Figure 3: The concept of Green economy (UNEP, 2011)

In a green economy, growth in income and employment should be driven by public and private investments that reduce carbon emissions and pollution, enhance energy and

[10]UNEP1, 2011: Introduction: Setting the stage for a green economy transition, The United Nations Environment Program, 2011. Can be found at http://www.unep.org/greeneconomy/Portals/88/documents/ger/GER_1_Introduction.pdf

resource efficiency and prevent the loss of biodiversity and ecosystem services. These investments need to be catalysed and supported by targeted public expenditure, policy reforms and regulation changes. The development path should maintain, enhance and, where necessary, rebuild natural capital as a critical economic asset and as a source of public benefits, especially for poor people whose livelihoods and security depend on nature. Linked to this, figure 3 illustrates the six leading sectors of Green economy (UNEP, 2011).

Figure 3: Green Economy—Six Leading Sectors

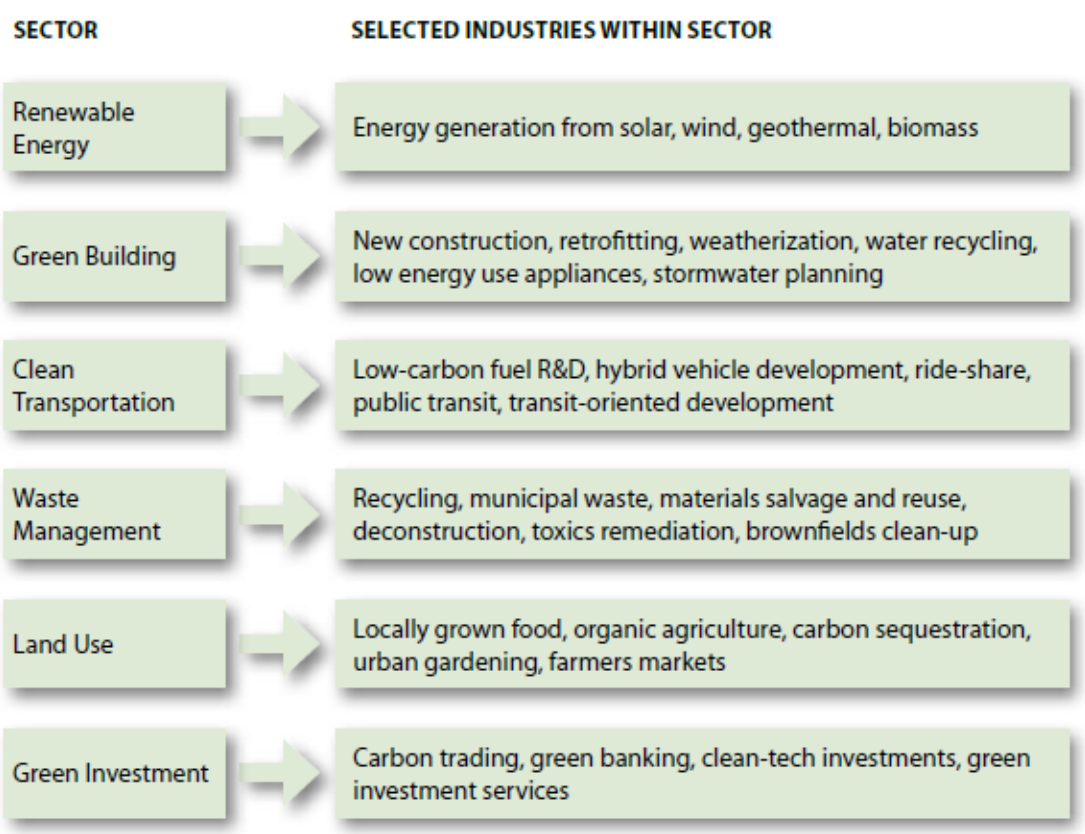


Figure 4: The six leading sectors of the Green Economy

4.3 Evolution of Agriculture as a Multi-function paradigm

Byerlee et al (2009)[11] are clearly stating the multiple functions of agriculture with a main focus on poverty reduction and employment generation, on food security, usage of natural resources and energy.

Agriculture's Role in Poverty Reduction is clearly demonstrated through overwhelming evidence that growth in the rural economy is essential for reducing

[11] Byerlee et al, 2009: Byerlee D, de Janvry A, Sadoulet E, Agriculture for Development: Toward a New Paradigm, http://are.berkeley.edu/~sadoulet/papers/Annual_Review_of_ResEcon7.pdf, 2009

poverty in most developing countries. From a simple decomposition analysis, 81 percent of the worldwide reduction in rural poverty during the 1993–2002 period can be ascribed to improved conditions in rural areas; migration accounted for only 19 percent of the reduction.

Agriculture is a main employer since the sector directly involves people and therefore creates employment opportunities, creates indirect jobs in the service, processing, transport and value chain sector. Furthermore, agriculture provides many upstream and downstream effects in income generation outside the sector. Even so, the rural poverty gap is still wide. Even in countries that have experienced rapid reduction in rural poverty, mostly in Asia, disparities between rural and urban incomes have tended to widen. In a sample of almost 70 countries, the median urban income (consumption) is at least 80 percent higher than rural income in half the countries.

A constant role in Food Security, where Agriculture's role in food security has shifted over time. With rapid population growth and growing food aid in Asia in the 1950s and 1960s and the global food crisis of the mid 1970s, attention was focused on food availability at the global and national levels. From the mid-1970s to the 2008 food crisis, the world was generally food secure, producing enough food to meet the dietary needs of today's global population. However, the 2008 crisis was a sharp reminder that global food security should not be taken for granted because of uncertainties from e.g. growing resource scarcity, rising energy prices, new demands such as biofuels and unsustainable agricultural management. Moreover continuous support should be brought for improving distribution systems, improving national food sovereignty, implement programmes for population excluded from the food market, and improve market access over time.

Agriculture as major user of scarce natural resources where the agricultural sector accounts for 85 percent of the developing world's fresh water withdrawal and 42 percent of its land. It is also a leading cause of underground water depletion, agrochemical pollution, soil exhaustion, loss of biodiversity through deforestation and an important contributor to global climate change, accounting for up to 30 percent of greenhouse gas emissions. At the same time, degradation of these natural resources undermines the basis for future agricultural production and therefore exposes, especially in the developing world, populations entirely dependent upon agricultural activities to a greater amount of risk.

Agriculture as an energy supplier. Developing countries often lack of an efficient, effective, and sustainable energy infrastructure, which is one of the challenges faced for economic development, especially in the current context of high oil prices and decreases in resource availability. Agriculture could offer the possibility of producing local energy resources. It has indeed a bilateral role as an energy user and energy supplier in the form of agro/bioenergy. Biofuel projects are not the "panacea", their success may depend where, when and how the project is implementing on local context basis.

"A new paradigm is needed that recognizes agriculture's multiple functions for development in that emerging context: triggering economic growth, reducing poverty, narrowing income disparities, providing food security, and delivering environmental services... Mobilizing these functions requires shifting the political economy to overcome anti-agriculture policy biases, strengthening governance for agriculture, and tailoring priorities to country conditions" (Byerlee D, de Janvry A, Sadoulet).

However in order to switch from an evolving multifunction concept towards a new dominant paradigm, it requires a shift in power, in other words a strong political support to the new concept from both developing countries and from other power forces as donors, international institutions and main private sector forces.
We therefore must address the politics and the paradigm if we really wish to change such policies. At the level of academics, unfortunately the multiplication of disciplines as such and the development-related discussions within them, and occasionally across them, often do not contribute to the type of understanding and conceptual clarity demanded by practitioners on the ground on the one hand, or policy makers in the Northern capitals on the other (Bendana[12], 2010).

5 A RECENT SWITCH FROM GREEN AGRICULTURE FARM-BASED APPROACHES TO SECTOR-LEVEL AND GLOBAL APPROACHES

5.1 Green farm-based approaches (1930-2010): Conservation agriculture and organic agriculture

In the 1930s, soil erosion in the United States reached crisis proportions. The problem was particularly severe in the Midwest, where millions of tons of topsoil were blown away by the wind or washed into rivers, in what came to be known as the 'Great Dust Bowl'. Supported by the government, American farmers started abandoning their traditional practice of ploughing. Instead, they left the crop residues on the soil surface, and planted the next crop directly into the stubble. Faced with similar problems, farmers in South America also took up conservation agriculture. By the year 2000, conservation agriculture was practised on about 60 million hectares of land worldwide, mainly in North and South America (figure 5). Now it is up to 117 million ha (FAO 2011[13]).

[12] Bendana A, Shifting Paradigms of Thought and Power: Problems and the Possibilities, Centro de Estudios Internacionales, 2010, http://www.policyinnovations.org/ideas/policy_library/data/01122
[13] FAO 2011: Theodore Friedrich, FAO presentation in FAO-WB Expert group, May 2011

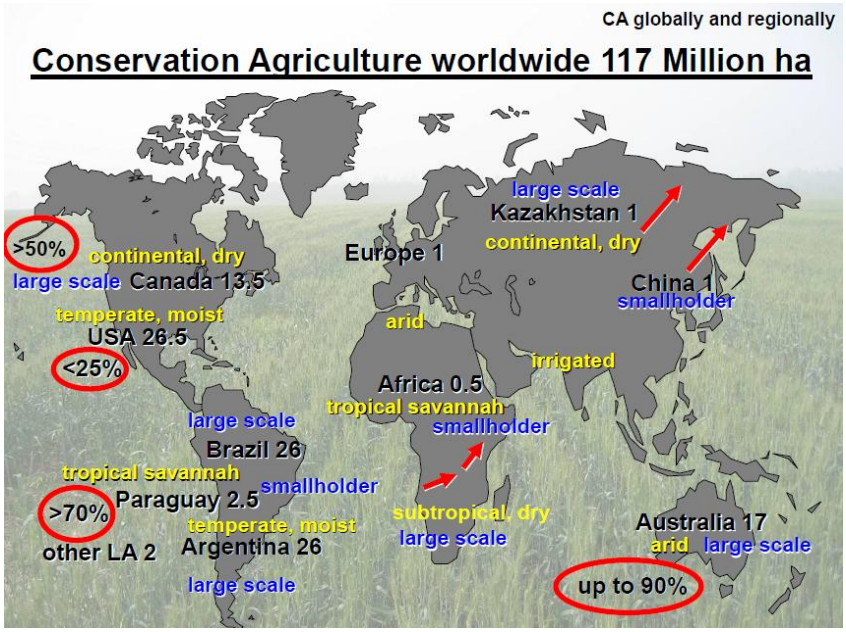


Figure 5: Conservation of Agriculture (FAO 2011)

Conservation agriculture (CA) is not 'business as usual', which is generally based on maximizing yields while exploiting the soil and agro-ecosystem resources. CA is based on optimizing yields and profits, in order to achieve a balance of agricultural, economic and environmental benefits. It advocates that the combined social and economic benefits gained from combining production and protecting the environment, including reduced input and labor costs, which are greater than those from production alone. With CA, farming communities become providers of more healthy living environments for the wider community through reduced use of fossil fuels, pesticides, and other pollutants, and through conservation of environmental integrity and services (FAO, 2011).

Conservation agriculture is the integration of ecological management with modern, scientific, agricultural production. Conservation agriculture employs all modern technologies that enhance the quality and ecological integrity of the soil, but the application of these is tempered with traditional knowledge of soil husbandry gained from generations of successful farmers. The holistic embrace of knowledge, as well as the capacity of farmers to apply this knowledge and innovate and adjust to evolving conditions, ensures the sustainability of those who practice CA (FAO, 2011).

Organic farming is the form of agriculture that relies on techniques such as crop rotation, green manure, compost and biological pest control to maintain soil productivity and control pests on a farm. Organic farming excludes or strictly limits the use of manufactured fertilizers, pesticides (which include herbicides, insecticides and fungicides), plant growth regulators such as hormones, livestock antibiotics, food additives, and genetically modified organisms. Organic agricultural methods are internationally regulated and legally enforced by many nations, based in large part on the standards set by the International Federation of Organic Agriculture Movements (IFOAM). Approximately 37,000,000 hectares worldwide are now farmed organically, representing approximately 0.9 percent of total world farmland (2009) (Paull, 2011[14]).

[14] Paull, 2011: Organics Olympiad 2011: Global Indices of Leadership in Organic Agriculture, Journal of Social and Development Sciences, Vol. 1, No. 4, pp. 144-150, May 2011. Can be found at:

5.2 Sustainable land management concept (2008)

Sustainable land management (SLM) is often defined as the use of land resources such as soils, water, animals and plants for the production of goods - to meet changing human needs – while assuring the long-term productive potential of these resources, and the maintenance of their environmental functions. It focuses on the functions of the environment for the benefit of society (SLM[15]) (figure 6).

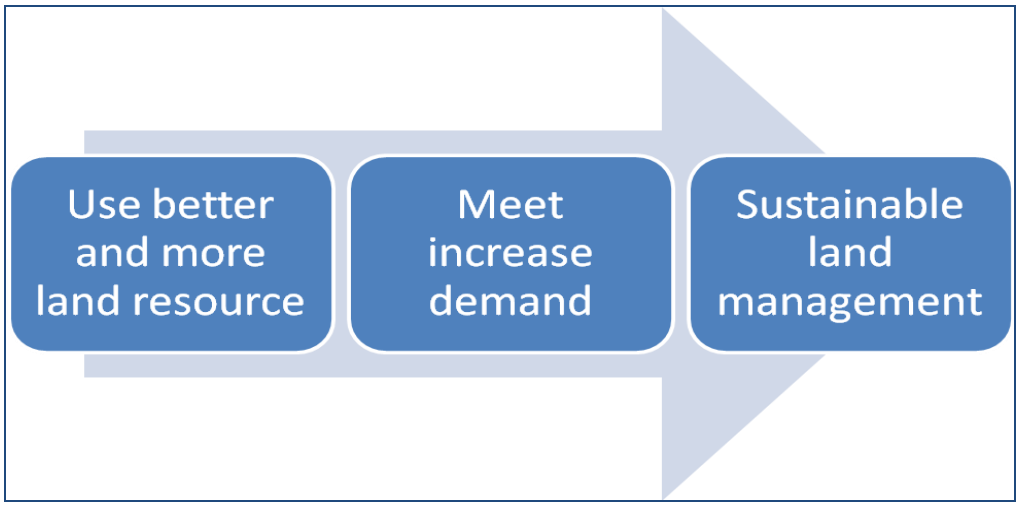


Figure 6: Sustainable Land Management (SLM) module

SLM appears a strategic component of sustainable development and poverty alleviation. Indeed, there are currently only a few countries in the world that still have spare land resources to meet the needs of their expanding populations. In the majority of cases, production must be increased and intensified on land already under cultivation because of the lack of additional land that could be reasonably put under cultivation. In most developing countries, the majority of people are still engaged in primary agriculture, livestock production, forestry and fishery. Thus their livelihood and options for economic development are still directly linked to the quality of the land and its resources essential to guaranty production at least.

Implementing SLM requires to i) observe the symptoms of unsustainability, e.g. soil degradation, water quantity and flows in decline, biodiversity losses, increase in diseases ii) identify the main causes of the symptoms, e.g. inappropriate land management resulting from unbalanced social, political, economic capacities and iii) propose options to manage the land in a better way.

The key questions to be raised before proposing SLM options are:

- Why do land users apply inappropriate management practices?
- What keeps them from applying more appropriate technologies?

Indeed farmers and land users are often aware of degradation but are not in a position to correct it, often due to political and economic circumstances, such as market price

http://www.ifrnd.org/JSDS/1(4)%20May%202011/Organics%20Olympiad%202011_Global%20Indices%20of%20Leadership.pdf

[15] SLM: Sustainable Land Management module: http://srdis.ciesin.org/pdf/slm.pdf

distortions, insecure land tenure, misuse of subsidies and incentives, etc. that limit their choice of options to practice SLM. SLM should address both processes of resource degradation and underlying causes of unsustainability, and indicates possible solutions. The procedure of applying SLM-IM is not proposing delightful options but more an insightful tool, providing guidance on how to effect the necessary changes, possibly using participatory processes applied with all major stakeholders.

According to World Bank, SLM involves the following activities (WB, 2008[16]):

- Preserving and enhancing the productive capabilities of cropland, forestland, and grazing land (such as upland areas, down-slope areas, flatlands, and bottomlands)
- Sustaining productive forest areas and potentially commercial and noncommercial forest reserves
- Maintaining the integrity of watersheds for water supply and hydropower-generation needs and water conservation zones
- Maintaining the ability of aquifers to serve the needs of farm and other productive activities.
- Stop and reverse degradation—or at least to mitigate the adverse effects of earlier misuse.

5.3 RIO+20 Greening Economy through agriculture (2011)

Rio+20 is the United Nations Conference on Sustainable Development (UNCSD), being a high-level international conference that will take place in Brazil on 4-6 June 2012 to mark the 20th anniversary of the 1992 United Nations Conference on Environment and Development (UNCED), in Rio de Janeiro, and the 10th anniversary of the 2002 World Summit on Sustainable Development (WSSD) in Johannesburg.

The conference will include the Heads of State and Government or other representatives. The objectives of the Conference are to i) secure renewed political commitment for sustainable development, ii) assess the progress to date and the remaining gaps in the implementation of the outcomes of the major summits on sustainable development, and iii) address new and emerging challenges

It will particularly focus on two themes: (a) a green economy in the context of sustainable development and poverty eradication; and (b) the institutional framework for sustainable development. In line with this, FAO is promoting the approach of "Greening the economy with agriculture"(GEA[17]). It refers to increasing food security in terms of availability, access, stability and utilization while using less natural resources, through improved efficiencies throughout the food value chain (figure 7).

[16] WB, 2008: The World Bank, The sustainable land management sourcebook. 2008. Available at: http://siteresources.worldbank.org/EXTARD/Resources/336681-1215724937571/eBook.pdf

[17] GEA: Greening the Economy with Agriculture, Concept notes. Available at: http://www.fao.org/fileadmin/user_upload/suistainability/docs/GEA__concept_note_3March_references_01.pdf

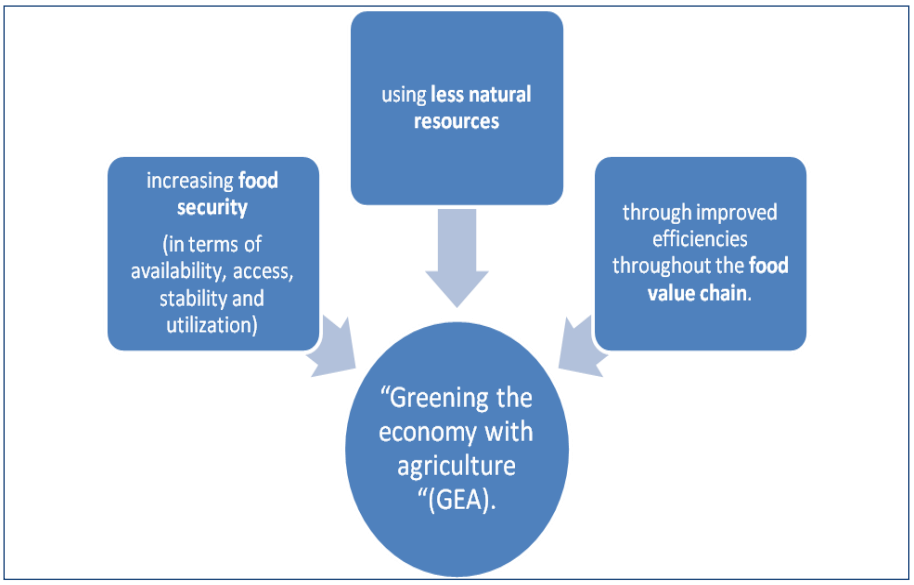


Figure 7: GEA model

Since the UNCSD will most likely produce a "Green Economy Roadmap for 205018", FAO seeks to contribute to this process by providing elements pertaining to its mandate, articulated through a "GEA Roadmap for 2050". The overall objective of this initiative is to contribute to the definition and implementation of the green economy in the context of sustainable development, food security and poverty alleviation through the mobilization of the food and agriculture sector.

The food and agriculture sector is indeed the single largest sector using 60 percent of world's ecosystems and providing livelihoods for 40 percent of today's global population, it is thus critical to greening the economy with agriculture[19].

Actions at technical, policy and civil society levels would seek to:

- Analyze the interactions between the green economy and the food and agriculture sector, including opportunities and constraints;
- Promote a dialogue on GEA strategies for 2050;
- Promote food and agriculture stakeholders' participation into the Rio+20 process and beyond, with a view to facilitate their access to the resources and institutional arrangements that will be put in place in order to effectively move towards sustainable development.

Therefore, GEA strives to balance diverse societal objectives, by taking account of the knowledge and uncertainties about biotic, abiotic and human components of ecosystems and their interactions and applying an integrated approach to agriculture, forestry,

[18] UNEP2, 2011: Towards a Green Economy, Pathways to Sustainable and Poverty Eradication, *A Synthesis for Policy Makers.* Available at: http://www.docstoc.com/docs/72524278/UNEP-Towards-a-Green-Economy

[19] GEA : Greening the economy with agriculture, Concept notes. Available at: http://www.fao.org/fileadmin/user_upload/suistainability/docs/GEA__concept_note_3March_references_01.pdf

fisheries and food chains within ecologically meaningful boundaries"(FAO/NRD, 2011).

5.4 Climate smart agriculture (2011)

Climate smart agriculture concept has been launched by FAO in 2011 (CSA, FAO, 2011[20]). CSA defines an agriculture that sustainably increases productivity, resilience (adaptation), reduces/removes GHGs (mitigation), and enhances achievement of national food security and development goals. Figure 8 demonstrates the concept of CSA.

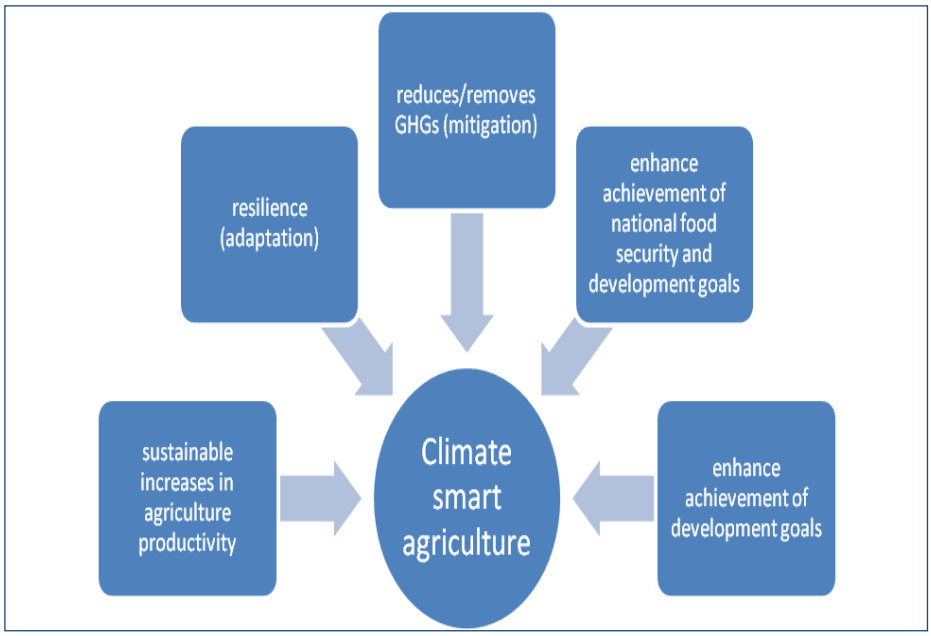


Figure 8: The CSA model (CSA, FAO, 2011).

Agriculture in developing countries must undergo a significant transformation in order to meet the related challenges of food security and climate change. Based on numerous studies, FAO expects the global demand for food to rise by 70 percent by 2050. Meanwhile, climate change makes this challenge increasingly difficult since there is an unbalance between the impacts of climate change and agricultural practice.

This is why the insititution calls on developing nations to invest on climate-smart production systems that are designed to better equip farmers in transforming existing methods into more efficient, resilient and adaptive systems that ensure maximum yield with minimum carbon emission.

Effective climate-smart practices already exist and could be implemented in developing country in various agricultural systems. Adopting an ecosystem approach, working at landscape scale and ensuring intersectoral coordination and cooperation is crucial for effective climate change responses.

[20] CSA, FAO 2010: "Climate-Smart" Agriculture, Policies, Practices and Financing for Food Security, Adaptation and Mitigation, FAO, 2010.

The transition to climate-smart agriculture requires institutional and financial support to enable its implementation by smallholders, to improve dissemination of climate-smart information and coordination over large areas and numbers of farmers.

Considerable investment is required in filling data and knowledge gaps and in research and development of technologies, methodologies, as well as the conservation and production of suitable varieties and breeds.

Available financing, current and projected, are substantially insufficient to meet climate change and food security challenges faced by the agriculture sector. In line with this, financing should be devoted by both public and private sectors to meet the investment requirements of the agricultural sector. To be effective in channeling fast-track financing to agriculture, financing mechanisms will need to take sector-specific considerations into account. Figure 9 resumes the positioning of these concepts both from micro level to macro level and from farm level towards sector level.

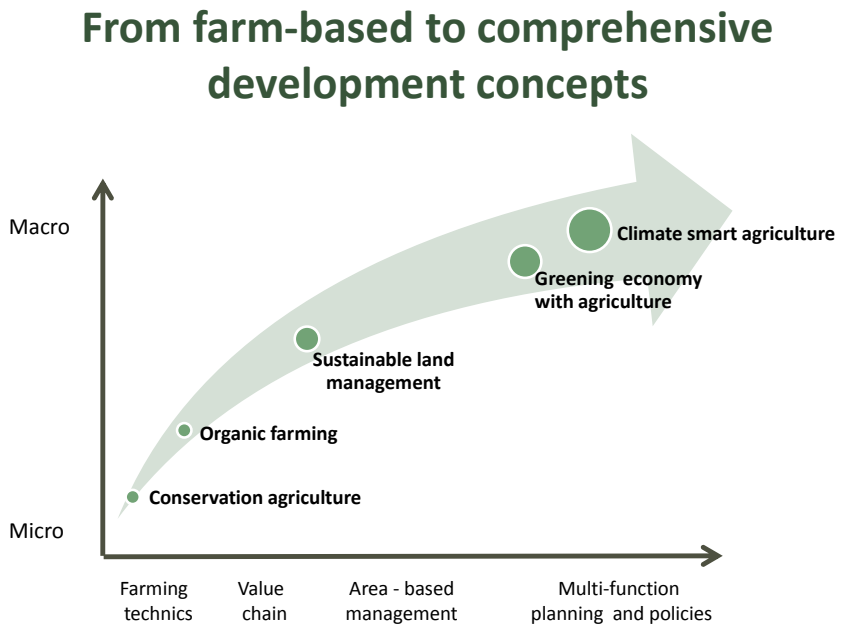


Figure 9: From farm-based level comprehensive development projects

6 OTHER SIGNS OF A WIDE SCALE WAVE IN THE AGRICULTURAL WORLD

6.1 A multi-partners driven move towards a common objective

Apparently iterative, this multiplication of initiatives demonstrates after a shared appraisal of the situation a simultaneous willingness of different partners, either countries, groups of countries, donors, international organizations or networks of research institutions to become pro-active change actors. These actors have just gone through their own process of brainstorming to build an ownership in their approach. The similarities and bridges between concepts as sustainable development, climate smart

agriculture, greening economy with agriculture contribute to demonstrate the relevance of the green orientation. In such a perspective it appears to be a very positive output.

6.2 A growing mobilization of countries around UNFCCC

The United Nations Framework Convention on Climate Change sets an ultimate objective of stabilizing greenhouse gas concentrations "at a level that would prevent dangerous human induced interference with the climate system". Such level should be achieved within a time-frame sufficient to allow ecosystems to adapt naturally to climate change, ensure that food production is not threatened and enable economic development to proceed in a sustainable manner. (http://www.ghgonline.org/kyoto.htm)

Over a decade ago, most countries joined the UNFCCC to consider what can be done to reduce global warming and to cope with whatever temperature increases are inevitable. The UNFCCC gathers around 192 ratification instruments. Later, a number of nations approved an addition to the treaty: the Kyoto Protocol, which has more powerful and legally binding measures.

The countries gathered within the UNFCCC are integrating more and more climate change dimension in their national policies. Currently 141 Non annex 1 countries submitted national communications, 43 annex 1 countries submitted their national GHG Inventories, 48 countries developed their NAPAs and 44 countries submitted NAMAs letter of intent reflecting a global mobilization of countries to better integrate climate change consideration amongst all sectors, agriculture included, trying to move toward greener long term perspective.

6.3 Interest of Private sector

The private sector plays an important role in accelerating the pace of economic development efforts. Recognizing this pivotal role, many international and public institutions works in partnership with corporations and organizations that are committed to promoting sustainable development and to improving corporate governance (Graham and Woo, 2009[21]).

One of the main interest of the private sector in being involved in such kind of development is economic. It both includes i) direct economy savings linked with the reduction of resource, e.g. fuel, water, energy, consumption, reduction of waste to be treated, the use of more efficient energy systems, ii) indirect economic development such as investment in low-carbon technologies e.g. solar or Carbon Capture and Storage that would lead to extra growth since it stimulates innovation, i.e. "endogenous" growth, iii) contribution to the development of green diversified activities and new "green" jobs, iv) improvements of the products marketing and additionally to those economic impacts, a shift as such of the private sector into new development paradigms aims at encouraging corporate social responsibility (CSR). Engagement of the private sector is also relevant on a broader perspective, e.g. the private sector investing in reducing post

[21] Graham and Woo, 2009: Fuelling Economic Growth, The Role of Public-Private Sector Research, International Development Research Center, 2009, ISBN 978 1 85339 675 5.

harvest losses through better storage could have a direct impact on land use changes. In Nigeria post harvest losses reaches 25 to 30% and if losses are reduced by 5%, less land may be converted from forest land to cropland (Pfitzer et al, 2009[22]).

Currently there are not many laws bindings commitments to participate in "green"development, however it may change in the near future, e.g. discussions around taxation emerging in different countries. Thus private sector may find it smart to pull ahead of the enforcement laws for green economic saving (investing instead of paying taxes for not acting).

6.4 Multiplication of country and regional voluntary initiatives

The following chapter describes different country based and regional initiatives that has recently been taken and implemented.

6.4.1 Sustainable Green Revolution for Africa (2009)

African agriculture ministers and officials negotiated the "Windhoek Declaration" in which they called for a **Sustainable Green Revolution for Africa**, based on the principles of sustainable development and a new paradigm for agriculture tailored to the specificities of the continent's highly diverse agro-ecological conditions, farming systems and socio-cultural contexts (figure 10) (UNCSD, 2009)[23].

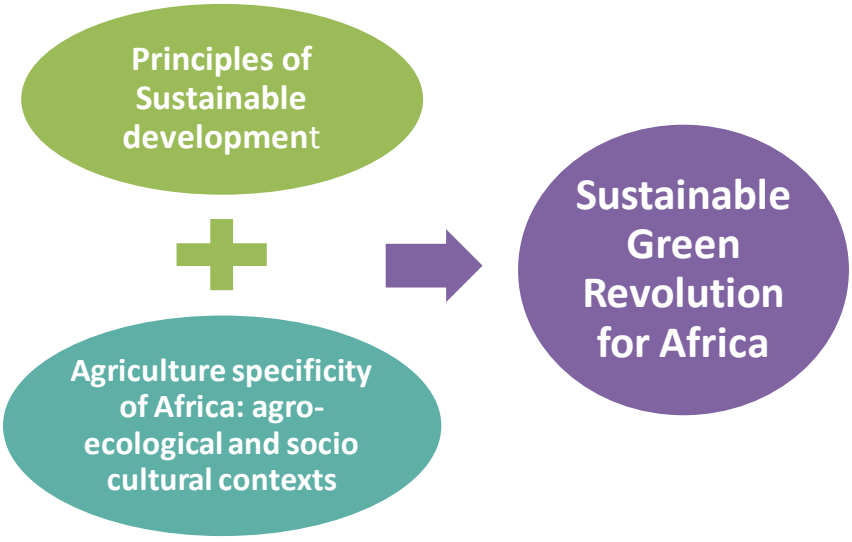


Figure 10: Sustainable Green Revolution for Africa (UNCSD, 2009)

[22] Pfitzer et al, 2009: Market Development Investments by Agricultural Input Companies and their Foundations: Transforming Smallholder Agriculture, Prepared for The Syngenta Foundation for Sustainable Agriculture, May 2009. Available at: http://www.fsg.org/Portals/0/Uploads/Documents/PDF/Transforming_Smallholder_Agriculture.pdf?cpgn=WP%20DL%20-%20Transforming%20Smallholder%20Agriculture

[23] UNCSD 2009: UNSCD, A "GREEN" REVOLUTION — SUSTAINABLE SOLUTIONS FOR AGRICULTURE, United Nations Commission for Sustainable Development, 2009

The Sustainable Green Revolution drives to the following elements(UNCSD, 2009) :

More food production in developing countries - Just as the food crisis most severely affected the most vulnerable people in developing countries, most of the needed increases in food production must come from developing countries: from more intensive production systems based on higher yields and multiple cropping. Yet, the traditional green revolution model based on the heavy use of inorganic fertilizers, pesticides and water is presently not particularly desirable in terms of usage, especially given the high cost of inputs, growing water scarcities, and the heavy damage to soils, water and biodiversity associated with the model. A new Green Revolution therefore will be based on a sustainable approach that will require a sound land management, water resources and ecological systems as well as measures to improve the socio-economic development of rural communities.

Linking agriculture and rural development - Countries have already identified a number of ways that agriculture and rural development are mutually reinforcing. Providing access to potable water, sanitation services, electricity and transport as well as healthcare and education, raises the quality of living in rural areas, while conferring positive externalities on the development of agro-industry and the broader rural economy. Given the prominent role of women in food production and land management, gender sensitive approaches and policies are key to raising food security and the quality life in rural areas.

Improving productivity - Investments in drought-resistant and other adapted crops will take a larger and increasingly important role, as well as improved research improved methods concerning soil management, including improved use of organic matter. Extension services closely linked to research will help farmers benefit from training, especially in new techniques and sustainable practices, as well as marketing. Additional private and public investments in agriculture, including by international donors has a large role with regards to improved agricultural productivity.
Scaling-up and applying what is known - There exists significant know-how on sustainable land, water and resources management, but it has not been applied in a large enough scale, especially in the context of agriculture. Global policy is needed to make recognized ‘green’ technologies and approaches widely accessible and tailored to the environmental conditions and cultural contexts in which food is grown in developing countries. Such methods and systems could help to overcome land degradation, drought, and waning soil fertility, as well as build resilience to climate change, lifting millions out of poverty.

Climate change leaves no development priority untouched, and must be considered in the context of a sustainable green revolution. Agriculture is not only impacted by climate change, from drought, heat stress, desertification and flooding, but agriculture and forestry are equally two major emitters of greenhouse gases. Sustainable forest management, including agro-forestry and a reduction of deforestation, along with mitigation strategies in agriculture such as enhancing soil carbon sequestration, improved livestock management and better management of crop and livestock waste, could contribute to global greenhouse gas mitigation, while at the same time improving soil fertility, boosting yields, and enhancing ecosystem services. Coherent policies for

linking such adaptation and mitigation measures in agriculture will be central not only to a sustainable green revolution but also to stemming the impacts of global warming.

6.4.2 Country self-funded initiatives towards greening agriculture

There exist numerous country self-funded initiatives towards greening agriculture and CSA practices. Some examples can be read within the text. The rest of the case studies might be found in FAO's report on Climate-Smart Agriculture from 2010.

Livestock production in developing countries: In developing countries livestock production is highly dependent upon fibrous needs, i.e. crop residues and low quality pasture. These nutrients are deficient in vitamins, nitrogen and minerals and the feedstuff can be better used if the rumen diet is supplemented with carbohydrate, vitamins, minerals and nitrogen. A present method, which is more suitable, has been developed which provides to the animals non existing nutrients from biomass feeds: it supplies the animals with animal urea and molasses in the form of urea-molasses mineral blocks. The blocks in question increases the productivity of milk and meat production and promotes higher reproductive efficiency in ruminant animal species, e.g. cattle, buffalo, sheep, goats and yak (CSA, FAO, 2010).

Zaï and stone bunds in Burkina Faso: In the Yatenga province, farmers reclaimed degraded farmland by digging planting pits, known as zaï. The traditional technique was improved by increasing depth and diameter of the pits and adding organic matter. The Zaï concentrate both nutrients and water and facilitate water infiltration and retention. Thus lands which used to be barely productive can now achieve yields from 300kg/ha to 1500kg/ha, depending on rainfalls. In the same province, farmers, with support from Oxfam, began to construct stone contour bunds to harvest rainwater. The bunds allows water to spread evenly through the field and infiltrates the soil and also prevents soil and organic matter being washed away. Thanks to local networks of farmers these techniques are now used on 200 000 to 300 000 ha (CSA, FAO, 2010).

Mitigating CH_4 emissions through new Irrigation Schemes at Bohol, Philippines: Bohol Island is one of the biggest rice-growing areas in the Philippines' Visayas regions. Before the completion of the Bohol Integrated Irrigation System (BIIS) in 2007, two older reservoirs (Malinao and Capayas Dam) were beset by problems and unable to ensure sufficient water during the year's second crop (November to April), especially for farmers who live farthest downstream from the dam. This problem was aggravated by the practice of unequal water distribution and a preference by farmers for continuously flooded rice growing conditions.

In the face of declining rice production, the National Irrigation Administration (NIA) created an action plan for the BIIS. This included the construction of a new dam (Bayongan Dam; funded by a loan from the Japan Bank for International Cooperation) and the implementation of a water-saving technology called Alternate-Wetting and Drying (AWD) which was developed by the International Rice Research Institute (IRRI) in cooperation with national research institutes. The visible success of AWD in pilot farms, as well as specific training programmes for farmers, were able to dispelled the widely held perception of possible yield losses from non-flooded rice fields. Ample

adoption of AWD facilitated an optimum use of irrigation water, so that the cropping intensity could be increased from ca. 119 % to ca. 160 % (related to the maximum of 200 % in these double-cropping systems). Moreover, according to the revised IPCC methodology (IPCC 2006), 'multiple aeration' to which the AWD corresponds, potentially reduces methane emissions by 48 % compared to continuous flooding of rice fields. AWD therefore generates multiple benefits related to methane emission reduction (mitigation), reducing water use (adaptation where water is scarce), increasing productivity and contributing to food security (CSA, FAO, 2010).

6.5 Quick Growing on carbon funds

In 2008-09 OECD's countries provided on average USD 9.3 billion per year in bilateral Official Development Assistance (ODA) to help developing countries reduce their own emissions, enhance greenhouse gas sinks or integrate climate change concerns in their development objectives. This represented 7.1 percent of their total bilateral ODA commitments in 2008-09. The largest donors were Japan (USD 3.5 billion), Germany (USD 1.4 billion) and France (USD 0.9 billion) (OECD, 2011[24]).

6.6 Rethinking around project appraisals

There is also a new wave regarding project appraisals where the major focus is changing. The concept of project appraisals is presently integrating sustainability issues within projects, with a stronger focus upon the area in question and not only economic and financial aspects. There is also a growing interaction between different stakeholders, such as institutions, NGOs, policy makers and the private sector.
An example regarding the new wave of project appraisals is the EX-ACT tool developed by the FAO, which is a carbon balance appraisal tool, applicable on a wide scale macro level. The tool is presently used in developing countries measuring the impacts of agricultural and forestry activities upon the climate, by determining different projects abilities to absorb and stock CO_2 emissions. It also measures the C balance, expressed in tones CO_2 equivalents, between two scenarios: with and without project. For instance, The FAO and The World Bank are cooperating together on different projects in, amongst others, Brazil, Madagascar, Niger and Ethiopia. The tool has the potential to work as an interactive base connecting different sectors regarding climate change adaptation and mitigation. Connected to this, there is equally a demand for such tool, where projects that are directly linked to tool can demonstrate a win-win situation in terms of sustainable adaptation and not only on economically related aspects. Talk about appraisal of policies and programs too, not only projects → large scale of application.

[24] OECD 2011: Tracking aid in support of climate change mitigation and adaptation in developing countries, March 2011. Available at: http://www.oecd.org/dataoecd/24/22/47477193.pdf

7 CONCLUSIONS

Decision makers should perceive the mentioned green concepts as both the reactivity of the development thinking tanks and the expression of a high level of convergence on the way to design the future role of the whole agriculture sector. Agreeing with the idea that a new paradigm is needed which recognizes agriculture's multiple functions for development in an emerging context, i.e. triggering economic growth, reducing poverty, narrowing income disparities, providing food security, and delivering environmental services, we analyzed both relevance and convergence of the different green concepts and their potential to mobilize the development actors.

Coming back to the purpose of this paper, which was to highlight the main concepts and provide clarifications on respective background, it is possible to observe different green conceptions, which follows the same path and in the end raises the same issues and means. In this sense, it is possible to link different actors in a same coherent frame. The term 'sustainability' becomes less of a foreigner and definitions, concepts and multiple models are now going from abstract to concrete. The different concepts mentioned within the paper address sustainable agricultural issues on different levels, e.g. The Green Economy focuses on the concept of sustainability within each sector whilst GEA has a higher focus upon the agriculture greening role in value chain and food security. GEA and Climate smart agriculture both present a lot of convergences and could be considered as targeting quite similar objectives with a small focus divergence towards Green economy for GEA and towards Climate change for Climate-Smart Agriculture (CSA).

CSA regroups these concepts, having a multi-functional purpose on all levels. Nonetheless, in order for CSA to mobilize development partners and countries, it requires a wide scale fund mobilization towards such agriculture rethinking process. Within the low current mobilization on green climate funds far below engagements, and in line with the weight of both economic and financial global crisis, it seems rather pragmatic to target a progressive merging of Climate smart agriculture concept within on-going Official Development Assistance (ODA) programmes and in national public policies as started by China, Brazil, Turkey and India.

We have noticed a new trend, where multiple partners are striving for a common objective and, as evoked previously in the paper, there are incentives from institutions, policy makers and the private sector. There are also multiple self-funded country based initiatives and mechanisms put into place e.g. Clean Development Mechanisms (CDM). Presently, let's remember that CSA is a set of techniques, also put in place in order to improve the situation of our target group, the small-holders. Yet there are still changes to be made, mainly regarding project appraisals and the difficult horizontal and vertical communication, going from macro to micro or vice versa.

This paper hopefully clarified the main green concepts, where we stand and how to move forward, adapting and implementing proactive practices on all levels.

8 EASYPOL LINKS

This paper is part of ..... see [link]

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