NEW PARTNERSHIP FOR AFRICA'S DEVELOPMENT (NEPAD)

Version 09Aug02

Comprehensive Africa Agriculture Development Programme (CAADP)

Prepared with the collaboration of the
Food and Agriculture Organization of the United Nations (FAO)

August 2002

PROCESS AND SCOPE OF THE AGRICULTURE PROGRAMME

Process: At the invitation of the NEPAD Steering Committee, this document, which presents the Comprehensive Africa Agriculture Development Programme (CAADP) of NEPAD, has been prepared by FAO following a consultative process, the key elements of which have been as follows:

- *March 2002*: Presentation of the main themes of potential CAADP contents by the Director General of FAO to the NEPAD Heads of State Implementation Committee in Abuja, Nigeria;
- *End April 2002*: Circulation for review and comment of a first draft (at that stage as a summary and three separate papers). Distribution was to all African Ministers of Agriculture and for African integration; the Heads of African Regional Economic Organisations; the Chairman and members of the NEPAD Steering Committee; the Heads of the African Development Bank and of other selected African sub-regional development banks; the Head of UN Economic Commission for Africa; World Bank agriculture experts; information copies to the Organisation for African Unity;
- *Early May 2002*: Consolidation of the separate papers into the unified Comprehensive Africa Agriculture Development Programme document and integration of the comments received on the April drafts;
- *Mid May 2002*: Presentation of the first consolidated document for comment at the Maputo meeting of the NEPAD Steering Committee;
- *End May 2002*: Recasting of the CAADP draft to take account of the proposals and comments of the NEPAD Steering Committee and circulation to same network of reviewers and commentators.
- *June 2002*: Meeting in Rome, Italy (9th June 2002) of African Ministers of Agriculture (joined by some members of the NEPAD Steering Committee) to review the CAADP (See Annex 1).

Scope: The document has been prepared to best respond to the widely recognised crisis situation of African agriculture. It has been cast to deliberately focus on investment into the following three mutually reinforcing "pillars" that can make the earliest difference to Africa's dire situation: (a) extending the area under sustainable land management and reliable water control systems; (b) improving rural infrastructure and trade-related capacities for improved market access; and (c) increasing food supply and reducing hunger. The CAADP also pays attention to emergencies and disasters that require food and agricultural responses or safety nets; if ignored, the dislocation caused by these can undermine or reverse development achievements.

In no way is the focus on these pillars intended to imply that other things, such as policy and institutional reform, capacity building etc are not important. Indeed, these long-term enabling factors should be integrated into implementation of all the "pillars". However, so deep is Africa's agricultural crisis that priority must go to immediate action that can make the earliest difference. This is based on the understanding that despite its weaknesses, Africa even now has a core body of knowledge, capacity, and policy and institutional arrangements upon which immediate action can build. Africa need not await achievement of the ideal enabling conditions. It may be noted that enabling conditions take very long to make a positive difference: thus, despite decades of undergoing structural reforms of its economies, policies and institutions Africa has yet to show discernible benefits for the majority of its people from the reforms. To hold back action while seeking long-term capacity gains may do the needy the injustice of denying them early relief from desperation without offering the assurance of long-term betterment.

Furthermore, at this stage of seeking broad priorities rather than formulating a strategy ready for implementation, it has not been thought necessary to go into details of what agricultural products are to be produced in which of Africa's diverse regions or countries; what are to be the responsibilities of various African and external /international stakeholders; how gender factors are to be given adequate attention in programme preparation and implementation; and exactly what combination of land, labour and capital are to be mobilised to achieve optimal, remunerative and sustainable results. Among frequent observations on the first version of the CAADP is the lack of explicit reference to gender and of attention to the forestry sector (long-term importance for food security) and to the livestock and fisheries sectors (immediate potential). As indicated in Chapter 5, "Special attention must be given to the vital food-producing and entrepreneurial roles of women in rural and urban African communities. African women account for substantial amounts of production in both the informal and formal sectors." It is clearly essential that gender be a core consideration in operationalising the CAADP; at this stage, the broad pillars are important for both men and women. With regard to fisheries and forestry, it is proposed that the particular needs of these other land-using sectors be taken up in a linked but separate exercise in the near future without holding back the action on crop production which can provide the most urgent calorie supply.

With the broad lines of the CAADP now available, operationalisation needs to be launched – this will require leadership by Africa itself, in the spirit of self-reliance that is the hallmark of NEPAD.

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Executive Summary

0.1 Background

African Ministers of Agriculture met at FAO Headquarters in Rome, Italy on 9th June 2002 under the auspices of the FAO Regional Conference for Africa, which held the special follow-up session meeting to review an earlier draft of this document – the Comprehensive Africa Agriculture Development Programme (CAADP) - prepared by FAO in co-operation with the NEPAD Steering Committee. Extracts from the report of their meeting are produced as Annex 1. It can be seen that the Conference welcomed and endorsed the CAADP and agreed on the need to quickly operationalise it; it offered guidance to member governments on a wide range of aspects of operationalisation and action to revitalise African agriculture.

What follows is the full CAADP document after some adjustment to reflect some comments received on the version presented to the Ministers, including their desire to see research included as a pillar for action. Clearly, a programme on agriculture must remain living and open to continuing improvement and also be open to interpretation for each of Africa's sub-regions in order to best address that continent's diversity. This document therefore offers a broad frame of priorities from which more precise strategies and programmes can be derived for operationalisation.

The latest figures (for 1997-99) show that some 200 million people – or 28 percent of Africa's population – are chronically hungry, compared to 173 million in 1990-92. While the proportion of the population facing hunger is dropping slightly, the absolute numbers are rising inexorably. During the 1990's declines in the number of hungry have been registered in only 10 countries. At the end of the 1990's, 30 countries had over 20 percent of their population undernourished and in 18 of these, over 35 percent of the population were chronically hungry. As of 2001, about 28 million people in Africa were facing food emergencies due to droughts, floods and strife, of which some 25 million needed emergency food and agricultural assistance. To reflect its particularly difficult situation, the World Food Programme - which accounts for two-fifths of international food aid - has spent US$12.5 billion (45 percent of its total investment since its establishment) in Africa and 43 percent in 2001.

In line with the rise in the number of hungry, there has been a progressive growth in food imports in the last years of the 20th century, with Africa spending an estimated US$18.7 billion in 2000 alone. At the same time, food aid gives evidence of considerable external dependency: in 2000 Africa received 2.8 million tons of food aid, which is over a quarter of the world total. Imports of agricultural products have been rising faster than exports since the 1960s and Africa as a whole has been a net agricultural importing region since 1980. Agriculture accounts for about 20 percent of total merchandise exports from Africa, having declined from over 50 percent in the 1960s. For Africa as a whole, the agricultural sector accounts for about 60 percent of the total labour force, 20 percent of total merchandise exports and 17 percent of GDP.

Until the incidence of hunger is brought down and the import bill reduced by raising the output of farm products which the region can produce with comparative advantage, there is no way in which the high rates of economic growth to which NEPAD aspires can be attained. People suffering from hunger are marginalised within the economy, contributing little to output and still less to demand. Investing in reducing hunger is a moral imperative but it also makes economic sense. Agricultural-led development is fundamental to cutting hunger, reducing poverty (70 percent of which is in rural areas), generating economic growth, reducing the burden of food imports and opening the way to an expansion of exports.

0.2 Areas of primary action

As currently formulated, the proposed initiatives under the NEPAD Comprehensive Africa Agriculture Development Programme (CAADP) focus on investment into three "pillars" that can make the earliest difference to Africa's agricultural crisis plus a long-term pillar for research and technology. The three fundamental mutually reinforcing pillars on which to base the immediate improvement of Africa's agriculture, food security and trade balance are:

- **Extending the area under sustainable land management and reliable water control systems**. Reliance on irregular and unreliable rainfall for agricultural production is a major constraint on crop productivity and rainfed agriculture is also often unable to permit high-yield varieties of crops to achieve their full production potential. Accordingly, it is of concern that for Africa the percentage of arable land that is irrigated is 7 percent (barely 3.7 percent in Sub-Saharan Africa) while the corresponding percentages for South America, East and South-East Asia and South Asia are 10 percent, 29 percent and 41 percent respectively. Furthermore, in Africa 16 percent of all soils are classified as having low nutrient reserves while in Asia the equivalent figure is only 4 percent; moreover, fertiliser productivity (expressed in terms of maize yield response) in Africa is estimated at some 36 percent lower than in Asia and 92 percent lower than in developed countries. Building up soil fertility and the moisture holding capacity of agricultural soils, and rapidly increasing the area equipped with irrigation, especially small-scale water control, will not only provide farmers with opportunities to raise output on a sustainable basis but will also contribute to the reliability of food supplies.

- **Improving rural infrastructure and trade-related capacities for market access.** Improvements in roads, storage, markets, packaging and handling systems, and input supply networks, are vital to raising the competitiveness of local production vis-à-vis imports and in export markets. Investment in these areas will stimulate the volume of production and trade, thereby assisting to generate an appropriate rate of return on needed investments in ports and airport facilities. In general, Africa urgently needs infrastructure improvements for development given that it faces the longest distances to the nearest large markets and a fifth of its population is landlocked. Its rail freight is under 2 percent of the world total, the marine freight capacity is 11 percent (much being foreign owned but registered for convenience in Africa), and air freight is less than 1 percent; similarly, its power generation capacity per capita is less than half of that in either Asia or Latin America. In parallel with improvements in infrastructure within Africa, adjustments are needed in the promotion and support (including subsidy) policies of developed countries. Exporting countries within the region need to raise their capacity to participate in trade negotiations and to meet the increasingly stringent quality requirements of world trade.

- **Increasing food supply and reducing hunger.** Africa currently lags behind all other regions in terms of farm productivity levels with depressed crop and livestock yields, and limited use of irrigation and other inputs. By accessing improved technology – much of which is simple and relatively low in cost – small farmers can play a major role in both increasing food availability close to where it is most in need, raising rural incomes, and expanding employment opportunities and contributing to a growth in exports. This requires improved farm support services, pilot projects targeted at poor communities and a supportive policy environment.

  A sub-component of this pillar is for investment to respond to the growing frequency and severity of **disasters and emergencies** calls for some attention to rapid humanitarian interventions followed by rehabilitation before normal development can resume. IFAD recently observed that in addition to natural disasters, over 50 countries were facing or had recently undergone civil or cross-border conflicts, including some 20 poorest countries. As a result, emergency relief is an increasing share of development aid; IFAD also noted a troubling gap in the transition from relief to development – hence a need for

corrective action.[1] Furthermore, achieving an immediate impact on hunger also requires that the production-related investments be complemented by targeted **safety nets**. Failure to attend to unpredictable needs and to providing safety nets can easily derail long-term development. However, the actuarial basis for dimensioning investment is too weak. For lack of better information, therefore, Africa at this stage needs to at least provide some nominal resources: a figure starting at some US$3 billion annually is proposed, to decline progressively to US$2 billion annually by 2015. Together the "investment" in safety nets and humanitarian / emergency food and agriculture would require some US$34.5 billion between 2002 and 2015.

- **Agricultural research, technology dissemination and adoption**, the long-term pillar, aims at achieving accelerated gains in productivity and will require: (a) enhanced rate of adoption for the most promising available technologies so as to support immediate improvement of African production by way of linking, more efficiently, research and extension systems to producers; (b) technology delivery systems that quickly bring innovations to farmers and agribusinesses so making increased adoption possible, notably through an appropriate use of new information and communication technologies; (c) renewing the ability of agricultural research systems to efficiently and effectively generate and adapt to Africa new knowledge and technologies, including biotechnology, needed to increase output and productivity while conserving the environment; and (d) mechanisms that reduce the costs and risks of adopting new technologies.

0.3 Investment estimates

The implementation of the programme will be undertaken at regional level in co-operation with regional economic organisations and unions and also at national level.

Preliminary estimates suggest that required investment in these three pillars between now and 2015 would have the order of magnitude given below. Converting them to reality will involve the formulation of specific bankable projects; a task for which NEPAD may wish to involve its external partners as it co-operates with its participating countries and their regional organisations. The total outlay (including operations and maintenance) for the three pillars is some **US$ 204.5 billion** to 2015 (of which US$68.2 billion for operations and maintenance), apportioned as follows:

- **Extending the area under sustainable land management and reliable water control systems**: Increasing the area under irrigation (new and rehabilitated) to 20 million ha and improving land management on the same area: **US$37 billion**.

- **Improving rural infrastructure and trade-related capacities for market access: US$92 billion** of which US$62 billion would be for rural roads and US$2.8 billion for trade-related capacities for improved market access. To protect these investments would require additional allocations for continuing operation and maintenance totalling some **US$37 billion** over the period.

- **Increasing food supply and reducing hunger:** Raising the productivity of 15 million small farms through improved technology, services and policies: **US$7.5 billion.**

The above implies an annual investment in core activities under the "three pillars" aimed at immediate improvement of some **US$14.7 billion** between 2002 and 2015, including operations and maintenance costs. Excluding the operations and maintenance costs would reduce annual investments to **US$9.8 billion**.

[1] IFAD, 1998: IFAD Framework for bridging post-crisis recovery and long-term development. International Fund for Agricultural Development, Rome. Executive Board, 64th session, Document EB 98/64/R.8. From http://www.ifad.org/

Systematically paying attention to safety nets and emergency related food and agriculture, as indicated earlier, would raise the estimated 2002-2015 investment requirement total to some **US$240 billion**, equivalent to an annual outlay of some **US$17.2 billion** (just over 90 percent of Africa's annual cost of food imports). This has included safety net programmes such as a possible school-feeding programme based mainly on community-managed school gardens for children.

Taking into account the investment in **agricultural research, technology dissemination and adoption** will, according to the Forum for Agricultural Research in Africa (FARA), will require investment for the period 2002-2015 of some US$ 136.2 billions. The estimate fails to fit into the context of an overall NEPAD priority investment programme investment estimate of only US$240 billions over the period – it would make research alone represent some 60 percent of total NEPAD agricultural investment. Put another way, the investment in research, technology and extension would nearly equal the combined total proposed for land and water, rural infrastructure, trade-related capacities, and food security. Accordingly, as indicated in Appedix table 10, this estimate of research investment (including for the projects indicated in chapter 5), and which are yet to be discussed by the main constituencies, clearly need a re-look.

It is believed that an important part of funding can come from investments by the beneficiaries themselves and from domestic resource mobilisation but for many countries, additional Official Development Assistance (ODA) and private inflows will be required, in line with the spirit of Monterrey. Indeed, for Monterrey, the three Rome-based UN agencies for food and agriculture issued a joint statement communicating this vision of shared responsibility.[2]

0.4 Africa's contribution to investment

Africa's own commitment to funding agriculture should be seen against a background of re-emerging international recognition that funding agriculture is vital for sustainable development. Worldwide, industrial countries, which can easily do without agriculture and still prosper, continue to finance their agriculture sectors heavily. Africa, with some 70-80 percent of its people dependent on this sector, needs to emulate their example. Financing for agriculture under this NEPAD CAADP is therefore based on the dual assumption that Africa itself will increase its level of investment and that its external partners will come forward and support it.

On this basis, the CAADP presents a preliminary estimation of what Africa itself can reasonably afford to invest, leaving the rest to be raised at the international level. The broad assumptions given in Chapter 1 suggests that Africa should progressively increase its domestic contribution to agricultural investment from a current base estimated at somewhere over 35 percent to some 55 percent by 2015 (Table 2). Under this scenario, Africa's expected contributions to investment under NEPAD agriculture could be summarised as shown in Table 1. It should be noted that the African share covers both public and private funding. To achieve it in practice will require deliberate insertion of NEPAD allocations in national and regional economic groupings' budgets; more importantly, it will require putting in place policies that can make agricultural investments attractive to the region's own private sector.

0.5 Enabling conditions for action

[2] FAO / IFAD / WFP (2002): Reducing poverty and hunger: the critical role of financing for food, agriculture and rural development. Paper prepared for the International Conference on Financing for Development, Monterrey, Mexico, 18-22 March 2002. The report (revised version, May 2002, page 4-5) states, *inter alia*: "*The responsibility for escaping from hunger and poverty rests first and foremost with the individuals themselves, and then with their families, communities and governments. . . . . The proportion of public expenditure which developing countries now devote to agricultural and rural development and food security is, however, far from adequate, especially in countries where food deprivation is higher, implying a need to adjust public finance policies. However, the international community has important roles in supporting national endeavours, ... especially those of low income countries, to meet the costs of the necessary investments to the extent that these cannot be met by their own resources*."

Much of the investment under the three pillars is into the "hardware" of development – it is intended to respond to the crisis situation facing African agriculture. Yet Africa also needs to address many other "software" issues if it is to permanently reverse the declining trends of the agricultural sector. A brief outline of these "software" concerns – many focused on creating an enabling environment[3] - is presented in Chapter 1.

In the preamble, it has been stressed that enabling factors require medium to long term attention and that Africa needs to continue paying attention to them even now when rapid action may appear to be all that is needed. It has also been said that the rapid action proposed is possible because there is already some available capacity, technology and enabling policy/institutional factors upon which the three-pillar investment approach can be based. Thus in justifying the focus on investment for action under the three mutually reinforcing "pillars" that can make the earliest difference to Africa's dire situation, the preamble has stated that science and technology, policy and institutional reform, capacity building and other long-term enabling factors should be integrated into implementation of all the "pillars".

It is an underlying assumption that the creation of enabling conditions will go hand in hand with investment, otherwise it becomes an empty exercise, with little hope of success or of acceptance by Africa. Thus, for example, the decades-long efforts at structural adjustment of African economies, policies and institutions show little discernible benefits except in isolated cases.

[3] It may be noted that in its Action program for Africa, the Kananaskis Summit of the G8 (25-27 June, 2002) also focused on enabling conditions as reproduces in the extracts of Annex 2. This focus makes the support of Africa's potential leading external partners complementary to the immediate action focus of the CAADP. The two approaches can be synergistic and it is hoped that no party will seek to pursue one as an alternative to the other but as mutually reinforcing areas of emphasis.

Chapter 1

Underpinning Investments in African Agriculture and trade-related Capacities for improved Market Access: A Continental Vision

1.1 Introduction - purpose of the document

This document, which presents the Comprehensive Africa Agriculture Development Programme (CAADP) of NEPAD, is directed at Africa's policy makers in NEPAD's own institutions; at national policy makers in both public and private sectors; at those who influence public opinion through non-governmental institutions; at academia and think tanks concerned with Africa's development; and at officials in the development co-operation agencies of donor and multilateral bodies. It is prepared to present broad themes of primary opportunity for investment to reverse the crisis situation facing Africa's agriculture, which has made the continent import-dependent, vulnerable to even small vagaries of climate, and dependent to an inordinate degree on food aid.

This document is not a blueprint, nor is it a manual for stepwise action to uplift African agriculture. It is also not a shopping list of projects – indeed, it has no specific project on offer for investors[4]. It is believed that its main contribution is in sensitising policy-makers that they need to act on selected fronts in order to make a quick difference to Africa's agricultural malaise:

- pay immediate attention to management and use of water for agriculture so that the important task of food production is not at the mercy of fickle weather;

- in order to ensure competitiveness, invest in better infrastructure to facilitate access to rural areas and thereby reduce the costs of production, storage and extraction of produce to markets. In parallel with this, they should pay attention to trade-related capacity building so as to enhance Africa's market access;

- apply at farm level modern productivity enhancing practices, using properly adapted approaches tested under the special programme for food security;

- build readiness and response capacity to natural and man-made disasters which, if left unattended, can undermine or reverse any gains in productivity that the other interventions can achieve; and (e) research, development, promotion of adoption as an important long-term guarantor of productivity and therefore competitiveness.

The document title promises a "comprehensive" programme but in fact the contents deliberately focus on a few pillars of action that can most rapidly enable Africa to be more productive in agriculture. In a continent that is the world's poorest but which spends over US$18 billion annually on agricultural imports, accounts for a quarter of global food aid disbursements, and suffers most from man-made and natural disasters, the decision to focus on what makes the earliest difference has been an obvious one.

However, Africa can at the same time not afford to ignore globally recognised lessons which show that development is easiest if the environment for it is right: appropriate knowledge and human capacities, supportive policies, laws, institutions and attitudes – all these, as well as capacity are important. Thus, while stressing the pillars listed above for immediate action, the CAADP makes reference to enabling conditions –

[4] A minor exception is Chapter 5 on research and technology which outlines five uncosted projects.

but leaves further elaboration for other documents and for the longer term. One exception is made: the issue of research and technology. It has been the strong view of the NEPAD Steering Committee and of the June 2002 meeting of Africa's ministers responsible for agriculture that the CAADP needs to include a pillar on this crosscutting need, even though its impacts are of a long-term nature.

1.2 Evolution of the CAADP document

As indicated in the preamble, this document has, at the invitation of the NEPAD Steering Committee, been prepared by FAO in co-operation with the NEPAD Secretariat. It has been prepared following a consultative process, the key elements of which have been as follows:

- *March 2002*: Presentation of the main themes of potential CAADP contents by the FAO Director General of FAO to the NEPAD Heads of State Implementation Committee in Abuja, Nigeria;

- *End April 2002*: Circulation for review and comment of a first draft (at that stage as a summary and three separate papers). Distribution was to all African Ministers of Agriculture and for African integration; the Heads of African Regional Economic Organisations; the Chairman and members of the NEPAD Steering Committee; the Heads of the African Development Bank and of other selected African sub-regional development banks; the Head of UN Economic Commission for Africa; World Bank agriculture experts; information copies to the Organisation for African Unity;

- *Early May 2002*: Consolidation of the separate papers into the unified Comprehensive Africa Agriculture Development Programme document and integration of the comments received on the April drafts;

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- *End May 2002*: Recasting of the CAADP draft to take account of the proposals and comments of the NEPAD Steering Committee and circulation to same network of reviewers and commentators.

- *June 2002*: Meeting of African Ministers of Agriculture (joined by some members of the NEPAD Steering Committee) (Rome, 9th June) to review the CAADP (See Annex).

- *July 7*-9: Durban informal meeting on finalisation of the CAADP and integration of the research component into it.

In revising it, the process has benefited from an earlier strategy document prepared by the NEPAD Secretariat; written inputs from IFAD; and text for the research aspect (Chapter 5) provided by the Forum for Agricultural Research in Africa (FARA) in co-operation with the World Bank. Chapter 5 in fact followed a different path from the rest, with its series of consultations having been within the research community (rather than with governments).

1.3 African Agriculture in Crisis

Africa, most of whose people are farmers, is unable to feed itself and has been in this situation for many decades now. The number of chronically undernourished people has risen from 173 million in 1990-92 to some 200 million in 1997-99. Of these, 194 million (34 percent of the population) are in Sub-Saharan Africa.

At the same time, there has been a progressive growth in food imports in the last years of the 20th century, with Africa spending an estimated US$18.7 billion in 2000. Africa's share of global agricultural imports in

1998 was 4.6 percent. Its share of developing country imports was 16.3 percent. Agricultural imports account for about 15 percent of total African imports. It is of particular concern that the share of gross export revenues needed for importing food has increased from 12 percent to over 30 percent in East Africa. Part of Africa's "imports" is food aid, with the continent receiving 2.8 million tons in year 2000. In the mid-1990s, out of the world total of 32 million victims of disasters receiving relief assistance from the World Food Programme (WFP), 21.5 million were living in Africa. In 2001, the number of people suffering from food emergencies ranged between 23 and 28 million. In terms of exports too, agriculture has generally performed poorly, with the relative share of African agricultural exports in world markets falling from 8 percent in 1971-80 to 3.4 percent in 1991-2000. The value of agricultural exports, which amounted to US$14 billion in 2000, is growing extremely slowly, having been US$12 billion in 1990.

Food insecurity is greatest in Sub-Saharan Africa. Between 1990-92 and 1997-99 daily per capita dietary energy supply in Sub-Saharan Africa rose slightly from 2120 to 2190 kcal. The number of chronically under-nourished people, however, increased from 168 to 194 million during the same period. Imports of cereals by Sub-Saharan countries are estimated at some 17 million tons in 2000, including 2.8 million tons of food aid. Much of the solution to poor nutrition lies with expanding production in Africa itself: it may be noted that globally, even after the doubling of world grain supplies, the share of trade in total grain consumption has remained stable at about 10 percent. Thus, by and large, most of the world's food consumption takes place in the countries in which it is produced. In low-income countries, this dependence on production to ensure adequate food supplies is more acute.

This food shortage is a source of enormous concern. It is estimated that if the self-sufficiency ratio in Sub-Saharan Africa is to stay the same in 2015 as in 1995-97 (about 85 percent), the sub-continent will have to meet 118 million tons of its projected needs of 139 million tons of cereals through increased production in the region itself, requiring a substantial increase of output. These stark realities highlight the huge scale of the problem.

It is, however, also possible to look at the food gap as a tremendous opportunity. The existence of such large shortfalls provides a potential market for small farmers, amongst whom poverty and hunger are concentrated, to expand their output and improve their livelihoods, in turn enabling countries to reduce their import dependence. For this to happen in a situation of increasingly liberalised international markets, however, farming within the Region must become more competitive.

Until the incidence of hunger is brought down and the enormous costs of importing food supplies is reduced by raising the output of farm products which the region can produce with comparative advantage, there is little prospect of achieving the high rates of economic growth to which NEPAD aspires. People suffering from hunger are marginalised within the economy, contributing little to output and still less to demand; they are also constantly vulnerable to shocks. Agricultural-led development is fundamental to cutting hunger, reducing poverty, generating economic growth, reducing the burden of food imports and opening the way to an expansion of exports.

1.4 Importance of agriculture and challenges in tapping its potential

1.4.1 Importance

Agriculture, providing 60 percent of all employment, constitutes the backbone of most African economies; in most countries, it is still the largest contributor to GDP; the biggest source of foreign exchange, still accounting for about 40 percent of the continent's hard currency earnings; and the main generator of savings and tax revenues. The agricultural sector is also still the dominant provider of industrial raw materials with about two-thirds of manufacturing value-added in most African countries being based on agricultural raw materials. Agriculture thus remains crucial for economic growth in most African countries.

The rural areas, where agriculture is the mainstay of all people, support some 70-80 percent of the total population, including 70 percent of the continent's extreme poor and undernourished. Improvement in agricultural performance has potential to increase rural incomes and purchasing power for large numbers of people Thus, more than any other sector, agriculture can uplift people on a mass scale. With greater prosperity, the consequent higher effective demand for African industrial and other goods would induce dynamics that would be a significant source of economic growth.

For best contribution, it will be important that development initiatives under any component of the NEPAD framework be supportive of or compatible with agriculture, given its fundamental role in economic development in Africa. For example, NEPAD's activities on good governance, infrastructure, policy reform, human resources development etc. all help to create an enabling environment for farmers to contribute more to Africa's economic development. In short, agriculture must be the engine for overall economic growth in Africa.

1.4.2 Challenges and basis for response

However, there should be no illusion of quick fixes, or miracle paths, towards African self-reliance in food and agriculture. Achievement of a productive and profitable agricultural / agro-industrial sector will require Africa to address a complex set of challenges, including the following:

- low internal effective demand due to poverty;
- poor and un-remunerative external markets (with declining and unstable world commodity prices and severe competition from the subsidised farm products of industrial countries;
- vagaries of climate and consequent risk that deters investment;
- limited access to technology and low human capacity to adopt new skills;
- low levels of past investments in rural infrastructure (such as roads, markets, storage, rural electrification, etc.) essential for reducing transaction costs in farming and thereby increasing its competitiveness in serving production, processing and trade; and
- institutional weaknesses for service provision to the entire agricultural chain from farm to market.

Furthermore, Africa will also need to improve the policy and regulatory framework for agriculture to make it more supportive of both local community participation in rural areas and commercial private sector operations. It will need to improve governance, in terms of giving a voice to both small and large-scale players in the farming community.

If such constraints are eased through a combination of actions, a virtuous cycle can be started of reduced hunger, increased productivity, increased incomes and sustainable poverty reduction. All the above require commitment of a high order. Regrettably, the past decades have revealed that Africa's governments themselves as well as bilateral and multilateral development partners pay little attention to agriculture and rural development. Many African governments are reported to allocate as little as under 1 percent of their budgets to this sector. The World Bank, a prime funding source for Africa, had 39 percent of its lending going to agriculture in 1978, but only 12 percent in 1996 and further down to 7 percent in 2000.

1.5 NEPAD – overall vision and agriculture in context

The New Partnership for Africa's Development (NEPAD), hitherto known as the New African Initiative, resulted from the merger of the Millennium Partnership for the African Recovery Programme (MAP) developed by Presidents Mbeki of South Africa, Obasanjo of Nigeria, Bouteflika of Algeria and Mubarak of Egypt, and the Omega Plan proposed by President Wade of Senegal. The NEPAD is spearheaded by a core group of five countries namely, South Africa, Nigeria, Senegal, Algeria and Egypt, and an Implementation Committee of 15 Heads of State. South Africa hosts the Secretariat of NEPAD. The President of Nigeria Chairs the Implementation Committee of 15 Heads of states and Governments, with those of Senegal and Algeria serving as Vice-Chairs. Under NEPAD, which is a project of the Organisation of African Unity / African Union, African Heads of State and Government have adopted an overall vision of Africa's development, which states *"We agree on the overall vision of Africa's development: a prosperous continent free of conflict in which all our people can fulfil their potential, that participates effectively in the global economy on an equal footing".*

Realising that Africa can only take its proper pace in the international community if it gains economic strength, African Heads of State and Government have set an ambitious target of 7 percent annual growth rate in GDP over the next 20 years to eradicate poverty, achieve food security and build the foundations of sustainable economic development on the continent.

NEPAD, which seeks to complement other African initiatives and to use existing frameworks for action, concentrates on priorities organised under two broad themes: *Peace, Security, democracy and political governance* and *Economic and corporate governance.* Specific themes include:

- Peace, Security
- Democracy and political governance
- Infrastructure
- Human Resource (education, skills development, reversing the brain drain)
- Health
- Agriculture
- Access to markets
- The Environment
- Culture
- Science and Technology.

For all these, NEPAD intends to mobilise domestic and external resources and to establish new forms of partnership with the domestic and international communities.

1.6 A vision for African Agriculture

Within the overall vision of NEPAD, the vision for African agriculture should seek to maximise the contribution of Africa's largest economic sector to achieving the ambition of a self-reliant and productive Africa that can play its full part on the world stage. In essence, agriculture must within NEPAD, deliver

broadly based economic advancement which other economic sectors, such as petroleum, minerals and tourism, may also contribute significantly to but cannot achieve on the mass scale that agriculture has potential to do. The NEPAD goal for the sector is an agricultural-led development that eliminate hunger, reduces poverty and food insecurity thereby opening the way for an expansion for exports and put the continent on a higher economic growth path within an overall strategy of sustainable development and preservation of the natural resource base.

Text Box 1: NEPAD Agriculture and the Millennium Development Goals

In the year 2000, African countries signed up to the Millennium Declaration. The Declaration, which defined eight Millennium Development Goals (MDGs) and 18 more detailed targets, represented a determination by all governments to create and environment, at the national and international levels, which is conducive to development and the elimination of poverty by 2015. The MDGs, and particularly its goals of eradicating extreme poverty and hunger and ensuring environmental sustainability, are crucial for the NEPAD programme for African agriculture: specifically, member countries should expect NEPAD interventions to fall within the framework of the MDGs, and to contribute to their achievement.

In Africa as elsewhere in the developing world, Poverty Reduction Strategies are increasingly used the national level as the vehicle through which governments seek to operationally their agriculture and rural development strategies. There is, therefore, a clear and two-way relationship between the NEPAD programme for African agriculture and the Poverty Reduction Strategies: on the one hand, the contents of the national strategies will determine the content of NEPAD's approach to agricultural development; while on the other, NEPAD can be increasingly expected to inform the preparation and revision of Poverty Reduction Strategy Papers (PSRPs).

The vision for agriculture is that the continent should, by the year 2015:

- Attain food security (in terms of both availability and affordability and ensuring access of the poor to adequate food and nutrition);
- Improve the productivity of agriculture to attain an average annual growth rate of 6 percent, with particular attention to small-scale farmers, especially focusing on women;
- Have dynamic agricultural markets among nations and between regions;
- Have integrated farmers into the market economy including better access to markets, with Africa to become a net exporter of agricultural products;
- Achieve more equitable distribution of wealth;
- Be a strategic player in agricultural science and technology development; and
- Practice environmentally sound production methods and have a culture of sustainable management of the natural resource base (including biological resources for food and agriculture) to avoid their degradation.

1.6 Enabling Conditions for African Agricultural Development

Africa has some success stories and these demonstrate the enormous potential that the agricultural sector can offer as an engine of economic growth. The NEPAD programme recognises these and a wide range of constraints hindering progress in African agriculture, of which attention can be drawn in particular to: limited incomes and therefore constrained markets; how to ensure large-scale adoption of locally adapted agricultural technologies to remove the constraints to productivity; how to make the predominant small-scale production in a world dominated by large-scale producers, many of whom are subsidised; and how to bring about institutional innovations that will enable the African agricultural community to maintain efficient and dynamic, demand-driven, participatory and pluralistic systems; climatic uncertainty and lack of access to irrigation; Africa also faces inadequate and inefficient agricultural systems; and weak institutional support (including in research and extension). Agriculture operates in an environment that in many African countries has some of the following attributes that need attention if the environment is to be enabling:

- a sparse and dispersed domestic market expensive to serve due to lack of concentrated demand and respectable disposable incomes;
- an international market where prices are falling and unstable; which is expensive to access (due to small volumes being traded and long distances from Africa's largely land-locked production sites); which demands sustained quantity and quality levels Africa has difficulty in meeting; where subsidised large-scale producers offer direct competition;
- production is dominated by large numbers of unorganised producers, many unskilled and therefore little able to absorb new technologies;
- farmers are generally small-scale players with no capital or access to capital necessary to improve production and begin to generate investable surpluses;
- The withdrawal of the state from direct production functions towards creating and maintaining a conducive climate for private sector initiatives has at times been rushed and, in the absence of a sound private sector, has caused severe dislocation of production and farm trade and of support services to them.

- poorly defined property rights inadequate to satisfy requirements of serious investors;
- in parts of Africa, the health status of farmers is deteriorating with the advent of HIV/AIDS.
- African agriculture has for long been starved of investment; the prolonged neglect has resulted in a poorly productive, uncompetitive and declining sector. The widespread hunger as well as the growing number of hard-core poor people in the continent are the distressing manifestations of this decline. In attracting limited investment, African agriculture mirrors the African economy in general, which is perceived to be uncompetitive, poorly productive, a risky venue for investment. In addition, however, agriculture in particular is often considered unattractive in comparison with other options, even if the macro framework for the economies were to be corrected.

Other impediments that should be corrected if the environment is to be enabling are in text box 2; text box 3 lists some specific measures that could be taken; agriculture-relevant elements highlighted by the G-8 in their Africa Action Plan (many of which relate to of the enabling environment rather than to action) are in Annex 2.

A particularly thorny element of the enabling environment in many countries is the issue of *accessing and controlling land*. In Southern Africa, where the land holding structure remains profoundly inequitable, improvements in the condition of the rural poor will depend on increased access to land; here programmes of fair, orderly and consensual land reform may be essential preconditions for sustainable agricultural development. In other parts of Africa, the challenge will be to ensure that poor people continue to control their land in the face of pressures from outsiders who, so far, are in a better position to profit from market development. This includes ensuring that women - the principal users of land - develop stronger rights over the land they work. There will be need to promote security of access by the poor, individually and in communities, in all areas where the rural poor perceive emerging livelihood threats.

Text Box 2: Selected Impediments to African Agricultural Renewal

Introduction: The widespread hunger as well as the growing number of hard-core poor people in the continent are the distressing manifestations of prolonged decline caused by too limited investment. It is in view of the critical need for injection of new capital that investment is the focus under the three "pillars" of the CAADP [land and water management (Chapter 2); infrastructure and trade-related capacities for improved market access trade-related capacities for improved trade-related capacities for improved market access (Chapter 3); and food security – both as safety nets/response to emergencies and support to productivity increase in agriculture (Chapter 4)]. Much of this intervention will consist of the "hardware" of agricultural development that is essential in responding to the crisis the sector is facing. Yet, Africa also needs to create enabling conditions to permanently reverse the decline and for this will need to pay attention to many other "software" interventions. Some of the "software" weaknesses as presented here have helped make the continent's agriculture low in productivity, uncompetitive, highly risky and dominated by low-value primary commodities.

Governance: Poor political and economic governance are twin root causes of much of the malaise that afflicts Africa. They create general political and economic uncertainty, an unpredictable environment for business, political unrest and, sometimes, even war that make pursuit of economic growth difficult. The issue of participation is also critical; IFAD observes for Western and Central Africa that "First and foremost, the poor have little or no voice in many major decisions affecting their livelihoods"[5]

Policy and institutional weaknesses: Poor governance also creates an environment inimical to efficient investment of human and material resources and undermines formulation and implementation of policies and laws that can accelerate the process of economic growth and development. In the specific case of agriculture and

[5] IFAD Strategy for rural poverty reduction in Western and Central Africa. http://www.ifad.org/operations/regional/2002/pa/pa.htm

rural development (broadly defined) improvements are sorely needed to adapt to changing market conditions and food security priorities. This involves overcoming institutional rigidities and ensuring: coherence of macro-economic frameworks. Policy, regulatory and institutional shifts are required to enable all levels of farming practice to have a stable engagement with natural resources and markets. New capacities in both the public and private sector are required. Systems of rights and land tenure arrangements need updating together with a reduction of gender-bias in policies.

Technological stagnation: African agriculture faces technological stagnation and needs to exit from excessive reliance on fickle weather conditions. It needs to increase the research and development effort as well as extension outreach. For better capacity to progress technologically and to close the technology gap, however, improved educational level of rural people is probably the most critical precondition. Combating HIV/AIDS, which in some countries is rapidly decimating the age groups with best potential for technologically upgrading agriculture, is essential.

Weakness of entrepreneurship and the private sector: Many African countries have no local private sector to speak of in the agricultural and agro-industry sectors. While it is now fashionable to speak of the African "smallholder" as the region's true private sector, the reality gives cause for great concern. The African smallholder of today may be private but lacks education; has severely limited access to communications or physical infrastructure; suffers poor health and nutrition; lacks remunerative markets and access to yield-enhancing inputs; faces competition with products from abroad that have been subsidised by more money than s/he can ever dream of. This farmer may constitute a "private sector" but cannot stand alongside and compete with multinational farming and agroindustry giants that trade with Africa. Whether labelled as private sector or otherwise, the smallholder farmer class also often suffers marginalisation, with no voice to influence policy in favour of its mainstay activity and to secure support services that are tailored to its particular needs. Africa cannot afford to be lured into complacency by references to a large smallholder private sector; it needs to develop a true rural entrepreneurial capacity. Successful entrepreneurship requires fair prospects for competitive access to markets both at home and internationally and the information to enable the farmer get the best from such markets.

Other concerns: The diversity of areas requiring attention is nearly limitless. From this can be selected: (a) inadequate targeting of attention on the particular needs of women who are the dominant agricultural producers, traders and nutrition providers in many parts of Africa; (b) limited specialisation in production and inadequate significance of any one country or of the region to influence global markets; (c) unclear definition of roles among the public, private and civil society institutions in development; (d) poor harmonisation of agricultural development promoting initiatives at national, sub-regional and continental levels; (e) inability to systematically mobilise savings for reinvestment; (f) disengagement from or poor performance of cash crops that were formerly important for rural incomes.

Text Box 3: A selection of possible principles NEPAD could consider for creating a positive environment for agricultural development

1. Establish and maintain a sound macroeconomic policy framework and an open economy based on continued and enhanced economic reforms, liberalised exchange and trade systems and investment regimes, strengthened institutional, legal and regulatory systems, reformed state institutions that operate with transparency, accountability, competence and professionalism, and the rule of law.
2. Ensure efficient physical infrastructure through regulatory reforms, privatisation, and additional investments in key infrastructure (including road/rail transport, telecommunications, power, ports, shipping and transit facilities), harness modern information and communications technology, and encourage private sector participation in infrastructure financing and operation.
3. Encourage and promote the growth, diversification, and deepening of the financial sector so as to facilitate savings mobilisation to meet the investment and working capital requirements of business, within the context of a deregulated but prudentially supervised system of financial intermediation.
4. Removing obstacles to cross-border trade and investment, including harmonising tax and investment codes to promote regional integration.
5. Undertake measures to enhance the entrepreneurial, managerial and technical capacities of the private sector.
6. Strengthen national and sub-regional mechanisms for investment and trade promotion by disseminating information about business opportunities, identifying and targeting prospective investors and export markets, servicing investors, and providing export credit and insurance schemes.
7. Strengthen chambers of commerce, trade and professional associations, and regional networks to provide market information and training for their members, in order to promote exports and investment.
8. Organise dialogue between government and private sector to develop a shared vision of economic development strategy and remove constraints to private sector development.
9. Strengthen and encourage the growth of micro, small, and medium-scale industries through appropriate technical support from service institutions and civil society, and improve industries' access to capital by strengthening micro-financing schemes, with particular attention to women entrepreneurs.
10. Provide assistance to improve technical and managerial capabilities of business enterprises by supporting technology acquisition, production improvements, and training and skills development.

Source: *Working for household food security and economic prosperity in Africa.* National Department of Agriculture (South Africa) on behalf of NEPAD Secretariat. [First NEPAD provisional agriculture strategy paper – presented at 22nd FAO Regional Conference for Africa, Cairo, February 3 – 8, 2002 and later updated].

1.7 Pillars for priority investment

The picture of African agriculture portrayed earlier speaks of crisis. It also demands crisis response, hence the proposed initiatives under the NEPAD Comprehensive Africa Agriculture Development Programme (CAADP) as currently formulated focus on investment into three "pillars" that can make the earliest difference to Africa's agricultural crisis – land and water management (Chapter 2); infrastructure and trade-related capacities for improved market access trade-related capacities for improved trade-related capacities for improved market access (Chapter 3); and support to productivity-increasing activity among small farmers in the context of food security programmes (Chapter 4). The long-term capacity to maintain competitiveness by ensuring high productivity is to be ensured by research and development, allied with technology dissemination for widespread and effective adoption (Chapter 5).

1.7.1 Pillar 1: Land and Water Management

World-wide, the application of water and its managed use has been an essential factor in raising productivity of agriculture and ensuring predictability in outputs. Water is essential to bring forth the potential of the land and to enable improved varieties of both plants and animals to make full use of other yield-enhancing production factors. By raising productivity, water management (especially when combined with adequate soil husbandry) helps to ensure better production both for direct consumption and for commercial disposal, so enhancing the generation of necessary economic surpluses for uplifting rural economies.

Chapter 2 provides details about opportunities for Africa to capitalise on the existence of about 874 million hectares of Africa's land that is considered suitable for agricultural production, including increasing the managed use of water. It reports on substantial untapped potential for the development of the continent's water and land resources for increasing agricultural production. FAO estimates that the current area under managed water and land development totals some 12.6 million ha[6], equivalent to only some 8 percent of the total arable land. Currently, the percentage of arable land that is irrigated is barely 3.7 percent in Sub-Saharan Africa, a figure that rises to 7 percent in Africa as a whole given that 40 percent of the total irrigated area is in North Africa. These are the lowest percentages in the developing world: the corresponding percentages are 10, 29 and 41 for South America, East and South-East Asia and South Asia respectively. Substantial public and private investments in developing and improving the management of these land and water resources will be essential to enable African countries reach the levels of agricultural production required to meet the Millennium Goals for poverty alleviation, food production and economic recovery by 2015.

The chapter makes the point that protecting and improving the soil also makes good business sense. Research in one country has shown that on relatively good soils initial nutrient recovery was only about 30 percent, but after 4 to 7 years of soil improvement, nutrient use efficiency increased two to three times. It draws attention to Africa's poor record relative to other regions and ample room to catch up, including in fertiliser use which in Africa is only around 20 kg (nutrients) per ha of harvested land per year, and is even lower in Africa south of the Sahara at 9 kg per ha of arable land. The corresponding figures are 100 kg/ha for South Asia, 135 kg/ha for East and Southeast Asia, 73 kg/ha for Latin America and 206 kg/ha for the industrial countries.

Chapter 2 refers to projections of investments required for ***land and water development*** until 2015, which are based mainly on the expert study undertaken for the 1996 World Food Summit, and subsequently updated on the basis of the AT2030 report to be published in June 2002 and FAOSTAT and AQUASTAT updates.
It provides estimates of required investments for productive water and land development, which are: (i) small-scale irrigation developments, including small-scale informal irrigation, humid lowland developments, as well as land improvement activities (14.2 million ha); (ii) upgrading and rehabilitation of existing large-scale irrigation systems (3.6 million ha); and (iii) development of new, large-scale schemes (1.9 million ha). The full benefits of such infrastructure investments, in terms of increased productivity and competitiveness and improved access to markets will take time to materialise. In the short-term, agricultural growth will respond primarily to expansion of domestic demand for food, including the demand created by targeted interventions aimed at meeting the food needs of those who are hungry.

The chapter indicates that by making possible rapid increase in production, irrigation can make food more readily available but that its impact on reducing hunger depends on appropriate arrangements for the poor to have access to irrigated lands. Irrigation, even on a small scale, carries investment and maintenance costs that the poorest may find beyond their capacity. To enable them to benefit from it thus requires deliberately supportive policy frameworks that facilitate access and enable the poor to have the capacity to use the higher-value land to its potential. It also makes the point that increased irrigation is not a panacea for all agricultural ills and that there are strong synergies between irrigation and other principal sources of agricultural growth such as better husbandry of soils and resources in general, fertiliser, improved plant varieties, upgraded

[6] FAO. 2000. Agriculture Towards 2015/30 estimates.

infrastructure and better integration into markets. It therefore calls for Africa to carefully sift lessons from its difficult experiences with large-scale irrigation in the past. The institutional and policy weaknesses responsible for severe underuse of earlier schemes must be corrected to ensure future success in this area.

Chapter 2 reports the investment requirement of some US$37 billion (Appendix Table 2)[7] of which immediate investment requirements (2002-2005) are estimated at US$9.9 billion, short term investment requirements (2006-2010) at US$20.1 billion and medium term requirements (2011-2015) at US$6.8 billion. In addition, operation and maintenance requirements[8] for all categories of land and water improvement are estimated to reach annually, by the year 2015, some US$3.8 billion; equivalent to an overall expenditure throughout the period of some US$31 billion. To make the greater production that irrigation and land improvement make possible worthwhile, other investments are necessary in infrastructure and facilitation of market development and access – Chapter 3 gives estimated requirements for this. The application context for irrigation and land husbandry so that they can help uplift the poor is provided by Chapter 4, which presents community-oriented programmes for food security.

1.7.2 Pillar 2: Rural Infrastructure and trade-related capacities for improved market access

Infrastructure

Chapter 3 deals with complementary investments in rural infrastructure, particularly rural roads, storage, processing and market facilities, that will be required to support the anticipated growth in agricultural production and improve competitiveness of production, processing or trade in crop, livestock, forestry or fishery sub-sectors. Information on infrastructure is poor for all sub-sectors but perhaps particularly so for livestock, except where this activity is highly commercialised as in South Africa and parts of Zimbabwe and Botswana. Dualism in access to infrastructure is notable, with industrial production far better served than the artisanal part whether in crops, livestock fisheries or forestry.

Africa's rural infrastructure is inadequate by almost any measure and its road network is particularly underdeveloped. Africa's people face the longest distances to nearest large markets. A rapid look at the overall scene compared to other regions reveals the following: (a) a fifth of Africa's population is landlocked – all other regions have less than 10 percent; (b) less than a third of Africans live within 100 km of the sea compared to over 40 percent for other developing regions; (c) rail freight in Africa is under 2 percent of the world total, marine freight capacity 11 percent, and air freight less than 1 percent; (d) power generation capacity per capita in Africa is less than half of that in either Asia or Latin America.

The poor state of Africa's infrastructure reflects neglect of investment but also the fact that the level of production cannot often justify the required investment and maintenance costs. External investment in economic infrastructure[9] in the period between 1990 and 1996 for Sub-Saharan Africa had US$26.7 billion compared to US$41.4 billion for Latin America and the Caribbean and US$101.9 billion for Asia, of which some US$71.9 billion for East Asia alone. Further details on infrastructure and its absolute and comparative inadequacy are in Chapter 3, including regarding marine and air port infrastructure which is inadequate partly Africa has too little trade that could justify necessary investments. The chapter calls for priority to be given to the recovery of the current degraded stock of rural infrastructure to its full operational capacity and for

[7] A breakdown of areas and associated investment estimates by Regional Economic Organization is shown in Table 8 (Chapter 2). No totals for Africa should be derived from the Regional Economic Organizations' totals since country membership overlaps, with some countries belonging to two or three organizations, in particular SADC and COMESA; and ECOWAS and UEMOA which have a very high multiple country membership.

[8] Including allowances for both institutional strengthening and the recurrent costs of the organisations responsible for operation and maintenance.

[9] Including communications, energy, transport, water, sanitation. *Sources*: UNCED Secretariat; Euromoney 1997/98 Annual report.

institutional support for capacity building and training in support of all levels and types of institutions[10] responsible for the planning, design, construction and continuing operation, maintenance and management of infrastructure.

Trade-related capacities for improved market access

Africa's share of overall world trade is insignificant and continues to decline. According to a recent G-8 report,[11] Africa's exports account for only 1.6 percent of global trade despite Africa having 13 percent of the population. In agriculture, the share of Africa in world exports has dropped steadily, from 8 percent in 1971 - 1980 to some 3.4 percent in 1991-2000. These numbers are causes for concern in that if it continues to matter so little economically, it will continue to be hard for Africa to be taken seriously in any sphere of international affairs; furthermore, these numbers suggest that Africa is in no position to influence world prices – it must be a price taker for most of what it exports, including in agricultural trade.

Reversing the decline in Africa's share of international trade will require increased efforts by the African countries, with the assistance of the international community, to alleviate their domestic supply-side constraints. These can broadly be divided into structural constraints, which are particularly prevalent in Sub-Saharan Africa and concern their high dependence on a limited number of export commodities, weak technological capacities, inadequate legal and regulatory institutional frameworks and insufficient transport, storage and marketing infrastructure, and policy-induced constraints resulting from trade and macroeconomic policies that have biased the structure of incentives against agriculture and exports.

Globalisation was expected to offer opportunities for growth and development, but in case of Africa, the hopes and promises attached to rapid liberalisation of trade and finance have not so far been fulfilled. Export patterns continue to be characterised by a small number of primary (often plantation-based) commodities and dependency on preferential access to a few developed-country markets. An important reason for this is the supply-side constraints in the countries themselves. But others have their origins elsewhere.

Competition from industrial countries is hard for Africa to face: under agricultural and trade policies of industrialised countries in 2001 alone, total subsidies to agriculture by OECD countries were estimated at over US$311 billion. Rich countries also currently have the option of granting direct export subsidies on agricultural products to the tune of US$14 billion. These domestic and export subsidies not only undermine export potential of non-subsidising developing countries, but also make it difficult for their products to compete with cheap imports into their own economies. While in the short-term poor consumers in developing countries benefit from lower world prices, in the longer term there are disruptive effects on the viability of agriculture, due to the irreversible flow of resources from the sector.

Developed country markets dominate trading opportunities for African agricultural exports[12], and their conditions of access are of critical importance. Despite progress made in the implementation of the Uruguay Round Agreements, support to agriculture in developed countries continues to be high, tariff peaks still persist in several products (sugar, meat and horticultural products), and tariff escalation still prevails in several important product chains (e.g. coffee, cocoa, oilseeds, vegetables, fruits and nuts, and hides and skins). Unprocessed produce, which might have easier market entry, has generally low and declining prices, with dire consequences for the incomes of producer countries dependent on them.

[10] Ranging from central to local level and decentralized government entities, representative bodies, private sector actors, NGOs and CBOs, etc.

[11] G8 Africa Action Plan Highlights. Kananaskis Summit, Canada 26-27 June, 2002. http://www.g8.go.ca/kan-docs/afraction-e.asp

[12] Currently receiving more than 70 percent of African agricultural exports.

Meeting technical standards for export products, in the context of the WTO Sanitary and Phytosanitary Measures (SPS) and on Technical Barriers to Trade (TBT), remains a major challenge for all African countries. The gap in these standards between the African and richer countries is already high, and may grow wider unless a massive effort is undertaken to raise them. The gaps tend to be higher precisely on those value-added, processed products where global demand is elastic, as against primary agricultural products. To overcome these handicaps will require large amounts of investment in both facilities and human resources. Overall, African countries face many impediments in spurring diversified agricultural growth and in gaining from trade, despite the implementation of the Uruguay Round Agreement on Agriculture. But this also means that the scope for reforming the global trading system is immense, as well as the scope for strengthening supply-side capability in these countries to take advantage of new trading opportunities.

Within the context of intra-Africa trade in particular, the main constraints are: inadequate physical infrastructure, unstable market opportunities related to production variability, relatively small markets, lack of current market information and trading skills, uncertain policy environments, and rapidly changing trade regulations. Solution of these will require countries to develop regional or continent-wide technical standards for various sectors including plant protection and fisheries. A continent-wide approach, starting at regional level, may facilitate both the harmonisation of standards and the improvement of infrastructure and enforcement mechanisms – all in the context of compatibility with international recommendations in order to avoid adoption of norms that would create confusion, distort markets and, potentially, conflict with WTO agreements.

Given the hurdles Africa would continue to face in the global markets, regional integration may, despite its challenges, be the main viable way forward for African countries – it can force them to resolve the unnecessary bottlenecks that constrain even the limited trade opportunities further and thereby learn ways for dealing with the world. Intra-African trade can also be the learning ground for some trade opportunities coming out of the WTO dialogue. Collective positions are another area of opportunity, given that single African countries stand no chance in a world where even continental Africa is a marginal player in trade.

Actions in support of improving African countries' trade-related capacities for improved market access will, however, also include a number of policy and institutional related themes. For example, developed countries could improve access to their own agricultural markets and also help to build capacity in African countries to face the challenges and take full advantage of the opportunities flowing from the multilateral trading system. Attention will also be needed to addressing the weaknesses in their food safety and quality control systems. While these actions may improve the trading environment for exports, they will not necessarily result in an expansion. There is a clear need to diversify the production and export base (both horizontally and vertically) from low value-added to high value-added products.

Investment requirements

Investment requirements for ***rural infrastructure and trade-related capacities for improved market access*** are a function of more general socio-economic demands, in addition to underpinning the increased agricultural production. However, a substantial proportion of the existing rural road network is in a poor operational condition and, consequently, investments will have to include the rehabilitation of existing stock, as well as the construction of new works and overall maintenance. Hence, it is estimated that some 1.45 million km of roads will require rehabilitation (both unsurfaced and surfaced roads) and that 2.2 million km of new roads will need to be constructed. Unit costs for the ***other types of infrastructural investments*** have been derived on the basis of a range of current estimates from different sources (FAO[13], World Bank, and country data) and applied to the targets identified for each category of rural infrastructure. The investment requirements in rural infrastructure and other support to trade-related capacities for improved market access amount to some US$94

[13] FAO AQUASTAT. 1995. For water and land developments, adjusted for inflation; other costs based on 1996 WFS estimates (for storage, marketing and processing facilities) and World Bank/ILO/CIA (for rural roads), also adjusted for inflation.

billion. In addition, associated recurrent *operation and maintenance* requirements[14] are estimated to reach annually, by the year 2015, some US$3.7 billion; equivalent to an overall expenditure throughout the period of some US$37 billion (Appendix Table 1 plus Tables 18 and 19).

For rural infrastructure and trade-related capacities for improved market access, immediate investment requirements (2002-2005) –including operations and maintenance costs – would amount to some US$30 billion, while short-term requirements (2006-2010) would amount to some US$48 billion and medium-term requirements (2011-2015) would total some US$49 billion (see Table 2). One set of scenarios of apportionment of funding among the private and public, internal and external sources is given in Tables 20 and 21.

1.7.3 Pillar No 3: Increasing Food Supply and Reducing Hunger

For long, hunger has remained widespread in Africa. Despite gains in some countries, the threat of hunger remains a major peril for far too many people, with many adverse consequences for health and productivity of the population, reinforcing poverty. In Africa as elsewhere, the poorest and the most hungry tend to be one and the same people, living on the margin of survival and highly vulnerable to any shock. There is no doubt that eventually Africa will develop a diversified agricultural sector with commercial as well as smallholder farming. In the short-term, however, the need is for an immediate impact on the livelihoods and food security of the rural poor through raising their own production. Chapter 4 presents approaches to making an immediate impact on farmers' livelihoods through agriculture. It covers two things: (a) the need for Africa to deal with food security in the short-term perspective of disaster-induced food and agricultural emergencies; and (b) food security through enhancement of production.

Africa can itself do much to attain a higher level of food security but there is need for partnerships with other developing as well as industrialised countries and the multilateral system. Within countries, successful action requires partnerships among communities, governments and the private sector.

Emergency-related food security

Far too often, there is need for preparedness in Africa in the context of ***emergency-related food security.*** The number, scale and intensity of emergencies in Africa have all been increasing due to both natural disasters (especially droughts and floods) and human-caused calamities including civil strife and conflict. Wars and related factors have become the single most serious cause of food insecurity in much of the region.

Large numbers of Africans are displaced within or outside national borders by wars and productive lands are frequently flooded or rendered barren by drought; such extreme events can reverse overnight long-term agricultural development gains. Therefore, in looking at Africa's immediate needs for agricultural renewal, it is absolutely essential that the emergencies be kept in mind. The weakness of economies and of its institutions place Africa at a great disadvantage when calamity strikes. Thus, given its high indebtedness and current account deficit, Africa is obliged by emergency-related needs to divert its very scarce resources to food imports - it does so at a cost to investment in its future; Africa is a continent that is consuming without being able to create assets for the future. Therefore to ignore the emergency dimension would be a disservice to securing stable agricultural development in the region – Chapter 4 has a section on this area of need.

Associated with response to emergencies and their aftermath should be the creation of targeted safety nets by governments aimed at broadening access to food for persons who do not have the means of increasing their own food supplies, such as school children.

[14] Including allowances for both institutional strengthening and the recurrent costs of the organisations responsible for operation and maintenance.

Improvement of production

Food security can also be secured through ***improvement of production.*** The second part of Chapter 4 presents one approach towards promoting vigorous large-scale community-based programmes to improve the performance of small farms throughout the continent. It draws mainly upon the example set by the Special Programme for Food Security (SPFS), launched by FAO as a means of achieving and sustaining a higher level of household and national food security. In each country, the SPFS is planned within the broader vision of a National Strategy for Food Security and Agricultural Development. Thus the SPFS approach complements and builds upon already existing strategies and programmes for agricultural development and food security developed by African governments and regional organisations. It is implemented in two interrelated Phases. As detailed in Chapter 4, Phase I aims at enabling households and communities to attain higher levels of food security and better livelihoods, initially on a pilot scale but quickly followed by progressive scaling up. Phase II addresses food security issues at national level through creating an enabling policy and institutional environment for food security and supporting the preparation of bankable projects.

The SPFS recognises the importance of respecting economic fundamentals: African production must be competitive as it makes little sense to have high cost products whose markets are easily undermined by cheaper imports. For this reason, SPFS-type interventions need complementary investments in infrastructure, water and land management that can boost yields, reduce unit production costs and contain the costs of storage, transport and marketing – themes which are covered in Chapters 2 and 3. The approach seeks to reduce both weather-related and other environmental risks as well as economic risks, all of which have a significant depressing impact on the level of private investment in the agricultural sector.

Chapter 4 recognises that raising the output of the small farmer sector depends on the decisions of millions of households throughout the continent and, in such a situation, the role of governments should be to provide a policy and incentive framework that is conducive to agricultural growth. With this in place, much of the investment in raising production will be made by the farmers themselves. It contrasts the situation of the African farm with other regions in farm productivity: in 2001 its cereal yield averaged 1230 kg/ha compared to 3090 kg/ha for Asia, 3040 kg/ha for Latin America and 5470 kg/ha for the European Union. It makes similar comparisons in use of irrigation; use of yield-enhancing inputs (such as fertilisers, improved seeds, vaccines and others).

The SPFS approach promotes the view that food security does not mean just subsistence food sufficiency but also implies addressing the other underlying causes of persistent rural poverty. Thus, while it may appear to emphasise production, this is not in exclusion of demand considerations in that the incentive for continuing output growth is the “market”. It is in this latter context that national programmes can benefit from complementary food security interventions at regional level that can facilitate trade-related capacities for improved market access, the development of common standards and the diagnosis and control of transboundary pests and diseases. Some of the market issues are dealt with in greater detail in Chapter 3.

Regional Programmes for Food Security (RPFS) offer measures to expand intra-regional trade and competitiveness in external markets, to assist in creating improved conditions for the sustainable growth of agriculture, including through trade facilitation, harmonisation of policies and underpinning of national SPFS, especially in areas of accelerated technology development and information, to ensure sustainable use of cross-boundary natural resources, to provide for control of transboundary pests and diseases. At present, Africa’s Regional Economic Organisations have developed and are seeking funding for RPFS. Regional co-operation in support of food security is an area where NEPAD, in close collaboration with Regional Economic Organisations, can make significant early contributions.

Based on the experience acquired so far in implementing the Special Programme, average costs to be incurred by the public sector to ensure food security for a small farm household can be estimated at US$500. The breakdown varies according to the different options facing farm households: typically it includes around

US$350-400 per family for on-farm investments, particularly in land and water management, as well as inputs, including young stock, fertilisers, seeds and equipment (to be repaid into revolving funds) and thereby ensure sustainability. Some US$35-85 is required for off-farm support, including technical services (backed in many cases by South-South Co-operation), participatory constraints analysis and inputs into policy reform. A furtherUS$65 equivalent per family can be allowed for complementary food security investments at a regional level.

Even if individual interventions can be at community scale, to have a significant impact on reducing poverty and hunger, programmes to ***increase food supply and reduce hunger*** should be collectively massive in scale. For Africa, the intention adopted in Chapter 4 is to raise the performance of some 15 million rural households (affecting the livelihoods of some 100 million people) by 2015 which would require some $7.5 billion. Of this, $6.5 billion would be for national level and $1 billion for regional action programmes. The distribution of costs between regions is based on country-level data on the number of undernourished, given in the FAO Report "The State of Food Insecurity 2001". The effectiveness of such programmes for on-farm development or related improvements at community level is dependent on the investments proposed in productive and transport and communications infrastructure in Chapters 2 and 3 of this document.

1.7.4 Pillar No 4: Agricultural Research, Technology Dissemination and Adoption

Chapter 5 "Agricultural Research, Technology Dissemination and Adoption" represents a departure from the focus of the other chapters on the need to immediately regain production; it presents instead an area of intervention for long-term gain. In Africa as elsewhere in the world, agriculture will need a scientific and technological underpinning if it is to remain competitive through sustained productivity gains. The chapter reviews the difficult situation of agriculture: falling productivity, low spending on research and development; inefficiency of ongoing research in reaching the farmer; the need for reform towards sustainable research and its funding at national, sub-regional and regional levels; integrating technology adoption; strengthening institutions.

To avert food insecurity and reduce poverty, African leaders have set a target to increase agricultural output by 6 percent a year for the next 20 years. At present, many countries barely achieve 1 percent annual growth in output and some are regressing. without technological upgrading and adoption, even large-scale investment would soon perform sub-optimally and fail to gain for Africa the success it needs.

Achieving a 3 percent annual growth rate will require: (a) acceleration of adoption for the most promising available technologies so as to support immediate improvement of African production by way of linking, more efficiently, research and extension systems to producers; (b) technology delivery systems that quickly bring innovations to farmers and agribusinesses so making increased adoption possible, notably through an appropriate use of new information and communication technologies; (c) renewing the ability of agricultural research systems to efficiently and effectively generate and adapt to Africa new knowledge and technologies, including biotechnology, needed to increase output and productivity while conserving the environment; and (d) mechanisms that reduce the costs and risks of adopting new technologies. To do this requires several lines of action, of which the following may be highlighted:

- Increasing investment in research and technology development
- Increasing the share of private sector funding of agricultural research
- Institutional and financial reforms aimed at making national agricultural research systems more sustainable.

The goal is to double the current annual spending on agricultural research in Africa within 10 years.

The chapter, which provides no estimates of investment, also offers a possible priority research agenda for NEPAD agriculture. The proposed NEPAD research programme would be comprised of four sub themes which would collectively contribute to testing the central hypothesis: "*that conservation and efficiency of use of soil and other natural resources will be optimised under conditions of market and/or policy and institution driven productivity*". The four research themes are:

- Integrated Natural Resource Management (also highly relevant to Chapter 2)
- Adaptive management of appropriate germplasm (long-term importance to Chapter 4)
- Development of sustainable market chains (essential for the Special Programmes for Food Security in Chapter 4 to achieve objectives)
- Policies for sustainable agriculture (important underlying need to support all chapters).

In addition, there is to be a crosscutting initiative:

- Scientific capacity building.

Underlying the inclusion of the chapter on research is the key message that in pursuing immediate responses to its agricultural crisis, Africa cannot afford to be short-sighted: it must keep an eye on factors essential for its continuing long-term competitiveness and productivity.

1.8 Investment Levels and Strategies

There is renewed recognition that financing agriculture is essential in national development of low-income countries. In industrial countries, despite agriculture being a minor contributor to overall economic production, governments have always provided sustained support to the sector and the level of subsidies for it and for farm exports remain high.

An example of renewed strong support for funding agriculture in developing countries is the recent intervention of Mr Andrew Natsios, the Administrator for the United States Agency for International Development (USAID). Speaking in March 2002 at the recent International Conference on Financing for Development (ICFfD) in Monterrey, Mexico, Mr Natsios stressed the vital importance of funding agricultural development[15]. Recalling that with few exceptions agriculture had been the engine driving development in all economically successful countries, he regretted that agriculture had been "basically de-funded by virtually all of donor aid agencies and all of the international banks over the last 15 years." He called this "perhaps the most devastating mistake made by the northern countries and the international financial institutions in the last 15 years", adding that many developing countries ".....have not graduated because we've stopped investing in agriculture. All of the studies show that all of this growth in the economy is driven by agricultural production. And so, we need to do more in the agricultural sector". Mr Natsios reported that the US government has renewed commitment to reinvest in the agricultural sector "because it is absolutely essential for economic growth over the longer term".

[15] US Agency for International Development (USAID). News Conference at the International Conference on Financing for Development by USAID Administrator Andrew Natsios. Monterrey, 21 March 2002.

1.8.1 Levels of investment

The majority of African countries have been exposed to years of fiscal austerity programmes and often of failure to find alternative sources of income to replace declining revenues from weaker terms of trade in their traditional markets. Levels of both ODA and private finance have fallen in real terms: in 1990, Africa received 30 percent of global agricultural ODA, but its share declined to 21 percent in 1998. Moreover, the total flow of ODA to primary agriculture declined over the same period from US$11 billion to only US$7.4 billion. This lack of funding has contributed not only to insufficient infrastructure construction but also to a lack of appropriate maintenance – hence there are also substantial needs for rehabilitation.

The total estimated investment requirements for the NEPAD programme are summarised in Table 1, with details in Appendix Table 1 for all pillars except for research, which is in Appendix table 10. A notable feature is the significance of emergencies now and in the near future but also of infrastructure to create conditions for competitive agriculture. Table 2 breaks down the investment by time horizon into the immediate, short-term and medium term; Table 4 offers a plausible break down by source of investment.

1.8.2 Africa's own investment

It is against a background of re-emerging international recognition of the importance of agriculture that Africa's own commitment to funding agriculture should be seen: if countries that can do without agriculture and still prosper are willing to continue financing it heavily, why should Africa, where 70-80 percent of the people depend on the sector, not do the same? Financing for agriculture under this NEPAD CAADP is therefore based on the double assumption that (a) Africa itself will increase its investment and (b) that its external partners will come forward and support it. With this in mind, attempts have been made to estimate what Africa itself can reasonably raise as investment, leaving the rest to be raised at the international level.

Basically, there is not enough information on which to base such estimates: African government statistics to show the breakdown into investment and operational funding are not collected in any one agency. The Anti-Hunger Programme[16] estimates made recently are said to be the minimum amounts required to promote hunger reduction through agricultural development in Africa and they exclude the cost of programmes to promote direct access to food.

Given the special needs of Africa, especially Sub-Saharan Africa, the Anti-Hunger Programme has set a minimum amount of US$4.6 billion per year as *additional* requirement, to be additional resources be allocated to Sub-Saharan Africa as follows:

- US$2.4 billion (52 percent) – concessional assistance to agricultural and rural development;
- US$1.6 billion (35 percent) – public domestic sources;
- US$0.6 billion (13 percent) – non-concessional loans.

The above sums ignore African private sector investments, which are also not well documented. It is reasonable under the circumstances to report what Africa is likely to raise. Instead, one can present what it would mean if Africa raised specified ratios of the total needs. The assumptions made for the African public and private sector investments are in Table 3; the funding levels that result from this scenario are given in Table 4. It may be noted that the share for the foreign private sector is initially very low due to continuing perceptions of high risk in the continent. It should be noted that the ratios given are averages; in reality, certain activities such as disaster relief and similar will initially be almost entirely externally funded.

[16] FAO. Reducing Hunger through agricultural and rural development and wider access to food. Draft paper for the proposed Anti-Hunger Programme. World Food Summit: five years later.Rome.

1.8.3 Public versus private investments

Estimates of the likely distribution of financing between public and private sources must remain, at this stage, highly conjectural and will require specific country conditions to be taken into account; Table 3 represents one set of assumptions and Table 4 its results. As said elsewhere, detailed breakdowns between public and private sector would almost certainly show contrasts among the areas of investment. For water and land development, the public sector is expected to take the lead, as also for rural infrastructure. The estimated cost of increasing food supplies (US$7.5 billion) would also be mainly a charge to the public sector but would be matched by considerable farmer contribution. The total incremental investment requirement would therefore amount to about US$15.7 billion per year between 2002 and 2015 (including operations and maintenance), thus drawing upon both national public and private resources and upon international co-operation, in line with the Monterrey commitments on financing for development.

As elsewhere in the world, most African development investments will occur at national level; this is expected to continue. However, there is growing recognition that some issues require regional approaches. Therefore, the implementation of the NEPAD programme will also be undertaken in co-operation with Regional Economic Organisations. Detailed investment projects will have to be prepared at national and regional levels, with FAO support where this is needed.

1.9 Impacts

While benefits arising from investments in rural infrastructure and major water and land developments as well as those in research and development will clearly need some time to materialise, in terms of impact on productivity, agricultural growth and consequent poverty reduction, of accelerated production programmes for food security and the rehabilitation and development of small-scale irrigation systems will be more immediate. If these are deliberately linked to programmes for reducing chronic hunger, they will bring about rapid improvements in nutrition and hence in the productive potential of the population. When it materialises, the impact of the rural infrastructure and trade-related capacities for improved market access programme will, however, be significant through its mitigation of the current constraints placed on the region's competitiveness by geography and the difficulty of accessing markets. Other direct benefits will arise, in the short- and medium-term, through the construction of rural infrastructure - stimulating output and employment, promoting domestic market activity and market integration, and facilitating access to regional international markets.

In order to have an immediate impact on hunger, these production-related investments need to be complemented by targeted safety nets and measures to address food emergencies. A school-feeding programme based mainly on community-managed school gardens for 100 million children, for instance, would cost US$2-3 billion and there is ample shared experience among FAO, IFAD and WFP in implementing such programmes. Provision of safety nets is important in allowing the weak and vulnerable to participate in long-term development.

1.10 Moving from dialogue to action

With the CAADP endorsed by sector ministers at their Rome meeting on 9th June 2002, its operationalisation must now take centre stage. The approach to converting the broad themes of the CAADP into practical action and investment requires a different process than the preparation of the document itself. The ideas offered here are only in outline and carry only informal status. In essence, NEPAD offers Africa new opportunities to move forward with agricultural development, placing this sector at the forefront of economic and social

progress. To succeed, NEPAD will above all need to harness the commitment and energies of its member countries but also to attract the support of its partners, both traditional and new. It is essential that efforts mobilised early and are focused on key opportunities that can yield the largest gains; also that the selected priorities have potential to touch the lives of large numbers of Africa's poor and hungry.

A primary need appears to be greater publicity for the CAADP and constituency building for it. Although the process of preparing the document has involved seeking comments from and a review meeting for senior government officials, ministers, and regional economic groupings, ignorance about NEPAD programmes remains widespread among large swathes of civil society and the private sector. Furthermore, within Africa's governments, the NEPAD process in agriculture is currently better known to officials at the top in ministries of agriculture, external affairs and the presidency from where officials have been most involved with NEPAD. Still excluded from dialogue are the ministries responsible for planning and budget, which will in the end create the budget lines for the required increased agricultural investments to meet NEPAD goals.

In view of this, the primary step for operationalisation of NEPAD agriculture must be building a constituency and ownership for itself. A concerted publicity campaign is needed, using the most appropriate media for the various sub-regions and societal groups in Africa. In addition, the holding of a series of consultations at continental, sub-regional, and national levels is a prerequisite for developing the sense of ownership and generating the interest necessary for success. The primary targets would be national governments, regional and sub-regional economic organisations (including development banks), the commercial private sector, civil society, and donors. Such meetings, both custom-designed and opportunistically organised to take advantage of other meetings, would sell the "value-added" of NEPAD above and beyond national programmes; explain what type of programmes could carry the NEPAD label; how they could be processed without a stifling and inefficient centralisation; what steps would be needed to raise significant funding from within Africa (both public and private); how to monitor implementation; and what roles the countries and their internal constituencies should play.

The consultations would also provide fora for interpreting the main CAADP pillars into specific priorities for Africa's diverse national, sub-regional and all-Africa realities; for agreeing on necessary balance between systemic interventions (non-project policy and institutional changes that create enabling conditions or capacity to execute actions) and project interventions requiring investment. Following the building of a constituency, there will be four critical needs:

- *Creating a basis for informed choice in setting investment /intervention priorities* through analytical work to identify areas of agricultural production, agro-processing and agricultural trade where Africa has or can relatively easily develop comparative advantage so that the choice of investments has a high probability of commercial success and sustainability. Such preparatory analysis is necessary also to draw attention to cases where African countries might work at cross-purposes in their investments and so to suggest complementary investments among them ;

- *Formulating and funding of additional concrete projects* (accompanied by review of key ongoing and planned initiatives to identify those which can most usefully link up with NEPAD intentions). *Formulating and funding of additional interventions* should include both investment and systemic capacity/institutional/policy improvement interventions for domestic funding or technical co-operation;

- *Integrating NEPAD programmes into African development budgets* - of national development plans and of Regional Economic Organisations in Africa; and

- *Concerted action to promote private sector engagement and interest*. This will require that the private sector be a close partner from the earliest stages of constituency building and projects identification but

also that African governments should create the policy and institutional conditions to make agriculture attractive to private capital.

Given that NEPAD has fundamentally political origins, it may prove important to ensure collective ministerial oversight and support arrangements for its programmes in agriculture. The Rome meeting of African Ministers of Agriculture on 9th June 2002 recommended that "*That the NEPAD Steering Committee, operating through the initiating country responsible for agriculture – currently Egypt - establish a committee to follow-up this Ministerial Meeting in order to provide political oversight, monitor the implementation of CAADP and to facilitate the engagement of all countries in the future NEPAD developments on agriculture."* It may be noted that that meeting also saw the need *"To devise a concerted strategy involving the Ministers for Agriculture, Finance and Planning for raising the funding of agriculture and rural development in order to enhance the proper funding of NEPAD agriculture-related programmes"* – a function that could be adopted by the ministerial forum whose establishment was recommended. Text box 4 summarises governance issues for the agricultural issues under NEPAD.

Being a political process involving many countries also requires that commonly accepted arrangements be developed for assessing progress and judging success so that there can be full transparency and accountability to the political leadership in NEPAD and related mechanisms.

The NEPAD Secretariat, working on specific steps that could be considered to achieve success in developing agriculture, has developed the elements of national, sub-regional, regional and international actions in Annex 3. The Annex also lists key issues to be considered in implementing the CAADP.

Text Box 4: Governance and consultative forum initiatives for African agriculture

African agriculture is diverse and complex. Furthermore, since the time most African countries obtained their independence during the 1960s, the agricultural sector has been heavily dependent on external funding and technical assistance, in some cases with strings that constrain freedom of maneouvre in policy-making and action. These factors have made it extremely difficult to have a common platform for developing African owned and managed regional or continent-wide programmes. There are many initiatives for governance and consultation within the sector - the dispersion of efforts which this leads to denies the agricultural sector a strong lobbying and policy harmonisation mechanism—at national, regional and continental levels.

The NEPAD process provides a golden opportunity for a common agricultural policy framework across the continent, which would address this problem. Given the political will demonstrated at the highest levels of state and government, NEPAD can also provide the much needed policy environment for strategic action-oriented approaches, while recognising the importance of continuous monitoring of the progress made and impact achieved at country-level.

The existence of several regional economic organisations and many major international rivers like the Nile, Congo, Niger, Limpopo, Senegal, Zambezi, etc., provide a further impetus for inter-country co-operation on joint agricultural programmes and projects in selected agro-ecological zones. Collaboration among countries such as those participating in the Nile River Basin Initiative can maximise synergies and potential spillovers in technology generation and methodology development. Successful technical co-operation on such a large scale will require strong political commitment and constant inter-country dialogue at the policy level between and among the participating countries. Strong political commitment is even much more crucial for success in continent wide programmes.

However, the agricultural portfolio is organised differently in different countries - even in those that belong to the same economic grouping. The dispersed efforts deny the agricultural sector a strong lobbying and policy harmonisation mechanism—at national, regional and continental levels.

Apart from the Western and Central African Conference for ministers of agriculture, the FAO biennial Regional Conference for Africa is the only international forum available to Ministers responsible for the Agricultural Sector to meet regularly as a group to discuss regional issues. Nevertheless in those countries where more than one Ministry is responsible for the sector only one or two of the Ministers attend the Regional Conference. It is

therefore gratifying that as part of the NEPAD process the 22nd Session of the FAO Regional Conference in Cairo (February 2002) supported a recommendation in an earlier version of this document to establish a forum of African Ministers of Agriculture, Food and Natural Resources.

In addition there should be a Permanent Standing Committee, consisting of Senior Officials, for each of the sub-sectors of agriculture, forestry and fisheries or the three pillars of the agricultural sector, namely, (i) research and technology development; (ii) economics and trade; and (iii) rural development. The Committees should meet regularly and report to the Ministers on major emerging issues with policy implications.

Source: *Working for household food security and economic prosperity in Africa*. National Department of Agriculture (South Africa) on behalf of NEPAD Secretariat. [First NEPAD provisional agriculture strategy paper – presented at 22nd FAO Regional Conference for Africa, Cairo, February 3 – 8, 2002 and later updated].

Chapter 2

Extending the area under sustainable Land Management and reliable Water Control Systems

2.1 Introduction

Agricultural growth is more important for Africa than for any other continent. About 70 percent of people in Africa and roughly 80 percent of the continent's poor live in rural areas. These people depend on agriculture and non-farm rural enterprises for their livelihoods, and increasingly are unable to meet their basic food needs as population pressure on land grows, and land and water resources become scarce or degrade and agricultural productivity stagnates.

Land and water are the primary natural resources necessary for agriculture, food production and rural development in most countries. If used in proper association with suitable technologies and related factors such as labour, investment, land and water have the capacity to enable global agricultural production to continue outpacing growing demand despite declining availability of per capita land and water resources. For this trend to take root in Africa and to continue elsewhere, increased output must come mainly from intensified production, as new land for expansion is very limited in the world.

Building up soil fertility and the moisture holding capacity of agricultural soils, and rapidly increasing the area equipped with irrigation, especially small-scale water control, will not only provide farmers with opportunities to raise output on a sustainable basis but will also contribute to the reliability of food supplies. It may be noted that for Africa the percentage of arable land that is irrigated is 7 percent (barely 3.7 percent in Sub-Saharan Africa), the corresponding percentages for South America, East and south-east Asia and South Asia being 10 percent, 29 percent and 41 percent respectively. Furthermore, in Africa 16 percent of all soils are classified as having low nutrient reserves while in Asia the equivalent figure is only 4 percent. Moreover, fertiliser productivity (expressed in terms of maize yield response) in Africa is estimated at some 36 percent lower than in Asia and 92 percent lower than in developed countries.

FAO estimates show that between 1995/7 and 2030 about 75 percent of the projected growth in crop production in Sub-Saharan Africa will come from intensification in the form of yield increases (62 percent) and higher cropping intensities (13 percent), with the remaining 25 percent coming from arable land expansion. The share due to intensification will exceed 90 percent in land-scarce countries of Near East/North Africa. Intensified production occurs mostly on land already under cultivation[17].

In spite of the inherent fragility of Africa's soils, the continent's climatic variability, and the uneven distribution and availability of both surface and subsurface water resources, there is substantial untapped potential for the development of the continent's water and land resources for increasing agricultural production. FAO estimates that the current area under managed water and land development totals some 12.6 million ha[18], equivalent to only some 8 percent of the total arable land. Substantial public and private investments in developing and improving the management of these land and water resources will be essential to enable African countries reach the levels of agricultural production required to meet the targets for poverty alleviation, food production and economic recovery by 2015. FAO also estimates that between 1995/97 and 2030, about 75 percent of the projected growth in crop production in Sub-Saharan Africa will come from

[17] FAO. 2000. Agriculture Towards 2015/30. Technical Interim Report. Rome.
[18] FAO. Agriculture Towards 2015/30 estimates.

intensification in the form of yield increases (62 percent) and higher cropping intensities (13 percent), with the remaining 25 percent coming from arable land expansion.

2.2 Husbandry of soil resources

About 874 million hectares of Africa's land is considered suitable for agricultural production. Of this, about 83 percent have serious soil fertility or other limitations and will need costly improvements and amendments to achieve high and sustained productivity. Nutrient depletion is common in Africa and represents a significant loss of natural capital valued at an estimated US$1 to 3 billion per year. If most of the nearly 70 million smallholder families in Sub-Saharan Africa (SSA) fail within the next decade to adopt sustainable integrated soil fertility and land and water management practices on their farms, they will seriously jeopardise their long-term food security, productivity and incomes while environmental degradation will accelerate. Africa needs to address low farm productivity through integrated approaches combining increased use of organic matter, mineral fertilisers, hybrid seeds, irrigation or mechanisation (including reduced tillage systems) rather than each in isolation.

Degradation of soils and other natural resources is a big challenge for Africa. Indeed, IFAD reports for Western and Central Africa[19] indicate that land degradation from extensive agriculture, deforestation and overgrazing has reached alarming levels and that about 50 percent of the farmland suffers soil erosion and up to 80 percent of rangelands are degraded in some way due to use beyond carrying capacity. As good resources diminish and land itself fails to satisfy all needs, land conflicts between herders and sedentary farmers are more frequent.

Protecting and improving the soil also makes good business sense. Research in one country has shown that on relatively good soils initial nutrient recovery was only about 30 percent, but after 4 to 7 years of soil improvement, nutrient use efficiency increased two to three times. Without soil improvement, in fact, the capture of nutrients is only about 35 percent for nitrogen and 15 percent for phosphorus which is approximately half of rates typical elsewhere. This is particularly important in Africa where roughly twice as many nutrients are said to be lost compared to other regions, so that the majority of available nutrients are not utilised by crops. Apart from inefficient uptake of nutrients, the total input of fertilisers is very low: fertiliser use in Africa is only 21 kg (nutrients) per ha of harvested land per year, and is even lower in Africa south of the Sahara at 9 kg per ha of arable land. The corresponding figures are 100 kg/ha for South Asia, 135 kg/ha for east and southeast Asia, 73 kg/ha for Latin America and 206 kg/ha for the industrial countries.

The levels of soil constraints are significant in Africa, as seen in Table 5.

2.3 Water control and management

World-wide, the application of water and its managed use has been an essential factor in raising productivity of agriculture and ensuring predictability in outputs. Water is essential to bring forth the potential of the land and to enable improved varieties of both plants and animals to make full use of other yield-enhancing production factors. Yet the percentage of arable land that is irrigated is barely 3.7 percent in Sub-Saharan Africa, a figure that rises to 7 percent in Africa as a whole given that 40 percent of the total irrigated area is in North Africa. These are the lowest percentages in the developing world: the corresponding percentages are 10, 29 and 41 for South America, East and Southeast Asia and South Asia respectively. In Africa as a whole, in the absence of deliberate steps to accelerate progress, the amount of irrigated land is expected to grow at under 1 percent over the period from 1995/97 to 2030 at which time the amount of irrigated land would be barely 20 percent of potential in Sub-Saharan Africa.

[19] IFAD Strategy for rural poverty reduction in Western and Central Africa. http://www.ifad.org/operations/regional/2002/pa/pa.htm

Within the context of NEPAD, strategic public and related private investment in water management and land improvement will be essential for the intensification of agricultural production and for meeting targets for poverty alleviation, food production and economic recovery by 2015. This document sets out best estimates of the potential investment in irrigation to increase irrigated land in Africa from 12.6 million ha at present to some 20 million in 2015. Due to evident diversities both among and within the countries considered, these estimates should be viewed as orders of magnitude and are based on current new costs of building, rehabilitating, and operating and maintaining irrigation systems. The sources of funding will very much depend upon the character of the irrigation and the respective institutional responsibilities.

The nature of Africa's climatic variability and the inherent fragility of its soils pose natural limits to the extent of intensified agricultural production. These limits have to be recognised and subsequent measures applied for mitigation through research and innovation. At the same time, institutional and policy, and economic frameworks will be important factors in determining the extent to which the full investment potential cited here can be realised in practice. Africa's long experience with shared river basins and the role of river basin organisations will need to be put to good effect in negotiating both resource allocation and environmental externalities between riparian countries.

2.4 Assumptions and Investment Estimates

In order to assess potential and needs for land and water investments in Africa, the following steps have been used in this study:

- A 1998 baseline has been established.

- Three types of conventional water control and land improvement investment have been identified, allowing for the definition of reasonably well bounded targets for investment, viz.:
  - on-farm and small-scale irrigation development including small scale informal irrigation (private, peri-urban, horticulture etc.), humid lowland development (fadamas, "bas-fonds", dambos, marais, etc.), and land improvement (soil structure, fertility etc.);
  - upgrading and rehabilitation of existing large scale irrigation systems;
  - development of new, large-scale schemes.

- An assessment of potential targets for 2015 has been derived through expert judgement, based on an examination of national targets for land and water improvement.

- Estimated average unit investment costs have been applied to the areas identified for each kind of development.

The data sets and methodology were developed on a country basis, and aggregated at regional and continental levels.

2.4.1 Data and information sources

The methodology is based mainly on expert knowledge about the situation of land and water development in Africa and its prospect in the future. The main sources of information used in this study are:

- FAOSTAT: FAO main statistics by country on rural/urban population, land use, irrigation, agricultural production;

- AQUASTAT: Country based statistics and information on the situation of water management for agriculture. A survey made in 1995, which includes trends and projections, by country, at different time horizons, together with unit investment costs. In addition, the irrigation potential has also been compiled for the whole of Africa on the basis of river basins;

- Agriculture Towards 2015/30 (AT 2015/30): FAO Perspective study on agriculture in 2015 and 2030, providing country-based projections on agriculture, including land and water development, in 2015 and 2030, as well as a description of the situation during its base year (1998);

- A similar study, on water management potential for Africa, carried out in 1996; the study produced three scenarios for the development of land and water in Africa by 2010. It was based on the information available at that time, and on expert knowledge of the potential for land and water development in each country of Africa.

2.4.2 Typologies of investment interventions

Three main categories of land and water improvement interventions were identified, allowing for the definition of reasonably well bounded targets for investment. They correspond to the main types of interventions already taking place in Africa, for which models and unit costs are available. They are:

- on-farm and small-scale irrigation development including small scale informal irrigation (private, peri-urban, horticulture etc.), humid lowland development (fadamas, "bas-fonds", dambos, marais etc.), and land improvement (soil structure, fertility etc.);

- upgrading and rehabilitation of existing large scale irrigation systems. Rehabilitation of existing irrigation schemes would involve further development of the command area up to its designed capacity;

- development of new, large-scale schemes.

For the first category, investments in land improvement are necessary to make the best use of the proposed investments. A *land improvement* component was therefore added to the overall proposed investment computations. Typically, this component would include tools and equipment, one-time soil fertility improvement, sub-soiling to break compaction, together with capacity building and training in agricultural practices.

The apportionment of public and private finance sources will depend upon the institutional responsibilities in each country and will be related to the various styles of irrigation and agricultural production systems.

2.4.3 Assessing unit investment costs

Unit investment costs were based on information obtained from AQUASTAT in 1995, adjusted to take into account unit costs used in recent agriculture investment projects provided by the Investment Centre (TCI). In view of the large discrepancy between regions in terms of unit costs, Africa was divided into 7 main regions showing some kind of physical and economic homogeneity and unit costs were assessed for each region and for each type of intervention. The results are presented in Table 6. Two exceptions are Egypt, for which investment cost for large schemes was set at US$5 000 per ha, and Sudan, for which investment cost for large schemes was set at US$10 000 per ha and rehabilitation costs at US$2 500 per ha.

Irrigated areas in Africa comprise 12 million ha and are distributed very unevenly. North Africa (Morocco, Algeria, Tunisia, Libya and Egypt) represents more that 40 percent of the total. Of all cultivated land in

Africa, 10 percent is irrigated which equals only 2 percent of all cultivable area. Especially compared to the developing countries in Asia these figures are extremely low. In Asia, almost a quarter of all cultivable area and 40 percent of all cultivated land are irrigated.

In Africa there is still significant potential for irrigation development on the basis of the land and water resource alone, but regional disparities are wide within the continent. It is estimated that seven countries (Angola, Sudan, Egypt, Democratic Republic of Congo, Ethiopia, Mozambique and Nigeria) account for an irrigation potential of more than 30 million ha which is about 60 percent of all irrigation potential of Africa, while at the other end of the list, 18 countries share only 5 percent of all potential.

Investment in irrigation development in Africa lags behind other developing regions of the world (Table 7). Africa has some 12.2 million ha irrigated compared to about 18.4 million ha for Latin America and 157.6 million ha for Asia-Pacific. These numbers represent about 10 percent, 14 percent and 40 percent respectively of the cultivated area and 2 percent, 5 percent and 24 percent respectively of potentially cultivable land. Five-year linear extrapolations were used to obtain regional data on irrigated areas from FAOSTAT series 1961-1999 for the computation of net irrigation increase by decade in the 60's, 70's, 80's and 90's. Based on an average lifetime of 30 years, reduced for the first two decades because of investment levels in the 50's and 60's, the irrigated area rehabilitated every decade was assumed to increase from 20 percent to 33 percent of the area irrigated at the beginning of the period.

2.4.4 Describing the current situation

Reliable information on water management in agriculture is available from the 1995 AQUASTAT survey. Typically, it refers to the situation between 1990 and 1994. FAOSTAT data on irrigation are available yearly, by country, until 1999. In addition, country based information is also available from AT2015/30 for which the base year is 1998. This information is further enhanced by a comprehensive basin-wide compilation of resources and potential.

In this study, it was decided to use 1998 as a base year, and 2015 as target year, thus making the most productive use of the information available in AT2015/30. For 1998, data on irrigation were obtained from AT2015/30 (complementing them, for a few countries not covered by AT2015/30, with FAOSTAT figures). Breakdown by type of water control were obtained from the 1996 study (which used 1992 as base year), scaling up to fit the AT2015/30 irrigation data. Country data on arable land were obtained from the FAOSTAT database.

2.4.5 Assessing a possible target for 2015

AT2015/30 gives an estimate of the likely situation in 2015 that can be considered as the situation under a scenario of “business as usual”, i.e. without specific intervention in land and water development. The projections of AT2015/30 gives an increase in irrigation of little less than 2 million ha, going from 12.6 million ha to 14.4 million ha (large and small scale irrigation). In such a situation, irrigation would represent a slightly lower share of arable land than in 1998 (7 percent compared to the current 8 percent).

Country data on arable land in 2015 were obtained by linear regression, comparing AT2015/30 figures for base year 1998 and 2015 with figures on arable land by FAOSTAT for 1998. Projected figures on rural population for 2015 were obtained from FAOSTAT (UN Population Division).

Possible increase in land and water management between 1998 and 2015 were based mainly on the 1996 study. It takes into account the countries’ potential in terms of land and water development, and, to a certain extent, the demand, expressed in terms of national water resources development plans, from AQUASTAT. Four indicators were used to check if the proposed figures were reasonable: the total area to be developed, the share of arable land having received some kind of land and water control investment by 2015, the water

managed area by rural family in 2015, the annual growth rate in large and small scale irrigation between 1998 and 2015. Proposed figures from the 1996 study were adjusted to obtain a fair sample of these indicators for each country. When specific information was available for a given country, it was taken into account in the computation of the country figures.

2.4.6 General assumptions in the calculations

In deriving the potential investment figures the following key assumptions have been made:

- At this stage the approach is based upon an assessment of production potential as distinct from an assessment of actual food demand.
- Physical limits of land and water systems can be mitigated through improved conservation of surface and groundwater resources, soil structure and soil fertility.
- Economic limits to production can be addressed through improved economic, policy, and institutional frameworks.
- Investment requirements are inclusive of private and public resources, and exclusive of necessary complementary off-farm resource requirements.

2.5 Towards a Common Strategy for Investment

The specific strategy adopted will naturally vary depending on the country concerned. Nevertheless, the majority of the countries to be covered fall within the Least Developed Country (LDC) category, and as such lack both the public and private resources to launch the investment projects and programmes necessary for expanded and improved water control and crop irrigation on the required scale. In these circumstances, the most common strategy adopted would have three main elements, viz. in the paragraphs that follow.

First is the identification and preparation of investments to support small-scale irrigation, and where feasible the rehabilitation of existing large schemes for external public funding by regional and international multilateral financing institutions, as well as interested bilateral donors. Where appropriate, these external resources would be accompanied by complementary measures on the government's part to enhance the economic, policy and institutional framework and ensure the sustainability of such investment. Besides farmers' own resources, and such counterpart funds as may be available, this would be the main national public contribution.

Linked to, and in sequence with the above public investments in water control infrastructure, accompanied by appropriate policy reform, substantial flows of national private investment would be encouraged to underwrite necessary supporting services such as guaranteeing availability of seeds, fertilisers and other input supplies, storage, marketing and credit, and transport. Overseas direct private investments would be encouraged to take advantage of specific commercial opportunities, in particular for agricultural export crops.

Lastly, new large-scale investment schemes would only be considered on the basis of a full examination of past experience, careful assessment of economic and financial sustainability, and comparison to alternative opportunities which may offer lower per unit investment costs. While such investment cannot be excluded in specific favourable circumstances, initial priority in most cases would be on relatively low cost small-scale irrigation development, and the rehabilitation of selected existing large-scale schemes.

Underpinning all the investment in irrigation and water management has to be better care for soils in order to ensure sustained fertility. Initiatives underway are promoting a move beyond the original Soil Fertility Initiative concept towards "better land husbandry". This approach recognises in the first place that there are no wholesale prescriptions and that technical solutions to improved soil management are location- and farm-specific. It also involves better recognition of the interdependence of the "organic", "mineral" and "physical" components in implementing better land husbandry. Under the new approach, mineral fertilisers and organic matter are treated as complements rather than substitutes.

The introduction of sound technologies for enhanced land management cannot, however, represent a stand-alone area of operations. Resource degradation and (apparent) mismanagement are themselves aspects of rural economic systems and thus shaped in part by issues of market access and competitiveness - even in the most marginal areas. Population pressure is often identified as the cause of resource degradation, but there is no single inevitable agricultural or environmental outcome to population pressure. In areas with poor market access, it can lead rapidly to resource mining. Where there are good market connections and access to a profitable crop, precisely the same population pressure can lead to intensification involving major investments in resource management and improvement. This approach will embrace a whole-system approach, tackling conservation within the whole structure of the rural political economy - and the opportunities of poor people to effectively manage resources to improve their livelihoods.

2.6 Estimated Potential for Investment

The order of magnitude for the investment required to increase the amount of arable land in Africa under improved land and water management from 8 percent (at a 1998 baseline) to 15 percent by 2015 is approximately US$36.9 billion, comprising:

- on-farm and small-scale irrigation development: US$ 14.4 billion;
- strategic rehabilitation of formal, large-scale irrigation schemes US$ 8.9 billion;
- expansion through new large-scale irrigation development US$ 13.6 billion.

These estimates will need to be systematically confirmed on a country-by-country basis and within the framework of shared river basins where international basin organisations are responsible for negotiating allocations for agricultural use. A breakdown of areas and associated investment estimates by Regional Economic Organisation is shown in Table 9. No totals for Africa should be derived from the Regional Economic Organisations' totals since country membership overlaps, with some countries belonging to two or three organisations, in particular SADC and COMESA; and ECOWAS and UEMOA which have a very high multiple country membership. Indicative country details are available but to arrive at proposals for distribution of efforts between small and large-scale irrigation as well as between rehabilitation and new investment will require prior consultation and updated assessments on the ground.

In addition, operation and maintenance requirements[20] for all categories of land and water improvement are estimated to reach annually, by the year 2015, some US$3.8 billion; equivalent to an overall expenditure throughout the period of some US$32 billion. These maintenance estimates are based on operational schemes and vary considerably per country.

Future investments in irrigation will be mainly for rehabilitation, upgrading and expansion. Such incremental investment will benefit from the large amount of sunk costs in existing schemes thereby enabling higher rates

[20] Including allowances for both institutional strengthening and the recurrent costs of the organisations responsible for operation and maintenance.

of return. A clear indication that irrigation yields adequate returns is the amount of private investment it attracts worldwide. Irrigation reduces the risk of crop losses from uncertain rainfall, enables production in areas or at times without rainfall, and provides water to enable farmers to increase output per hectare. There are strong synergies between irrigation and other principal sources of agricultural growth such as fertiliser, improved plant varieties, better husbandry, upgraded infrastructure and better integration into markets. These encourage farmers to invest in land improvements and in other inputs.

Estimates of annual expenditures for investments and maintenance of land and water improvement are shown in Table 10. Short-term investment requirements (2002-2005) are estimated at US$9.9 billion, the medium term investment requirements (2006-2010) at US$20.1 billion and the long-term requirements (2011-2015) at US$6.8 billion.

Estimates of likely projections for the distribution of public: private financing within this overall envelope must remain, at this stage, highly conjectural and will require specific country conditions to be taken into account. Distinction is made by type of investment and ODA is assumed to be 40 percent of the public sector investment in Low Income Food Deficit Countries but zero in the more developed poor countries. Some considerable data gathering and critical thinking is required to apply this approach; an indicative outcome of applying it is presented in Appendix Table 5.

2.7 Moving Forward

Clearly these types of water management and land improvement need to be placed within specific agro-ecological, hydrological and socio-economic settings. Well-judged investment can permit strategic consolidation, diversification and intensification of agricultural production to respond to changing market conditions. The proper identification of the most promising investment approaches and target areas will be of paramount importance, followed by investment preparation that meets the requirements of multilateral and bilateral funding sources. This will require a flexible, opportunistic approach with the governments concerned, with full national and local involvement and commitment. NEPAD might initially seek support from partners, including FAO, in four ways:

- Refining investment requirement estimates. A possible approach is presented in the paper ARC/02/4 ("The New Partnership For Africa's Development: Land and Water Resources Issues, and Agricultural Development"), which was presented to the 22nd FAO Conference for Africa, in Cairo, 4-8 February 2002. This approach has been endorsed by the NEPAD Steering Committee and is included as part of the proposed NEPAD Sector Priority Programme, B3: Agriculture.

- Supporting the development of appropriate regional and national strategies for irrigated agriculture and the identification of strategic investment targets, through technical co-operation.

- Implementing necessary pilot and pre-investment projects for on-farm irrigation and land-improvement projects under various action-oriented programmes for food security, of which the Special Programme for Food Security (SPFS) launched by FAO is an example.

- Assistance to countries in investment identification and preparation, on a case-by-case basis, and identifying the sources of public and private investments.

Chapter 3

Improving Infrastructure and Trade-related Capacities for Market Access

3.1 Introduction

The African leaders of the *New Partnership for Africa's Development* (NEPAD) have clearly indicated that one of their key priorities consists of the development of infrastructure and agriculture (encompassing crops, livestock and fisheries), and their diversification into agro-industries and manufacturing to serve both domestic and export markets. The share of Africa in world agricultural exports has dropped steadily, from 8 percent in 1971-80 to some 3.4 percent in 1991-2000, and reversing this decline will require increased efforts by the African countries, with the assistance of the international community, to surmount the hurdles, including domestic supply-side constraints. The latter can broadly be divided into structural constraints, which are particularly prevalent in Sub-Saharan Africa, and policy-induced constraints resulting from trade and macroeconomic policies that have biased the structure of incentives against agriculture and exports. Typical structural constraints are the high dependence on a limited number of export commodities; weak technological capacities; inadequate legal and regulatory institutional frameworks; limited access of farmers to credit; and inadequate transport, storage and marketing infrastructure.

Rural infrastructure is one of several subsets of activities that are essential elements for African rural transformation. The existence of poor standard, inadequate or non-existing infrastructure will inevitably impact negatively on the competitiveness of African agriculture through increasing internal transport margins, reducing levels of value-added at origin and lowering transaction efficiencies in the marketing chains, be they national or international. The provision of adequate and cost-effective rural infrastructure will clearly, therefore, underpin the development of agriculture in general and, in particular, facilitate lower-cost production and marketing to enable countries in the region to respond to both national and international market demand.

The provision of basic rural infrastructure is also an essential pre-requisite for enabling African countries to stimulate economic growth and to reach the targets for economic recovery and poverty alleviation by 2015: through increasing and diversifying agricultural output and employment, promoting domestic market activity and market integration, and facilitating and developing access to export markets. In addition, complementary actions will be required to improve the market access conditions facing African agricultural (including livestock and fisheries) exports in developed country markets.

This document builds on a companion FAO paper[21], first presented at the 22nd FAO Regional Conference for Africa held in Cairo, in February 2002. The document sets out estimates of complementary investments in rural infrastructure that are required to support the growth in agricultural production due to the land and water developments foreseen. Such infrastructure includes rural roads, storage facilities for crops, livestock and fish products, and related processing and market facilities. Due to the range of country conditions and the lack of precise, up-to-date information regarding the current stock of rural infrastructure in any particular country, the estimates should be viewed as providing preliminary and indicative orders of magnitude only.

[21] FAO Support to The New Partnership for Africa's Development: Quantitative Estimates of Investment Potential for Land and Water Development in Africa.

3.2 Role, Importance and Current Situation

3.2.1 Rural Infrastructure

Rural transport infrastructure consists of the network of rural roads and tracks on which the rural population travels by means of walking or using non-motorised and motorised vehicles. This network includes the intra-village tracks (both informal and formal) as well as local government networks that link the rural population to the rest of the economy and the outside world. Other rural infrastructure elements – storage facilities for crops, livestock and fish products, and related processing and market facilities – are clearly more closely linked to activities in the agricultural sector and have evolved over time in extent, sophistication and modalities of ownership and operation, depending on socio-economic conditions and country policies. In the latter respect, it can be noted that there have been cases of inappropriate, and often uneconomic, investments in Africa in the past. Indeed, in some countries, there is already an abundance of crop storage facilities operated by more-or-less defunct grain marketing boards which is not necessarily being made available to the private sector. A possible exception to this is storage for food security reserves. However, in most cases, there is a need to carry out an inventory of available stores, rehabilitate them and then seek means to involve more the private sector. With regard to post-harvest activities, clearly the days of expensive government involvement in most agro-processing facilities are past, and future emphasis will probably be very much on commercial investment by the private sector.

Rural infrastructure plays a critical role in poverty reduction, economic growth and empowerment for the African rural poor. The lack of adequate and reliable infrastructure touches the life of every rural African family daily; investments in rural infrastructure, particularly rural roads, storage, processing and market facilities, will therefore be required to support the anticipated growth in agricultural production and improve competitiveness. Family efforts to escape poverty and lift themselves above subsistence levels are limited by the present poor access to markets, supplies and vital information. Local roads and tracks are often impassable making it difficult, if not impossible for rural families to access the rural economy.

Apart from North Africa, which is reasonably well endowed, Africa's rural infrastructure is generally inadequate by almost any measure: Africa's people face the longest distances to the nearest large markets; a fifth of Africa's population is landlocked –less than a third of Africans live within 100 km of the sea compared to over 40 percent for other developing regions; rail freight in Africa is under 2 of the world total, marine freight capacity 11 percent and air freight less than 1 percent; and power generation capacity per capita in Africa is less than half of that in either Asia or Latin America. The poor state of Africa's infrastructure reflects neglect of investment. External investment in economic infrastructure[22] in the period between 1990 and 1996 for Sub-Saharan Africa was US$26.7 billion, compared to US$41.4 billion for Latin America and the Caribbean and US$101.9 billion for Asia, of which some US$71.9 billion for East Asia alone.

With the exception of the Mahgreb countries in North Africa, Africa's road network is particularly underdeveloped. It is clear that many Sub-Saharan African countries face a significant handicap in terms of rural road infrastructure, and they compare unfavourably with both North Africa and other parts of the world. For example, local road densities in a sample of representative countries in Sub-Saharan Africa show a mean density of 0.86 km per thousand head of population, while the equivalent density in Tunisia is 2.6 km/1 000 persons, and in South Asia is some 1.8 km/1 000 persons; for middle-income countries, the density is 8.5 km/1 000 persons. Africa has the lowest density of paved roads of any of the world's regions, which hinders access to markets. For example, there are an estimated 1.8 million km of roads in Sub-Saharan Africa, of which only 284 000 km (16 percent) are paved (see Table 12). Poverty and remoteness are particularly associated in Africa where the combination of scarce and poor roads results in high transport costs and make

[22] Including communications, energy, transport, water, sanitation. *Sources:* UNCED Secretariat; Euromoney 1997/98 Annual report

parts of the economy only semi-open. For example, recent studies in Burkina Faso, Uganda and Zambia have shown that walking is the principal means of transport for 87 percent of rural households[23]. Table 11 gives details of the current provision of road infrastructure for each of the major Africa sub-regions.

The few available data on rural roads also point to an African handicap relative to other developing regions (Tables 12, 13) which provide comparative data among regions of the world. Table 14 compares data from the early 1990s on the existing rural road network for African countries in the Humid and Sub-humid Tropics with those of India in 1950 (about 15 years before the green revolution period) – adjusted for population density. To the extent that adoption of high-yielding varieties depends on infrastructure, the extent of the handicap of many African countries becomes clear.

Africa is also deficient in port infrastructure, a situation partly associated with the fact that it has very modest international trade that could justify necessary investments, and partly due to the fact that most of them were built during the colonial period. Levels of traffic at many African ports, both marine and air, are quite low in relation to the heavy investments incurred; accordingly they represent outlays with low rates of return and may be a drain on treasuries while failing to be fully productive assets to the economies they serve. World-class ports are only found in South Africa and Egypt, with lesser ones in East Africa. Existing port facilities were often built for broad commercial objectives and failed to take into account the special needs of specific sub-sectors such as fisheries, livestock, forestry etc.

A similar picture prevails for airports that could facilitate exports of high-value perishables. While many airports have runway capacity to handle large cargo craft, there is neither the volume of exports nor the cold storage chain to support their contribution to exports. Notable activity is restricted to a few airports such as Johannesburg, Nairobi, Cairo and one or two other hubs.

Good quality infrastructure is a particularly important contributor to competitiveness and growth in agriculture. Many agricultural commodities are either bulky or perishable (or both), and costs of transporting both inputs and products can account for a high share in the value of final products where infrastructure and physical market access conditions are inadequate (e.g. 40 percent difference between margins for food grains in Kenya and Malawi and those in Bangladesh and Indonesia)[24]. In these cases, markets may remain effectively insulated, even if all trade barriers are lowered or removed. Current information on market accessibility underscores the importance of good quality infrastructure, with nearly all landlocked countries in the world currently being poor, and regions linked to coasts by ocean-navigable waterways being strongly favoured in development terms relative to their hinterlands. Poor infrastructure provision is detrimental to the vitality of agriculture in the continent and thus to prospects for poverty reduction. High transport costs reduce marketing margins, raising consumer or border prices and effectively closing off more remote regions. High transport costs effectively make much of African agriculture "semi-closed": any efficiency gains in production may be eroded by the high cost of transport and of other related transactions, which create a wedge between commodity prices at the farm-gate and border, and ratchet up prices of imported inputs.

Information on the current state, distribution and availability of livestock infrastructure is very scarce and somewhat anecdotal; there is clearly a need to review at national levels the state of this stock before proceeding with significant investment programmes in support of the sector. A 1996 study[25], while underlining the serious problems of inadequate infrastructure in the under-developed communal areas of Southern Africa, observed that – in general terms – the commercial sectors were generally more favourably endowed. In summary, South Africa, Zimbabwe and Mauritius had adequate infrastructure, while other countries of the region had some or serious problems.

[23] Barwell, I. 1996. Transport and the Village. World Bank, Discussion Paper No. 344. 1996.
[24] IFAD. 2001. Rural Poverty Report.
[25] FAO. 1996. Livestock and Meat Trade in the SADC community.

The fishery sector in Africa is characterised by a dualistic structure with an *industrial sub-sector*, composed by large boats operating on a purely commercial basis targeting high quality/high value fish to serve northern markets and a high degree of vertical integration from fishing through storing and processing up to marketing in northern markets. Most value added is therefore kept by the company itself and very little left within the country, as post-harvest infrastructure, where existing, is limited to storage capacity and very little processing. On the other side is the *artisanal sub-sector*, composed by African fishermen engaged mainly for subsistence and the local market, using labour-intensive technology. Among the major constraints are access roads, appropriate landing facilities, and availability of adequate gear and other inputs. Future developments in the sector, aimed at promoting a locally-owned industrial fleet, and to create conditions for investments in processing infrastructure within the continent, would have to include ports suitable to the needs of the sector, strategically located with respect to the fishing areas and with the required handling facilities.

As of now, markets for artisanal fishery products are also extremely important in the African continent for both coastal communities, whose livelihood strategies are heavily dependent on fisheries, and inland populations, for which fish represents usually a cheap source of protein and nutrition compared to other sources. Improvements to market infrastructure coupled with investments in connecting rural roads would reduce transaction costs with likely beneficial effects on both producer incomes (higher producer prices) and increased accessibility to fish and fish products for consumption by the general population (with lower consumption prices). Being built for general purposes, many African ports fail to meet the needs of artisanal fisheries, where the construction of small fishing jetties and docks could serve the many communities and villages along the African coast, thus creating poles of development that could easily link with national and regional markets.

3.2.2 Trade-related capacities for improved market access

The value of Africa's agricultural exports, which amounted to US$14 billion in 2000 is growing extremely slowly, having been US$12 billion in 1990. The share of Africa in world agricultural exports has dropped steadily, from 8 percent in 1971-80 to some 3.4 percent in 1991-2000, and reversing this decline will require increased efforts by the African countries, with the assistance of the international community, to alleviate their domestic supply-side and other constraints. These can broadly be divided into structural constraints, which are particularly prevalent in Sub-Saharan Africa.

The constraints concern the countries' high dependence on a limited number of export commodities, weak technological capacities, inadequate legal and regulatory institutional frameworks and insufficient transport, storage and marketing infrastructure, and policy-induced constraints resulting from trade and macroeconomic policies that have biased the structure of incentives against agriculture and exports. According to a recent meeting organised by IFAD in relation to NEPAD,[26] farmers lack the necessary skills to access markets, the information on market opportunities and prices. Furthermore, physical access to markets is poor, transaction costs are high, and these factors, combined with farmers' lack of organisation, results in low producer prices. On the national and local levels, the withdrawal of governments from direct involvement in marketing has left large gaps which the private sector is not yet able to fill; while the global conditions have created an inherently unfavourable environment for smallholder producers to enter markets – declining prices and heavy industrial country agricultural subsidies among them.

Africa's failure to produce enough domestically has contributed to progressive growth in food imports in the last years of the20th century, with Africa spending an estimated US$ 18.7 billion in 2000 – significantly more than the value of exports. Africa's shares of total agricultural imports in 1998 were 4.6 percent (world), 16.3 percent (developing countries). Agricultural imports account for about 15 percent of total African imports. It

[26] Regional Workshop on Poverty Reduction and Rural Growth in Eastern and Southern Africa. Dar-es-Salaam, 23-24 May 2002. Provisional Summary of Proceedings

is of particular concern that the share of gross export revenues needed for importing food has increased from 12 percent to over 30 percent in East Africa. It is against this background that a major thrust to promote exports and market access is justified for Africa.

Trading opportunities for African agricultural exports are dominated by developed country markets[27], and their conditions of access are of critical importance. Despite progress made in the implementation of the Uruguay Round Agreements, support to agriculture in developed countries continues to be high ($311 billion in OECD countries in 2001), tariff peaks still persist in several products (e.g. sugar, meat and horticultural products), and tariff escalation (higher tariff on more processed products which are given greater protection to the processing industry of the importing country) still prevails in several important product chains (e.g. coffee, cocoa, oilseeds, vegetable, fruit and nuts and hides and skins). The new WTO negotiations on agriculture aim to achieve substantial multilateral improvements in market access, the reduction of all forms of export subsidies and in trade-distorting domestic support.

At present, access of African agricultural exports to the developed country markets is governed largely by trade preferences they receive from several developed countries. These include in particular, preferences under the generalised system of preferences (GSP), the EU ACP agreements, the Euro-Mediterranean Free Trade Areas and the US African Growth and Opportunity Act (AGOA). However, the most significant development in trade preferential arrangements is the EU's ("Everything but Arms") initiative of duty-free and quota-free entry for all products (except arms) in favour of LDCs, 34 of which are African countries. This suggests that access to the EU markets for agricultural products may no longer be a major problem for African LDCs. A number of factors, however, may impede the ability of African countries to utilise the preferential access. These include, for example, rules of origin and standards such as sanitary/phytosanitary requirements and other technical barriers to trade.

Globalisation was expected to offer opportunities for growth and development, but in the case of Africa, the hopes and promises attached to rapid liberalisation of trade and finance have not so far been fulfilled. Export patterns continue to be characterised by a small number of primary (often plantation-based) commodities and dependency on preferential access to a few developed-country markets. An important reason for this is the supply-side constraints in the countries themselves. But others have their origins elsewhere. For example, under agricultural and trade policies of industrialised countries in 2001 alone, total subsidies to agriculture by OECD countries were estimated at over US$311 billion. This gives a competitive edge to the agricultural sectors of these countries that poorer countries cannot match. The competitiveness effect probably overrides any beneficial effects of lower world prices for poor consumers in developing countries (For a topical development on this see text box 6b).

Within the context of intra-Africa trade in particular, the main constraints are: inadequate physical infrastructure, unstable market opportunities related to production variability, relatively small markets, lack of current market information and trading skills, uncertain policy environments, and rapidly changing trade regulations. Solution of these will require countries to develop regional or continent-wide technical standards for various sectors including plant protection and fisheries. A continent-wide approach, starting at regional level, may facilitate both the harmonisation of standards and the improvement of infrastructure and enforcement mechanisms – all in the context of compatibility with international recommendations in order to avoid adoption of norms that would create confusion, distort markets and, potentially, conflict with WTO agreements.

It may be noted that Africa is urbanising and so creating large concentrated markets that may offer a focus for entrepreneurial agriculture in future. IFAD recently observed for Western and Central Africa[28] that by 2030

[27] Currently receiving more than 70 percent of African agricultural exports.
[28] IFAD Strategy for rural poverty reduction in Western and Central Africa. http://www.ifad.org/operations/regional/2002/pa/pa.htm

most people in that sub-region will be urban: this may create major opportunities for markets development due to spiralling urban demand. In the context of internal markets, it may be important to consider the elements in text box 5.

Text Box 5: Promoting Efficient and Equitable Market Linkages

Rural people in Africa, especially the poor, often say that one reason they cannot improve their living standards is that they face difficulties of accessing markets where they can obtain agricultural inputs and consumer goods and sell the produce that they grow.

For smallholder farmers a decade and a half ago, major markets were organised by governments, and exchanges were not critically influenced by farmer knowledge and organisation. Nearly everywhere the situation has changed radically. Smallholder farmers no longer face an assured market for their produce at fixed, pan-territorial prices that often represented a large tax on the value of their produce. Similarly, they no longer face a predictable supply situation for inputs and, in today's world, they may not be able to afford to buy what becomes available. A market environment which was far from perfect, but at least offered farmers some degree of security, has been replaced by a new one which is highly uncertain, and in which prices, whether for selling produce or purchasing inputs, are now largely negotiated. New commercial relations must be struck with a myriad of suppliers and buyers. For some farmers - particularly those producing export crops in areas enjoying good communications, this has created major new opportunities. For others - particularly those trying to produce and market staples at the agricultural margins, it has created major problems. Market access has become a critical determinant of farmers' production systems: those who live close to better roads and have more frequent and direct contact with the market are willing to produce more systematically for the market, while those with poor market access have little incentive to produce crops other than those required for domestic consumption. Put another way, improved market access is a prerequisite to increased farmer incomes.

By and large, smallholder farmers are ill equipped to extract the maximum from the new market relations that they face. They confront not only an uncertain production environment, but also enormous constraints in physically accessing markets – they are typically distant and transportation costs are high, and in many cases, there are few buyers of produce. Poor farmers in Africa are also constrained by lack of information about the markets, lack of business and negotiating experience, and lack of a collective organisation which can give them the power they need to interact on equal terms with other, generally larger and stronger, market intermediaries. The result is poor terms of exchange and little influence over what they are offered.

The situation is often no better on the other side of the market equation - that is, for the wholesalers who purchase farm surplus and those who sell technical inputs and provide finance to smallholders. In the wake of a history of limited "space" for the operation of private traders and the absence of adequate sources of investment finance an efficient private sector does not spring up overnight. The lack of basic infrastructure in many areas further discourages the entry of efficient and competitive private sector services and results in high transaction costs, which together translate directly into low prices to farmers. Restrictive or non-supportive government policies – or the local and inappropriate application of policies, further increase the cost of doing business and constrain the development of a new private sector. Neither the poor nor rural economic growth is served by an uncompetitive market structure.

African governments and their development partners have an important role to play in this area of market development, with three objectives in mind: speeding up the rate of market development; removing or reducing barriers to market access, both by special support in places where markets are slow to develop spontaneously and by easing market participation of poorer producers; and establishing a more equitable set of market relations between producers and markets intermediaries.

They can make a difference in several ways. First, they can give smallholders the skills and organisation they require to relate more effectively - on a more equal footing - with the private sector: the promotion of producer groups or associations is one such way this can be achieved. Second, they can help the private sector to develop and broaden its outreach, and so provide more competitive and efficient services to smallholders, particularly for input supplies, produce marketing and agro-processing. An important element of this will be to support the development of micro-enterprises, as new entrants into the market. Third, they can finance the provision of essential connecting infrastructure – both 'hard' infrastructure, such as market access roads, and 'soft' such as communications, and price and market information. And fourth, they can promote dialogue between the main stakeholders to generate the policy, institutional, and legal context required for enhanced market linkages.

While the issue of how to establish the rural poor on a stronger footing in national market-based systems of

exchange is one to which governments in Africa and their development partners are increasingly addressing themselves, it is incomplete without at the same time coming to terms with the issue of global markets. The most immediate issue is clearly the system of agricultural trade – including both market access and the way in which the prices of agricultural commodities are determined. They directly and indirectly affect the incomes of rural households: they are an essential part of the poverty and poverty reduction equation. **Text box 6** tell parts of the story on the international scale.

These questions will become more rather than less important in the future. African countries are being told that their income will increasingly be shaped by their ability to enter and compete in the global economy. Yet access to the markets that are vital to the future of African farmers is heavily distorted, and so are the prices for many of the products they produce. Under such circumstances, liberalisation and globalisation seem less like a path to development than a poverty trap. With restricted access to developed country markets, and with artificially depressed global prices for many agricultural commodities, small farmers in Africa gain scanty rewards for their efforts. Moreover, their progress towards development, and the impact made by their rural development partners, will remain meagre.

A key consideration is how large parts of the global agricultural economy are shaped by the way in which developed countries seek to maintain and improve the well-being of the agricultural and rural elements of their own societies – through protection of markets and huge direct production subsidies paid to farmers. It is an irony that many African countries have largely internalised the perspective that a dynamic and sustainable agricultural economy cannot be based on subsidies; yet their agricultural systems continue to be undermined by the subsidies paid out in precisely the developed countries that have been the main promoters of liberalisation.

Expenditure on agricultural subsidies for the few in developed countries dwarfs official development assistance for the many in Africa, and the negative impact on the poor is quite clear. But the issue is not necessarily one of subsidies *per se*. The issue is one of how to do it and the consequences of different choices. Huge subsidies to *production* penalise poor farmers in the developing countries – and generate negative environmental/public-good effects in the developed countries themselves. However, if the object of the subsidy is not the production, but rural incomes in some developed countries, then there are many alternatives to production subsidies. Environmental subsidies, for example, could have the same impact on rural incomes, have a positive impact on public goods, and eliminate many of the negative impacts of the current production subsidies on poor farmers in Africa. Other alternatives exist that give a chance to poor farmers within a win-win framework. These options must be pursued more vigorously if global development is to move from a polarised system, in which opportunities for some are created at the expense of opportunities for the many.

The case for reform in agricultural trade is being made ever more strongly, and justifiably so. Freer markets and less harmful subsidies to farming communities are critical – particularly for the producing poor of Africa. But that is only part of the trade story. The truth is that even within a fairer trade regime many African countries, and small farmers within them, are going to encounter increasing difficulties. In many traditional export crops, supply is rising faster than demand, and downward price trends for raw materials are likely to continue. If small farm production is to be the basis of the livelihoods of the rural poor, everything must change. The challenge is not only fair trade, but also product diversification, greater emphasis on value-added in raw materials processing, and far greater attention to the quality and phyto-sanitary standards of the major markets. Few countries in Africa are adequately equipped to meet these challenges. Poor producers have to be assisted – and quickly – if globalisation is to be a system of joint development.

Source: Edited text from E. Heinemann, IFAD

Text Box 6: Aspects of Trade and Market Access

(a) Key elements of export trade issues

The export of agricultural products is essential for African economic growth as agriculture plays a major role in the continent's overall economy. Only some 31 percent of African agricultural exports are currently shipped to developing countries and a significant potential exists for South-South trade if conditions for market access are improved. Tariffs on agricultural products are, overall, substantially higher in developing countries than in developed countries and a prerequisite for increases in trade and market access for Africa is the political will to implement SPS and TBT standards and regulations, and to increase regional market integration. In terms of trade and market access, the importance of domestic markets should not be neglected and this will require strong institutional capacities and the implementation of relevant policies (e.g. competition, tariff policy, financing, market development, etc.). A strong domestic market is a building block for export markets and there should be broad participation in domestic markets: e.g. small farmers, women, etc.

High tariffs and non-tariff barriers continue to be a major obstacle to regional African trade and regional integration will contribute to providing economies of scale and improved international competitiveness. However, the liberalisation of African markets is probably the key to optimising economies and to creating social wealth. The Africa Group has clearly indicated to WTO its commitment to further domestic tariff reduction in agriculture, linked to substantial progressive reduction of both domestic support and the level of export subsidies in developed countries. However, developing countries will need the assurance that improved market access conditions will not be exploited by highly subsidised products from developed countries. A further consideration is that trade and market access can only increase in a conducive environment for investment (infrastructure development, financial structures, strong national regulatory authorities to implement, information, and market development).

Real structural change/reforms are necessary in developed countries to ensure that developing countries can equally participate in international trade and that production takes place in line with comparative advantages and not in accordance with the availability of financial resources to support agricultural production. To this effect, African regional interaction in related international standard setting fora needs to be strengthened – both in Geneva, as well as on a regional basis in Africa, in particular the WTO meetings on SPS and TBT Agreements, and the IPPC, Codex, OIE, etc. The Africa Group has submitted a firm proposal for the second phase of the WTO-mandated negotiations on agriculture and this needs to be concretised and taken forward in the Doha negotiations process. This should lead to increased market access, a substantial reduction in trade and production distorting support, and the elimination of export subsidies. However, differential treatment should be extended to developing countries and should form an integral part of the negotiations.

Source: Country comments on first draft CAADP

(b) Farm Subsidies in Industrial Countries – the case of the US Farm Bill

The reality that NEPAD market access will face is that it remains uncertain whether developed countries will reduce farm subsidies or, if they will, how fast. The adoption of the US "Farm Security and Rural Investment Act, 2002" is a case in point. A recent review indicated that the Bill:

- offers support to a declared maximum of US$360 000;
- raises spending on subsidies by some 70 percent ($15-20 billion/year). This is already more than Africa's total annual agricultural exports);
- offers fixed payments each year for each eligible crop (including a number of crops currently or potentially important to Africa: cotton, rice, peanuts, other oil seeds, maize, sugar, soybean, sorghum);
- lowers loan rates and in case of low market prices, could offer direct subsidies;
- gives counter-cyclical payments when farm income falls below threshold levels;
- dairy farmers can receive 45 percent (up to a cap) of the difference from a target price specified in the bill;
- sugar continues to be heavily protected against imports;
- new supports are offered for wool, mohair, honey, chick peas and lentils;
- apples, fruit and vegetables are subsidised and their purchase and distribution is also supported.

Source: Questions & Answers – US Farm Bill: http://www.wtowatch.org/library/admin/upt (23/05/02).

Meeting technical standards for export products, in the context of the WTO, SPS and TBT Agreements, remains a major challenge for all African countries. The gap in these standards between the African and richer countries is already high, and may grow wider unless a massive effort is undertaken to raise standards. The gaps tend to be higher precisely on those value-added, processed products where global demand is elastic, as against primary agricultural products. Because of their limited capacities in scientific research, testing, conformity and equivalence, they face difficulties in meeting international safety and quality standards. The task is even more daunting when the developed countries, on risk assessment grounds, adopt higher standards than those currently recognised by international standard-setting bodies. Moreover, rising consumer concerns in the affluent countries over food safety and quality compound the difficulty of the African countries in meeting ever higher standards.

To overcome these handicaps will require large amounts of investment in both facilities and human resources. Overall, African countries face many impediments to spur diversified agricultural growth and to gain from trade, despite the implementation of the Uruguay Round Agreement on Agriculture. But this also means that the scope for reforming the global trading system is immense. However, in order to take advantage of new trading opportunities Africa needs to strengthen supply-side capability. Text box 6a, which draws upon comments and suggestions from Africa in respone to an earlier draft of this document, draws attention to a number of other aspects of international trade that are important for Africa.

3.3 Investment Strategy

3.3.1 Rural infrastructure

Most of the African countries to be included come within the Least Developed Country (LDC) category and, as such, have been exposed to years of fiscal austerity programmes. Austerity explains part of the decline in funding but other contributors include failures to find alternative sources of income to replace declining revenues from weaker terms of trade in their traditional markets; the drop in ODA; and reduction in private finance for infrastructure. With regard to ODA: in 1990, Africa received 30 percent of global agricultural ODA, but its share declined to 21 percent in 1998. Moreover, the total flow of official development assistance to primary agriculture declined over the same period from US$11 billion to only US$7.4 billion. The lack of funding has contributed not only to insufficient infrastructure construction but also to a lack of appropriate maintenance – hence there are also substantial needs for rehabilitation.

Thus, the strategy to address rural infrastructure requirements both to complement the projected expansion in areas benefiting from land and water developments and the requirements of the other major agricultural sub-sectors (particularly livestock and fisheries but in some countries also forestry) will clearly depend on the country concerned and would have the following main elements:

- Investments in existing and new rural infrastructure would support the expansion of agricultural production arising from the rehabilitation and development of water management and land improvement works, as well as underpin the sustainable development of the livestock and fisheries sub-sectors and provide for more general socio-economic development and poverty reduction in the rural areas. In some humid central African countries, important forest resources are inaccessible for commercial exploitation for lack of both river and road/rail infrastructure.

- In the design of an appropriate approach to rural infrastructure, the areas of emphasis will clearly vary by country and priorities should be based on clear linkages to related national policies and national poverty reduction strategies.

- Innovative approaches to financing, using a range and mix of public and private funding and perhaps new approaches to mobilising resources for, and managing, larger-scale rural infrastructure would be considered.

- Clear linkages would be established to countries' priority agricultural sector policies and programmes, including those designed to take advantage of external market trading opportunities. The recovery of the current degraded stock of rural infrastructure to its full operational capacity would be an essential priority.

- The need for continuing maintenance throughout the period to 2015 would be included.

Institutional support will be required for capacity building and training in support of all levels and types of institutions responsible for the planning, design, construction and continuing operation, maintenance and management of rural infrastructure; these would range from central to local level/decentralised government entities, representative bodies, private sector actors, NGOs and CBOs, etc.

Clearly, the way forward will be influenced by the fact that current assets of productive and rural infrastructure differ from country to country not only in terms of scope, extent and coverage, but also in the way that they are owned, managed and financed. In the last decade, such infrastructure has come to be seen not so much as a public asset, but rather as a stream of demand-driven services involving the State, the private sector and, particularly, the users themselves. In the future, in the relative absence of a strong private sector, rural infrastructure in Africa will have to be financed by a larger proportion of concessional loans and grants and be more community-based, provided the appropriate capacity can be built. An appropriate mix of financing from public sources (both domestic resources as well as international loans and grants) and private resources will also have to be considered, in line with the capacity of the existing stock and its conditions, country policies, institutional capacities and private sector interests including the interests of rural communities.

Prospects for export growth in Africa are more promising in new crops and processed products than in traditional primary commodities and several non-traditional agricultural commodities, particularly, but not exclusively, horticultural products, would appear to offer important opportunities for some African countries. The developments in water and land infrastructure, with complementary investments in rural infrastructure would underpin such market diversity.

3.3.2 Trade-related capacities for improved market access

Actions in support of improving African countries' access to external markets will also include a number of policy and institutional related themes. For example, developed countries could improve access to their own agricultural markets by, *inter alia:* (i) granting duty-free and quota-free market access, similar to those provided by the EU to LDCs; (ii) easing rules of origin criteria; and (iii) providing assistance to African countries to meet SPS/TBT standards. In addition, technical and financial assistance will be required to help build capacity in African countries to face the challenges and take full advantage of the opportunities flowing from the multilateral trading system, and to participate fully as equal partners in the new WTO negotiations on agriculture. Finally, assistance will be required to help countries address the weaknesses in their food safety and quality control systems, and the associated institutions.

While these actions may improve the trading environment for exports, they will not necessarily result in an expansion. There is a clear need to diversify the production and export base (both horizontally and vertically) from low value-added to high value-added products. The challenge for African countries is to initiate and sustain the momentum of modernisation and diversification of their agriculture in order to realise the considerable potential that exists. This will require substantial investments for upgrading the marketing, transport and communication infrastructure; irrigation improvements and modernisation; improving the

efficiency of financial institutions; strengthening research and extension for developing and adopting relevant technology; and establishing a fair and open regulatory framework. A large part of these investments have been incorporated in the section on rural infrastructure. The investment provision under "trade-related capacities for improved market access " therefore focuses on enhancing safety and quality standards, marketing and promotional services, and strengthening trade-related institutional capacities.

3.4 Estimated Investment Requirements

3.4.1 Basis of Estimates

In order to assess in broad terms the requirements for investments in storage, processing, market facilities and rural roads, the following steps have been taken:

- A 2001 baseline was established from 1999 data on country-level information, aggregated to sub-regional and regional levels; data have been derived from FAOSTAT, and other sources available from the World Bank, AfDB, IFPRI and the CIA.

- Requirements for crop *storage and processing capacity, enhanced safety and quality standards* as well as crop *marketing facilities and promotional services,* are a function of the anticipated increased agricultural production following investments in water management and land improvement; requirements for livestock and fisheries infrastructure are based on recent national-level sector studies and formulated investment programmes, as well as general assessments of sub-sectoral needs.

- Requirements for *rural roads* are a function of more general socio-economic demands, in addition to underpinning the increased agricultural production.

- The possible range of crop storage, marketing and processing facilities has been simplified for the purposes of this exercise into two types of each – dry storage of cereals and cool storage of fruits and vegetables; general rural markets and specific markets for fruits and vegetables; and mills for cereals and other processing facilities for fruits and vegetables.

- Livestock infrastructure facilities are considered to include livestock watering points and improvement of surface water supply systems, and vaccination and slaughtering facilities including livestock products' treatment.

- Fisheries infrastructure includes the rehabilitation of existing and the construction of new fishery port developments (limited number), the provision of artisanal fisheries landing points and infrastructure related to markets and processing.

- Forestry infrastructure (the estimated costs of which have not been included here) would largely consist of road, river or rail access to often-isolated parts of countries. In forest-rich countries, ports to handle exports are also crucial for the bulky forest products.

- Rural road infrastructure consists largely of unpaved roads, tracks and paths, while for the purposes of this document, some allowance is made for the inclusion of a proportion of the paved road network that directly serves the rural areas. Recent assessments generally indicate that a substantial proportion of the rural network is in a poor operational condition and, consequently, the rehabilitation of the existing stock of rural road infrastructure will clearly constitute an important element of future investment priorities.

- An assessment of the potential investments has been derived on the basis of the projections of increased agricultural production arising from the land and water developments, reviews of country situations and expert analysis of the available data and requirements for both rehabilitation of existing stock, as well as investment in new works and overall maintenance.

- The estimates of increased agricultural production are derived assuming that all the land to be developed was already cultivated (no new arable land) and that, consequently, incremental production arises from yield increases rather than increases in area cultivated.

- In addition, two broad categories of agricultural products were considered in the analysis: cereals and vegetables/fruits. Yield increases were calculated on the basis of average yield differentials between irrigated and rainfed crops for African countries[29]. The distribution of these crop categories was assumed to be 92.5 percent for cereals and 7.5 percent for vegetables/fruits in rainfed conditions (AT 2015/30), changing to 85 percent and 15 percent, respectively, under irrigation/water management, together with a shift from cereals to vegetables/fruits in 7.5 percent of the area.

- In addition, associated institutional strengthening requirements, of both the public as well as the private and informal sector (user or community groups), have been considered and allowances for their financing requirements have been included as part of the "maintenance costs" category.

- Unit costs for the several types of investments have been derived on the basis of a range of current estimates from different sources (FAO[30], World Bank, and country data) and applied to the targets identified for each category of rural infrastructure.

The general assumptions used in developing these estimates are as follows:

- Incremental crop production under expanded water control infrastructure would consist essentially of cereals (85 percent) with some fruits and vegetables (15 percent).

- Storage facilities for cereals would be met by existing and new facilities on an equal basis, whereas new cool storage requirements for fruits and vegetables would only be required for a relatively modest proportion of incremental production (equal to 5 percent).

- General rural market facilities would double by the year 2015 to serve an estimated 50 percent of the rural population.

- New markets for fruits and vegetables would be required for an estimated 50 percent of incremental production.

- New processing facilities would be required for some 60 percent of incremental cereal production (in terms of milling capacity) and some 20 percent of fruits and vegetables.

- Costs of livestock infrastructure are based on an overall estimate of US$1.8 per livestock unit (LU), to include all the infrastructure items outlined above.

- Costs for fisheries infrastructure are based on current estimates developed in the context of the design of investment project proposals for similar facilities in the region.

[29] FAO. World Agriculture: Toward 2015/30 (AT 2015/30).
[30] Based on 1996 WFS estimates for costs of storage, marketing and processing facilities, adjusted for inflation.

- Costs of forestry infrastructure have not been included.

- Unit costs for storage, processing and fruit/vegetable markets are taken as:
  - dry storage (cereals) - US$155/ton;
  - cool storage (fruits/vegetables) – US$3,210/ton;
  - cereal marketing facilities – US$3/person;
  - fruits/vegetables marketing facilities – US$360/ton;
  - Processing cereals (milling) – US$180/ton;
  - Processing fruits/vegetables – US$1,190/ton.

Data for 1999 from the US Central Intelligence Agency (CIA) sources for total roads (rural and non-rural) have been used for establishing the baseline situation (2001) for the current stock of roads, by country. This stock of rural roads has been derived by assuming that 20 percent of paved roads and 90 percent of unpaved roads are rural. With this baseline, minimum mean targets for 2015 have been applied, equivalent to a level of 5 km/1 000 persons and 25 percent of paved roads, to obtain an estimate, by country, of the requirements for new roads. In addition, it was assumed that 70 percent of existing rural roads require rehabilitation – see below. Rehabilitation would involve regrading and re-forming the road base and gravel surface as well as repairs to cross-drainage structures, as appropriate. Clearly, specifics can only be given after suitable feasibility and design studies have been undertaken.

Average unit costs for rural roads – rehabilitation and construction – have been applied, as follows:

- rehabilitation of paved road – US$50 000/km;

- rehabilitation of unpaved road – US$7 500/km;

- construction of paved rural road – US$100 000/km;

- construction of unpaved rural road – US$15 000/km.

Requirements for annual investment costs of the categories of rural infrastructure are derived, as follows:

- Storage, processing and fruit/vegetable markets –stream of annual costs developed on the basis of the assumed build-up of incremental cereal and fruit/vegetable production from the areas benefiting from land and water developments.

- Cereals' markets develop in direct proportion to population increases over the period.

- Roads' costs are derived on the basis of an assumed build-up of annual activities relating to rehabilitation and new construction.

- Estimates of annual maintenance costs (including institutional support requirements) are based on 2.5 percent of total incremental infrastructure investments (storage, marketing and processing), and on 3.5 percent of both existing and incremental rural road investments.
- Investment requirements for assisting countries improve their access to markets have – for preliminary, broad guidance – been assumed at some US$3 million per country during a 4-5 year period.

- Investment requirements will include public and private resources, which will be shared according to particular country policies and agreements, etc. For indicative purposes, the estimates indicated in the document are developed on the basis of the following feasible scenario:
  - dry (cereal) storage - Private/Public ratio = 50:50;

- cool (fruits/vegetable) storage - Private/Public ratio = 100:0;
- rural marketing facilities (cereals) - Private/Public ratio = 0:100;
- fruits/vegetable. facilities - Private/Public ratio =50:50;
- milling (cereals) - Private/Public ratio = 100:0;
- fruits/vegetables processing - Private/Public ratio = 100:0;
- livestock facilities - Private/Public ratio = 20:80;
- fisheries facilities - Private/Public ratio = 20:80;
- rehabilitation paved roads - Private/Public ratio = 0:100;
- rehabilitation unpaved roads - Private/Public ratio = 10:90;
- construction paved roads - Private/Public ratio = 5:95;
- construction unpaved roads - Private/Public ratio = 20:80.

Estimates of the rehabilitation and construction requirements for rural roads, by region, are shown in Table 15.

3.4.2 Total Investments

The **estimated total investments** in rural infrastructure required to support the increases in agricultural crop production arising from the land and water developments foreseen by the year 2015, together with supporting infrastructure for the livestock and fisheries subsectors, amount to some US$91 billion, distributed as follows: crop storage infrastructure 9 percent, crop marketing facilities 7 percent, processing facilities 14 percent, livestock and fisheries infrastructure 3 percent, and rural roads 68 percent. Table 18 provides details of the estimated total investment costs for each category, by region; Table 19 offers the annualised costs for each category, including both investments and operation/maintenance.

The total costs required for improving countries' access to external markets are estimated at some US$2.79 billion. To these totals must be added allocations for maintenance, calculated at nearly US$37 billion. Annual incremental investment requirements during the period 2003 – 2015 would clearly not be uniform but would depend largely on countries' absorption capacity in institutional, financial and technical terms, and their access to additional sources of finance. Over the period, average annual increments would range from some US$5 to 8 billion. Immediate investment requirements (2002-2005) would amount to some US$24 billion, while short-term requirements (2006-2010) would amount to some US$37 billion and medium-term requirements would total some US$33 billion.

In addition, operation and maintenance requirements[31] for all categories of rural infrastructure are estimated to reach annually, by the year 2015, some US$3.72 billion; equivalent to an overall expenditure throughout the period of some US$36.9 billion.

These estimates will need to be refined and confirmed, on a country-by-country basis. An overall breakdown, by sub-region, of rural infrastructure investment requirements is shown in Table 18.

Projections for the distribution of public private financing within this overall envelope must remain, at this stage, highly conjectural and will require specific country conditions to be taken into account. However, to facilitate this initial global analysis, a possible scenario is presented in Table 20. This indicates that, overall, the distribution of financing for rural infrastructure could be – public US$ 60.5 billion, private US$30.4 billion, equivalent to a 2:1 ratio. The likelihood of private sector participation to this degree will need country by country assessment, given that historical involvement has been weak except in a few countries. Regarding the apportionment of investment by external and African sources, Table 21 offers one estimate, which also would eventually need case by case review. In the first place some activities appeal to external partners better than others and in the second place, the specific beneficiary country affects external investor willingness to

[31] Including allowances for both institutional strengthening and the recurrent costs of the organisations responsible for operation and maintenance.

proceed. Both Tables 20 and 21 reflect significant optimism about private sector participation which may be seen in the context of more conservative expectations of possible progression of all-Africa shares of public and private funding given in Table 3.

3.4.3 Expected Impact

Benefits arising from investments in rural infrastructure and improved market access will clearly need some time to materialise in terms of impact on productivity, agricultural growth and consequent poverty reduction. However, available evidence points to an increase of 1 percent in GDP per caput in developing countries for every one- percent increase in the stock of infrastructure per person. For Africa, this impact is likely to be larger due to the constraints placed on the region's competitiveness by geography and the resulting difficulty of accessing markets. In particular, Sub-Saharan Africa has the highest percentage in the world of land-locked populations and the lowest share of population with access to coast or river. Proper rural infrastructure is therefore necessary to make up for at least part of the region's geographical handicaps, especially in the face of increasingly integrated world markets.

There are also a number of other direct benefits that can arise in the short- and medium-term, which will contribute to stimulate economic growth. First, construction of rural infrastructure directly stimulates output and employment and, in African economies where labour is relatively abundant, increased impact occurs due to the multiplier effect. Second, good quality infrastructure promotes domestic market activity and market integration by lowering both transaction costs and the costs of inputs. In addition, it expands the size of the market for domestically produced goods and services by facilitating access to regional international markets.

3.5 Future International Support

Clearly, the projections of rural infrastructure requirements need to be placed in their specific country-based policy and socio-political frameworks, with consideration also taken of the countries' physical conditions and socio-economic settings. Investments will need to be judged in a strategic manner so that the benefits of diversification and intensification of agricultural production are fully realised and can respond to the changes in market conditions. The proper identification of rehabilitation needs and priority investment requirements will necessitate a broad and multi-sectoral approach, involving several sect oral ministries within each government as well as a range of civil society actors.

After full agreement has been reached on both the strategy and broad content of the national programme, full investment formulation that meets the needs of domestic or external (multilateral and bilateral) funding sources will have to be carried out. Overall, a flexible, participatory approach will be needed, with full national and local involvement and commitment. International partners, including FAO, could initially assist NEPAD in this process in four ways:

- Refinement of current estimates of rural infrastructure assets based on a review of data availability on rural roads, storage, processing and market facilities, supported by in-depth country studies.

- Providing linkages to other UN Specialised Agencies who have responsibility for associated areas of activity. For example, ILO is concerned with the employment generation aspects of rural infrastructure works and has a good deal of African experience that could be drawn upon for use by member countries.

- Providing assistance to member countries in investment identification and preparation, on a case by case basis, and linked to the interest of international public funding sources.

- Expanded technical support for Regional Economic Organisations aimed at enhancing their capacity to promote intra-regional trade in farm products, improve agricultural product standards and support national programmes for expanded agricultural output.

Chapter 4

Increasing Food Supply and Reducing Hunger: Strengthening national and regional food security

4.1 Introduction

About one third of Sub-Saharan Africa's population remains chronically hungry[32]. As long as this situation continues, it is unlikely that the Region can attain the high rates of economic growth to which the New Partnership for Africa's Development (NEPAD) rightly aspires. The right of all people to have access to adequate food is recognised in international legislation and getting rid of hunger is a moral imperative. But it also makes economic sense to eradicate hunger, for as long as people are undernourished, they cannot achieve their full potential: they remain prone to ill health, their learning ability is compromised and their capacity for productive work curtailed. Ill health due to chronic hunger has severely reduced productivity in Africa and a recent study has shown that per caput GDP may have been halved relative to its potential if under-nourishment had been eliminated[33].

The hungry are the poorest of the poor, and hence reducing hunger must be among the first steps towards the achievement of the Millennium Development Goal to halve poverty by 2015, which is taken as a reference point for NEPAD. All African states subscribed to the global commitment of the World Food Summit (WFS) in 1996 to halve the number of hungry people by 2015. The presence of very large numbers of poor and hungry people, marginalised from the work force and from markets, not only acts as a brake on economic growth and development but, if not addressed, provides a breeding ground for social instability and conflict.

NEPAD gives high priority to agriculture and food security. This chapter briefly reviews the current state of food security in the continent and the extent to which progress is being made towards the achievement of the WFS goals. It then refers to the need, as part of the quest for improved food security and reduced poverty, for vigorous large-scale community-based programmes to improve the performance of small farms throughout the continent. In examining the implications of embarking on such programmes, it looks to the example of the Special Programme for Food Security (SPFS) launched by FAO as one approach to achieving sustainable food security. The chapter then examines how an expansion of action based on SPFS concepts could contribute to the achievement of NEPAD goals at both national and regional levels. Tentative estimates of the cost of such a programme are also presented.

The chapter also focuses on the role of small farmers in achieving higher levels of food household and national food security is not intended to imply that there is not a role also for larger-scale farms in Africa's future agricultural development. While such development, usually led by the private sector, can contribute importantly to economic growth, it tends to have fewer linkages within the rural economy and hence less of a multiplier effect than development driven by small-scale farmers.

While raising the output of small and marginal farmers can have a significant impact on hunger and poverty, this needs to be complemented by measures to widen food access through a combination of redistributive measures adopted within extended families and communities and accurately targeted food safety nets supported by governments.

[32] FAO. 2001. State of Food Insecurity in the World (SOFI).
[33] FAO. 2001. Economic and Social Development Paper No. 147, Rome. Undernourishment and Economic Growth: the efficiency cost of hunger:, by J.L. Arcand.

In making reference to the SPFS at national and regional levels, it is necessary to stress that African governments and regional organisations have their own strategies and programmes for agricultural development and food security. Many of them have established partnerships with FAO to adopt the SPFS as a framework for implementing these strategies while others have adopted alternative approaches to achieving essentially the same goals. In some cases, countries have decided to move forward with input-intensive agricultural development, as in the case of the Sasakawa Global 2000 programme that has demonstrated that high crop yields are attainable throughout much of the continent. Others are collaborating with the World Bank in community-driven development (CDD) programmes in which agricultural development is linked to a range of investments in rural development at community level. With bilateral assistance, some countries are engaged in processes aimed at bringing about sustainable improvements in the livelihoods of their rural populations. IFAD, which by mandate, focuses on the poor, has for long invested in community efforts to achieve higher productivity. As of 2001, IFAD had invested in Africa since 1977 (25 years) some US$3.5 billion in 318 projects - totals having been: Near East and North Africa = US$0.98 billion; Eastern and Southern Africa = US$1.2 billion; Western and Central Africa = US$1.3 billion.[34]

What is evident is that the massive attack on rural poverty and hunger which is required offers ample opportunity for partnerships among Africa's own institutions as well as between Africa and the international community. To the extent that governments decide to adopt the approach pioneered by the SPFS, this also depends on partnerships between governments and civil society, including effective participation by rural communities.

4.2 Food Insecurity in Africa

Between 1990-92 and 1997-99, the countries of Sub-Saharan Africa (SSA) succeeded in increasing average per capita dietary energy supply from 2120 to 2190 kcal per day, that is by 3.3 percent during the period. This is a significant achievement, given the high rates of population growth. In spite of this, however, in Africa as a whole the number of undernourished people rose from 173 million in 1990-92 to 200 million in 1997-99 (Table 22). Some 97 percent of the continent's food-insecure live in the countries of Sub-Saharan Africa (SSA) where over one third of the population (34 percent) is classified as undernourished.

There has been some decrease in the number of undernourished in West Africa (from 37.6 million to 32.1 million) but in all other regions the number has risen during the 1990s. Declines in the number of undernourished inhabitants were registered in only 10 SSA countries during the period. At the end of the period 30 countries had over 20 percent of their population undernourished: in 18 of these countries over 35 percent of the population were chronically hungry. Moreover, as of early 2001, some 28 million people in 21 SSA countries were facing food emergencies, as a result of droughts, floods and strife.

Such very widespread hunger is a source of enormous concern. It is estimated that if the self-sufficiency ratio in Sub-Saharan Africa is to stay the same in 2015 as in 1995-97 (about 85 percent), the sub-continent will have to meet 118 million tons of its projected needs of 139 million tons of grains through increased production in the region. These stark realities highlight the sheer scale of the problem.

It is also possible, however, to look at this food gap also as a tremendous opportunity. The existence of such large shortfalls provides a potential market for small farmers, amongst whom poverty and hunger are

[34] IFAD Strategies for rural poverty reduction (separate ones for the three IFAD Regions of Africa) http://www.ifad.org/operations/regional/2002/ Some successes have occurred but this investment even if matched by counterpart funding remains limited: if Africa population assumed at 700 million average, the investment has averaged US$5.00 per caput and if population has averaged 600 million, it is US$5.83 per caput. This is equivalent to US$0.20 – 0.23 per caput per annum respectively.

concentrated, to expand their output and improve their livelihoods, in turn enabling countries to reduce their import dependence. For this to happen in a situation of increasingly liberalised international markets, however, farming within the region must become more competitive and measures must be put in place to broaden food access through safety nets targeted on families who are unable to meet their food needs through the market alone.

Raising the productivity and output of the agriculture sector depends on the decisions of millions of households throughout the continent and, in such a situation, the role of governments should be to provide an economic policy and framework as well as a legal and institutional set-up that are conducive to agricultural growth, including well-functioning factor and product markets. With such a framework in place, the farmers themselves can make considerable contributions to the required investment in raising production. Around 70 percent of the population in Africa lives in the rural areas, and the potential exists to increase crop, livestock, fisheries and forestry output and improve rural livelihoods.

Improvements in the performance of the agriculture sector will start from a low base. Africa currently lags behind all other regions in agricultural productivity. For example in 2001, cereal yield averaged in Africa 1 230 kg/ha compared to 3 090 kg/ha for Asia, 3 040 kg/ha for Latin America and 5 470 kg/ha for the European Union. This reflects the limited use of irrigation mentioned earlier but also of yield-enhancing inputs such as fertilisers and seeds of improved varieties. A strong positive relationship exists between the level of fertiliser use and cereal yield as long as adequate organic matter levels are maintained in the soil. The use of fertiliser is about 19 kg/ha per year, compared to 100 kg/ha in East Asia and 230 kg/ha in Western Europe. In terms of technology use, few farmers yet apply integrated pest management methods or any other pest control.

No systematic records are kept on the use of improved seeds but indications are that about 20 percent of cropped area in Africa and South and Central America is sown to new varieties, while the rest of the area is sown to traditional varieties. With regard to livestock, while Asia uses about 50 percent of the global market value of animal health products, including vaccines, Africa claims less than 3 percent. Nomadic groups dominate the livestock sector, making the servicing of the sector difficult and expensive. Similarly, aquaculture and artisanal fisheries are underdeveloped in relation to their potential in most countries of the continent.

Furthermore, Africa still faces the problem of high post-harvest losses for lack of affordable storage, processing and other treatment and because of weak linkages with markets. Accordingly, the net food availability from an already limited production is reduced further.

4.3 Strategies to Reduce Food Insecurity

There is an emerging consensus that (a) economic growth is essential for sustainable poverty reduction, provided that socially acceptable resource redistribution mechanisms are put in place to combat poverty, (b) as long as large numbers of people remain hungry, the quest for economic growth will remain illusory, and (c) in most developing economies, agricultural growth has a stronger positive impact on poverty and hunger reduction in both rural and urban areas than growth in other sectors, because of its potentially strong multiplier effects due to numerous backward and forward linkages. In a continent where significant development resources from both local and external sources are often diverted to emergency needs for food, one element of the strategy must be addressing the emergencies. Simultaneously, interventions should promote higher productivity.

4.3.1 Preparedness and Response Capacity to Emergencies

The weakness of economies and of its institutions place Africa at a great disadvantage when calamity strikes, something that has become all too frequent. The number, scale and intensity of emergencies in Africa have all been increasing due to both natural disasters (especially droughts and floods) and human-caused calamities including civil strife and conflict. Wars and related factors have become the single most serious cause of food insecurity in much of the region. These problems all dislocate production and some affect even Africa's long-term capacity to recover. As stated elsewhere in this report, in 2001, about 28 million people in Africa were facing food emergencies, of whom some 25 million needed emergency food and agricultural assistance. In 2000 Africa received 2.8 million tons of food aid, which is over a quarter of the world total. Text box 7 gives a picture, based on information from several external agencies. Less striking but still overwhelming in its magnitude and speed of spread is the HIV/AIDS pandemic. The impact of this pandemic on the agriculture may be at least as severe as that from natural emergencies and could well be more systemically damaging in the long term.

In looking at Africa's immediate needs for agricultural renewal, it is absolutely essential that the emergencies be kept in mind: when large parts of the population are displaced within or outside borders or productive lands are flooded or rendered barren by drought, long-term agricultural development gains can be reversed overnight. Furthermore, given its high indebtedness and current account deficit, Africa is obliged to divert its very scarce resources to food imports. It does so at a cost to investment in its future; Africa is a continent that is consuming without being able to create assets for the future. Therefore to ignore this dimension would be a disservice to securing stable agricultural development in the region.

It should be remembered that many of the present day problems facing African agriculture are rooted in the decline over a long period of time in public investment in the basic foundations of growth such as rural infrastructure (including irrigation), research and development (R&D) and human resource development (HRD), as well as political instability, poor governance, resource constraint, and capacity limitation. In addition, about half of Africa's countries and one third of the continent's land area faces accelerated degradation of the natural resources, associated closely with natural calamities. In the difficult situations caused by resources degradation, these calamities easily trigger disasters, which undermine further the countries' ability to regain sustainable development.

According to the latest FAO Medium Term Plan,[35] "Notwithstanding the importance of further improving emergency responses, there is general agreement on ensuring that disaster risk management is an integral part of development,..." adding that "Food and agriculture recovery, particularly in post-conflict situations, requires fully co-ordinated interaction between domains such as institutional and capacity-building, restoration of productive assets and livelihood systems, and re-establishment of agriculture services, market infrastructures and trade networks". Thus, short-term responses to emergencies must be accompanied by simultaneous attention to building the basic foundations of long-term growth.

[35] FAO. 2000. Disaster Prevention, Mitigation and Preparedness and Post-Emergency Relief and Rehabilitation. In: 2002-2007 Medium Term Plan. Document CL 119/7 2000.

Text Box 7: Africa Disasters and Emergencies with Food and Agriculture implications – insights from selected international organisations

Africa has somewhere around 10 million people displaced by armed conflict. For North Africa, no situation seems to call for significant external food and agriculture intervention. In West Africa, there were displaced persons totalling some 2.36 millions due to conflicts. In Central Africa civil wars continue. Seven of Africa's twelve wars/conflicts are in East Africa (which includes the Great Lakes and the Congo wars) and they have displaced some 8 million people. In Southern Africa, a severe maize deficit is the main problem, worsened by natural disasters (e.g. the Mozambique floods). HIV/AIDS infection rates are very high and amount to a long-term emergency for agriculture. There are also some refugee problems. Responding to Africa's food and agriculture-dislocating emergencies takes the combined energies of many players. Responses go well beyond actual food and seeds delivery to the long-term institutional strengthening for action at community and higher levels. Brief insights are given here from the World Food Programme (WFP), the International Fund for Agricultural Development (IFAD), the International Federation of the Red Cross and the Red Crescent Societies (IFRCRCS) and FAO.

The Rome-based United Nations agencies for food and agriculture: FAO, IFAD and WFP operate with synergy: FAO collects and publicises forward looking early warning work and food insecurity and vulnerability needs assessment and mapping. FAO and WFP mount joint assessment missions to emerging crisis areas and feed the international community with timely information, alongside data collected by others such as the United States Famine Early Warning System (FEWS).

WFP: This UN agency combines attention to feeding after emergencies with support to rehabilitation and to enabling people dislocated by disasters to regain long-term growth – it thus deals with both emergencies and development. For rehabilitation, it offers *Protracted Relief and Recovery Operations* for up to 3 years to cover the later stages of an emergency, to help re-establish and stabilise livelihoods and household food security and to progressively introduce development activities. Since 1963, the WFP has invested a total of US$12.5 billion in Sub-Saharan Africa – about 45 percent of the world total of some US$27.8 billion. In 2001, WFP accounted for some two-fifths of global food aid totals. In volume terms, that year's total was nearly 4200 tons, of which Africa received 43 percent. For the same year, WFP had estimated operational expenditures of nearly US$1.62 billion [US$1.40 billion on relief activities, the rest on development], of which about 52 percent in sub-Saharan Africa alone. In per capita terms, this amounts to US$1.74 in that region, the highest in the world. For operational planning and targeting, WFP has developed a Vulnerability Analysis and Mapping (VAP) system.

IFAD: targets its support to post-crisis recovery in order to correct the gap frequently observed between emergencies and long-term development. IFAD teams up with the sister UN agencies in Rome but also with UNHCR, with UNDP (for grant contributions) and with non-UN parties. Thrust areas include (a) recovery of agricultural productivity and resumption of rural development processes – including reconstruction; (b) on-farm and off-farm income generation activities; (c) resources conservation such as soil and water; (d) capacity building.

FAO: operates the Global Information and Early Warning System (GIEWS) and the Emergency Prevention System for Plant and Animal Pest and Diseases (EMPRES). Contributes to providing emergency seeds, tools, other inputs for early resumption of productive agriculture after emergencies. This type of assistance and correction of agricultural systems affected by disasters has become the fastest growing part of the FAO field programme. As of 2002, FAO had emergency projects worth US$62.5 million, of which some US$58.6 million (94 percent) was for Africa.

IFRCRCS: The Red Cross and Red Crescent Societies actions are highly multi-faceted. Normally, the IFRCRCS mobilises resources through annual appeals for cross-sectoral needs (such as funds, general capacity building, co-ordination of actions etc) but also for specific disasters/emergencies and for sub-regions and regions. In Africa, the IFRCRCS sub-regions are: North Africa; West Africa; Central Africa; East Africa; and Southern Africa. For its 2002 Africa appeal, the IFRCRCS seeks some US$2.14 billion for overall "Disaster Response" of which only US$0.26 billion for food security.

The paragraphs that follow outline actions related to emergencies, despite lack of a single, organised source of information on the extent of emergencies and their effect on African agriculture. Estimates prepared for the OAU in year 2000[36] suggest investments between 1998 and 2010 of some US$60 billions or an annual level of some US$5 billions. The scope could include several main lines of inter-linked activity related to emergencies: response to emergencies; prevention and preparedness; post-emergency relief and rehabilitation and the establishment and operation of effective information and early warning systems. Although this US$5 billions annual net need provides orders of magnitude on resource requirements for coping with disasters and emergencies in the food and agricultural sector, much detailed research is needed to prepare better estimates. For the purposes of this document, therefore, a more conservative initial US$3 billion per annum is used, to also include safety nets. NEPAD will need to conduct an early study of emergency needs for investment and operations.

Response to emergencies: Africa's priorities must include taking on as mush as possible the functions for which the continent is entirely dependent at present on external relief organisations in the United Nations (WFP, UNHCR) and outside it such as the Red Cross and Red Crescent Societies plus a large number of Charities and NGOs from developed countries.

Prevention and preparedness: it is important to develop information on disasters affecting the food and agriculture sector, and their causal factors and estimation of their impacts and long-term effects. It is important to include identification of high-risk groups as well as to develop strategies that can reduce negative impact, building upon peoples' own coping mechanisms. Under this come the following sub-elements:

- strategic Regional, sub-regional reserves (buffer stocks for emergency);
- capacity building for forecasting, prevention and mitigation of adverse effects of natural disasters, including drought;
- improving water management;
- capturing and storing rainwater for use in times of drought through simple technologies - water harvesting and ground water recharge;
- combating desertification.

These elements are further elaborated in text box 8.

Post-emergency relief and rehabilitation: Africa similarly needs to increase its participation in activities that are hitherto almost completely donor-dependent. The challenge will be to integrate piecemeal interventions by a wide variety of official and NGO partners into a seamless process that bridges emergency response with rehabilitation and thereafter long-term development.

Information and early warning systems on food emergencies: for any needs to be better anticipated and for interventions to be more effective, *such systems* are a must for Africa. These systems can be associated for institutional convenience as appropriate with other national development monitoring and evaluation systems

[36] FAO Contribution towards a strategy for sustainable agricultural development and food security in the member countries of the Organisation of African Unity (OAU) with special reference to climatic emergencies. The net estimate for emergencies is derived by elimination after exclusion from a total of US$193 billions (1998-2010) of the following costs: irrigation (US$21.4 billions); livestock development (US$23.1 billions); agro-industry (US$55.9 billion) and marketing (US$32.7 billions. These estimates cover 43 OAU countries (out of a total of 53). Reported in: Overview and key issues in agriculture. New Partnership for Africa's Development (NEPAD). Food and Agriculture Organization of the United Nations (FAO). NEPAD Work In Progress Review Workshop, Benoni, South Africa. (24-27 January, 2002)

and linked internationally with arrangements such as the FAO-based global information and early warning system (GIEWS). Such arrangements facilitate co-ordinated response to emergencies.

4.3.2 Programmes to enhance Food Security through Production

It is also recognised that an expansion in agriculture, particularly through increasing smallholders' output of staple foods, can contribute significantly to reducing the incidence of under-nourishment by raising local food availability, especially in poor families. But smallholder production of non-food farm products, for both domestic and export markets can also have a positive impact on rural poverty through raising farm incomes and expanding employment opportunities. Rapid progress towards the eradication of hunger, however, requires targeted complementary measures to broaden the access to food by persons who are either unable to meet their dietary requirements through their own production or lack the means to purchase it. Such translation of unsatisfied needs for food into effective demand not only improves nutrition (a valuable end in itself) but could also stimulate domestic agricultural growth.

Whether farmers will expand the area cultivated or intensify production by adopting improved farming methods depends on their perceptions of the potential benefits and risks and their capacity to adopt intensified production systems. The role of governments is to provide a policy and incentive framework as well as an institutional and legal set-up that is conducive to agricultural growth, to put in place infrastructure that enhances the competitiveness of agriculture in domestic and international markets, and to ensure the reliable provision of support services, especially for extension, research and rural finance, that open the way for the uptake of improved technologies. If such an enabling environment is created, much of the investment in raising output can be made by the farmers themselves although other economic agents also have important roles to play in agriculture-related activities.

These strategic considerations lie at the heart of the SPFS. They also underpin other community-based agricultural and rural development initiatives supported by other international agencies and NGOs. Such programmes are based on the assumption that much of the action required to improve levels of food security lies within the power of individual countries and should be led by them. Lasting solutions, however, have important regional dimensions, related to intra-regional trade, food safety standards, harmonisation of policies, the control of transboundary pests and diseases, and technology development. Africa's regional bodies are developing and seeking funding for Regional Programmes for Food Security (RPFS) that can complement national SPFS initiatives. NEPAD, as a pan-African initiative, has particular importance as a framework for such multi-country aspects of food security.

A programme that attempts to increase and stabilise, in a broad and sustainable manner, food output and income through output intensification and diversification as well as through actions aiming at reducing weather and other environmental as well as economic risks, will significantly contribute to food security and poverty reduction. The achievement of this twin objective assumes an in-depth analysis and resolution of economic, social, institutional and legal constraints prevailing at the local and national levels. To successfully implement such a programme requires a clear division of labour and responsibility among stakeholders. This will also help determine the level of efforts different partners – government, private sector, farmers, and development partners – will have to mobilise.

Text Box 8: Areas of Focus to Combat Africa's Food and Agriculture Emergencies

Strategic regional, sub-regional reserves (buffer stocks for emergency): Regional and/or sub-regional food security reserves, which comply with the World Trade Organisation rules, could contribute to enhancing capacity for timely delivery of food supplies to affected populations in emergencies. Existing organisations could provide an institutional framework for such reserves adapted to the conditions in each sub-region. Alternatives to establishment of regional or sub-regional food security reserves could include:

- mutual co-operation to be brought into action during emergencies such as food loans repayable in kind, and assistance in providing transport facilities;
- co-ordination of national stocks with provisions to keep a specific percentage over and above the national needs to meet regional commitments;
- mutual assistance during emergencies, including provision of food or cash grants, currency or food loans, sale of food to the affected country or establishing other modalities, such as crop or price insurance schemes agreed upon.

Capacity building for forecasting, prevention and mitigation of adverse effects of natural disasters, including drought: Main elements include (a) meaningful early warning of natural calamities through environmental databases of benchmark information and capacity to use them; (b) capacity for early rehabilitation of production capacity in case of natural and man-made disasters is important although greater emphasis should be on prevention.

Improving water management: Almost one-third of Africa is too dry for rainfed agriculture, and countries in this area must look to irrigation as the only reliable means of increasing agricultural production and making it more predictable. Lessons must be learned from many irrigation schemes that have failed in Africa and future actions should concentrate on lowering the cost of irrigation through:

- Simple improvements to traditional swamp and flood irrigation;
- Major programmes to locate ground and surface water suitable for irrigation;
- Development of support for farm- and village-led schemes;
- Rehabilitation of modern irrigation schemes; and
- Grant-aided development of large-scale irrigation where there is no potential for smaller and cheaper schemes.

Capturing and storing rainwater for use in times of drought: Simple technologies for water harvesting and ground water recharge could include: (a) building upon existing indigenous water harvesting techniques throughout arid and semi-arid regions, introducing suitable techniques. (b) promoting widespread adoption of water harvesting techniques by the local population through motivational campaigns, training and extension work. Furthermore, in a region prone also to **flooding**, attention must also go to long-term prevention (through upstream vegetation management) and immediate assistance in relocation and reactivation of farming in affected areas.

Combating desertification: Dune stabilisation and other conservation techniques can be cheaply applied but medium and long-term action requires attention to the social and economic causes of the problem. Medium term action often involves re-vegetation such as through agroforestry and the overall regeneration of plant cover in the landscape. Zero tillage technologies and integrated soil treatment processes can help to improve the collection and stocking of rainwater while sub-soiling and micro terracing can also be important.

Emergency prevention systems (EMPRES) for plant and animal pests and diseases: the effective prevention of the diseases that hamper livestock production and trade is possible through applied research, enhanced early warning and early and co-ordinated reaction. In this regard FAO-initiated Emergency Prevention Systems (EMPRES) for plant and animal pests and diseases is of relevance.

4.4 Africa and the SPFS

The member countries of FAO have adopted SPFS in recognition of the need for a programme that empowers poor rural communities to raise farm output and income and improve local food security. It is described briefly below as an example of the kind of approach that needs to be a central element of any programme to achieve the World Food Summit goal of halving the number of undernourished by 2015.

The SPFS was launched in 1994 and the World Food Summit endorsed the programme concept in November 1996. The broad objective of the SPFS is to assist developing countries, in particular the Low-Income Food-Deficit Countries (LIFDCs), to improve their household and national food security on an economically sound and environmentally sustainable basis, while retaining the goal of enhancing social equity and the livelihoods of women and poor households. It aims to achieve this mainly by empowering groups of small farmers to achieve rapid increases in productivity and reductions in year-to-year variations in output, thereby contributing to better overall access to food within their families, their communities and local markets.

Formulated and implemented under national leadership, the SPFS is intended to be an integral component of the national food security strategies adopted by many countries after the World Food Summit. To date the SPFS is operational in 68 countries of which 38 are in Africa: it has been formulated or is under formulation in another 16 countries, of which 6 are in Africa.

The SPFS is a flexible programme that responds to local opportunities and embraces progressive and iterative learning and reorientation processes. It does not use the FAO framework as a blueprint but models itself after it and draws upon the accumulated experience of FAO. At national level, the SPFS is owned by that country, is adapted to its own realities and integrated into its strategies. Ownership is evidenced by the considerable in kind and cash investments made by developing countries, some of which have established large trust funds using their own resources. Voluntary donor contributions have also been significant and FAO has been a frequent broker in securing such collaborative agreements between developing and developed countries.

The SPFS is implemented in a stepwise fashion, starting with pilot activities initially at a few locations (Phase I) which are progressively scaled up with the aim of gaining pilot experience in all major agro-ecological zones in a country (Phase I extension). Building on this experience and that of other relevant programmes and projects, governments are invited to take the lead in formulating and launching a national-level food security programme (Phase II).

Phase I involves the engagement of self-selected groups of small farmers at a limited number of sites. As experience is gained and good practices are developed they are then replicated over an increasing number of sites. Depending on locally identified needs and opportunities, this first phase generally consists of four complementary components which touch on most aspects of agricultural development, viz.:

- *Water and soil management*: measures to address moisture limitations and excesses through low-cost irrigation, water harvesting and drainage methods, and through land husbandry systems which improve soil physical, chemical and biological conditions and avoid soil erosion.

- *Raising productivity*: actions to raise land or labour productivity on a sustainable basis, including improved varieties adapted to local conditions, integrated plant nutrients and pest management systems (with a minimum dependence on purchased inputs), and improved post-harvest technologies.

- *Farm diversification*: measures to improve household nutrition and income and to protect against risk, initially focused on short-cycle livestock such as chickens, sheep, goats, rabbits, bees etc., with an emphasis on enabling farmers to prevent diseases and improve animal nutrition: where appropriate,

support is also given to artisanal fisheries and aquaculture. Text box 9 refers to non-farm livelihood opportunities that may offer important complements to farm income.

- *Participatory study of socio-economic constraints* that restrict farm-level profitability and food security, prevent the emergence of greater social equity and impede the implementation of the programme on a wider scale. This process, combined with participatory performance assessment studies, provides an input into programme impact monitoring and evaluation, encourages the identification of self-reliant solutions and feeds into the formulation and adjustment of the programme's second phase as well as national strategies.

The emphasis on water control is particularly relevant to Africa in that it uses irrigation least of all regions and that, unless it combines an increase in the area irrigated with efficient water management practices, it has little prospect of raising productivity. It goes without saying that investing in irrigation becomes more worthwhile if productivity is also enhanced by application of improved technologies and yield-enhancing inputs. Text box 10 profiles one important input – farm energy – that is important for enhancing farm output and livelihood contribution potential of agriculture.

As the programme is extended to include more communities, the range of components and products also tends to broaden, to respond to the growing aspirations of participants and to ensure that constraints to expanded output (for instance relating to input supply, storage, marketing and financial services) are systematically addressed. Communities are encouraged to address problems of inequitable access to food within the community, focusing on vulnerable members including women (especially widows), children (especially orphans) and old and sick people. Such an inclusive approach to food security may lead to the creation of community managed projects such as school garden programmes.

The implementation of pilot activities increasingly benefits from the South-South Co-operation initiative (SSC), launched in 1996 to allow recipient developing countries to benefit from the relevant experience of more advanced developing countries. To date countries in Africa have signed 22 of the 26 SSC agreements linking countries in Africa, Asia, and Latin America and the Caribbean.

On-site monitoring is showing that field activities have already generated some encouraging results with farmers, both men and women, learning and adopting effective and low-cost technologies in a relatively short time. This is contributing to better farm performance and improved food security and livelihoods at the household and community level.[37] There have been some important lessons from dealing with the poor through programmes that have preceded and in any case not necessarily carried an SPFS label: the IFAD experience in Africa provides the insights in text box 11.

[37] FAO. 2002. Independent Evaluation of the Special Programme for Food Security. Rome.

Text Box 9: Diversifying rural income / fisheries and forestry pursuits

Rural Non-farm (RNF) Income opportunities

Although rural people are generally labelled agricultural", in fact it is very rare for them to engage solely in farming. Smallholder households in rural areas usually manage a complex portfolio of activities: diversification is the normal state of affairs. Everywhere in Africa, rural non-farm (RNF) income and employment account for a significant proportion of total rural income and employment, and in some countries they make up more than half the total. Rural households participate in RNF activities for various reasons, including potential high returns, cash flow management, and spreading risk. The poor may also participate in RNF activities because their agricultural asset base is not sufficient to achieve survival. In marginal lands like the Sahel where agricultural risk is high, RNF activities (including migration) are central to spreading risk.

Rural household members engage in a wide variety of RNF activities, with those activities linked to agriculture (food processing and marketing, transportation, blacksmith construction and repair of agricultural tools and machinery) among the most important. Indeed, it is often overlooked that a dynamic smallholder agricultural economy forms the backbone of a vibrant RNF sector. Due to multiplier effects, developing smallholder agriculture is more likely to stimulate off-farm employment than either large-scale agricultural or industrial development because poor smallholders are more likely to use increased incomes to demand locally-produced goods and services, which in turn stimulates additional local employment, which can be of particular benefit to women and youth. Conversely, RNF activities – particularly those related to agro-processing, transportation, and marketing of agricultural produce – can contribute to the growth of the agricultural sector. In the new market environment faced by smallholder producers this is more true than ever before, since the activities can provide a means to locally add value to the produce and so extract the maximum share of its end-price.

The rural poor have special problems in exploiting non-farm employment opportunities. A combination of limited human and social capital, insufficient access to markets, and lack of credit for working and investment capital lead to high barriers to entry to remunerative RNF employment opportunities. While the rural poor may already be diversified into RNF activities, these constraints lead to low and unstable returns. Strategies for reaching the rural poor through development of RNF activities include those pertaining to human capital, rural finance, marketing and infrastructure development.

Special considerations for Forestry and Fisheries

Forestry: Forests including the non-wood forest products are mainly used for subsistence or low-value commerce, such as for fuel wood. Nevertheless, forests offer many income and employment opportunities including trading in wood fuels, crafts, tourism from wildlife etc. The uncontrolled harvesting of natural forests has caused the destruction of biological diversity with minimal economic gains. Lack of value adding processing, and trading in forest products and services, have also reduced the contribution of forestry to economic development in the concerned countries and make forests appear dispensable. Industrial utilisation of forest products has shown greatest success in plantations development, with forest-poor countries e.g., South Africa being the prime exporters of forest based products while forest-rich countries export raw logs or low-value wood.

The low productivity of agriculture leads to extensive clearing of new land in order to increase production of food and other crops to cater for the high rate of population growth. This has been compounded by inability to introduce agro-forestry practices in farm landscapes to diversify livelihoods and enhance sustainable production systems. The low productivity of African forests has meant that large areas have to be used to satisfy the demands for firewood and other forest products. Rapid clearing of forests and woodlands in upper watersheds increases soil erosion, which in some cases silts up downstream dams used for irrigation and hydropower, to the long-term economic loss of many countries.

Fisheries: Irresponsible fishing in inland waters results in capture levels that are often in excess of the stocking and recharge capacity. Africa gains much employment and income from lake fisheries as well as coastline artisanal fisheries on the high seas. Furthermore, the infestation of some inland lakes and waterways with aquatic weeds has reduced fish catches. The reduction of local diversity of fish populations by alien species may have

serious consequences. There are severe problems with post-harvest handling, storage and distribution, which restrict supply to urban areas as well access to overseas markets; they also keep incomes sub-optimal for fisherfolk. As wild stocks decline and given that proper management is not being instituted in a timely manner, livelihoods are at risk. In such situations, the development of aquaculture (which in Africa is still in its infancy) offers new opportunities. Africa needs to complement its heavy reliance on fish capture in the wild (a practice that cannot cope with increasing demand) with aquaculture for food and for income and employment. On the high seas, most African countries do not yet have the capacity to compete with foreign fishing vessels, even in legally within their own exclusive economic zones.

Sources: RNF – Heinemann (IFAD); Forestry and fisheries – thematic information from FAO State of the World's Forests and State of Fisheries and Aquaculture.

Text Box 10: Farm Power and Mechanisation

The availability of adequate levels of farm power is among the essentials for increasing agricultural production. As Africa seeks to increase output, so its needs for farm power will also grow from its present heavy reliance on hand labour towards use of draught animals and powered machinery, according to circumstance. Any increase in total agricultural output (be it from area expansion, an increase in cropping intensity or an increase in yield) requires additional power, if not for technology application then for handling and processing increased volumes. Similarly, land improvements (such as terracing, drainage or irrigation structures), soil conservation and water harvesting techniques frequently place additional demands on the power resource. Change in composition of farm power inputs will reflect either demand or supply-side shifts, or both.

Taken on a global scale, in developing countries, farm power is dominated by hand labour (which is at one extreme) where the GDP per caput is low (under $1 000 per head), the economy remains dominated by agriculture, there is a low proportion of potential irrigated area in cultivation, and small areas of land are cultivated per person (0.5 – 0.7 ha of harvested area). Draught animals (mainly work oxen) are a significant or predominant source of power in countries where incomes are higher and is associated with there is an increase in intensity of cultivation on both rainfed and irrigated land, and an increase in the area under irrigation (but no expansion of rainfed land). It appears that use of animals does not displace labour. At the other extreme, tractor-based cultivation systems are generally characterised by high GDP per caput (more than $3000 per head) and where less than half of the economically active population works in agriculture; there are relatively larger areas cultivated per person (1 to 2 ha of harvested area). In Sub-Saharan Africa at present hand power is dominant particularly in Central Africa and Western Africa where it accounts for 85 percent and 70 percent of harvested area respectively. In Western and Eastern Africa there is significant use of draught animals despite humans remaining the major power source; there is increasing use of tractors in Southern Africa. In North Africa, tractors either dominate or there is a rapid trend towards this; here, mechanised farming occurs in irrigation schemes and is becoming increasingly important also in rainfed agriculture.

The period till year 2030 will witness some changes although on present scenarios of agricultural development, in some two thirds of the countries in Sub-Saharan Africa such changes are not projected to be significant by 2030. In Eastern Africa, disease, drought and rustling have decimated the number of draught animals in some areas thereby removing a principal power source from certain farming systems. Also in Eastern and Southern Africa in particular, HIV/AIDS will affect the workforce, with those countries which are expected to switch from hand power to draught animals being projected to lose almost 20 percent of their agricultural labour by 2020. Thus one impact of HIV/AIDS will be to make it vital for affected countries to change their source of farm power in order to cope with serious labour shortages at critical times of the farming year. Urbanisation may cause some switch in power sources as it draws labour away from the agricultural sector and possibly affects wage levels and composition of the remaining labour force.

Source: The text is adapted from two sources: (a) Farm Power and Mechanisation. Clare Bishop-Sambrook. Draft contribution to FAO's World Agriculture, Towards 2015/2030. FAO. Rome (b*)* Global Farm Power Assessment Study – Interim Report. Clare Bishop-Sambrook. January 2001. FAO. Rome.

Text Box 11: IFAD experience with poor farmers in Africa

In Africa, IFAD has since 1977 (25 years) invested in total some US$3.5 billion, of which US$0.98 billion in North Africa; US$ 1.3 billion in Western/Central Africa and US$1.2 billion in Eastern/Southern Africa. With these investments being focused on the poor, IFAD has gained insights on key issues to address, which any special programmes on food security need to pay attention to. The listing below is a selection:

Participation:

- "First and foremost, the poor have little or no voice in many major decisions affecting their livelihoods".
- farmers suffer *isolation*: from markets, inputs, products and services and from influence on policies and institutions

Markets:

- farmers lack information on market opportunities and prices, and lack the necessary skills to access markets. Physical access to markets is poor, transaction costs are high, and these factors, combined with farmers' lack of organisation, results in low producer prices.
- the withdrawal of governments from direct involvement in marketing has left large gaps which the private sector is not yet able to fill
- global conditions are inherently unfavourable for smallholder market access, including prices. For example, world prices for key export crops are quite volatile and are falling still.
- at least in West/Central Africa, by 2030 most people will be urban: this could create major opportunities for markets development due to spiralling urban demand.

Resources and opportunities:

- land and water "are at the heart of the economies of the rural poor" but the poor lack adequate access to land, and this situation is deteriorating, especially for women and youth
- there is little access to the managed water systems necessary for production intensification [in Near East/North Africa, 85 percent of all water goes to agriculture]
- land and natural resource degradation has reached alarming levels often due to use beyond carrying capacity etc
- on average, off-farm activities account for 36 percent of total rural income and employment and deserve attention in rural development

Other key production-dislocating factors:

- wars and other emergencies: IFAD calls for attention to post-conflict situations "in order to balance the overwhelming emphasis on short-term relief".
- HIV/AIDS
- lack of attention to the needs of rural women [more important than men as agricultural major producers in much of Africa].

Farmer productivity:

- needs priority attention in seeking to eradicate poverty, especially reduction of the drudgery faced by women
- HIV/AIDS is a key threat to productivity – output of many commodities has already been adversely affected, especially in Eastern/Southern Africa
- there is need for better knowledge, information and technology but the poor have no capacity to pay for these

HIV/AIDS and agriculture in Eastern and Southern Africa:

- evidence that the epidemic is disproportionately affecting smallholder agriculture which heavily depends on labour as key productive resource
- *IFAD action (in partnership with FAO)***:** strategies preparation for adapting to HIV/AIDS; capturing information and knowledge systems at risk; scaling up HIV/AIDS related activities using farmer field schools. IFAD has also special initiatives adapted to the needs of HIV/AIDS affected situations.

Sources:[38]

[38] Regional Workshop on Poverty Reduction and Rural Growth in Eastern and Southern Africa. Dar-es-Salaam, 23-24 May 2002. Provisional Summary of Proceedings; IFAD Strategy for rural poverty reduction in Western and Central Africa. http://www.ifad.org/operations/regional/2002/pa/pa.htm; IFAD Strategy for rural poverty reduction in Eastern and Southern Africa.

Unlike the pilot phase of the Special Programme, which focuses on household and community level food security and livelihood issues, its second phase tackles these issues at the national level so as to open the way for scaling up. The second Phase of the SPFS is expected to be prepared under national leadership, but with the engagement of all entities – national and international – committed to improving food security. Its preparation is integrated into the process of formulating and updating the national Poverty Reduction Strategy Paper (PRSP). The national programme is expected to be centred around agricultural and rural sector policy reforms aimed at addressing macro-level economic and institutional constraints: it would usually also include an investment plan for expanding community-led farm level improvements and for addressing physical and infrastructure constraints; and the preparation of bankable projects. Its objective is to ensure the development of a macroeconomic, institutional and policy framework which is:

- favourable to demand-driven agricultural production, storage, processing, and marketing, and broadened access to food;
- supportive of increased private and public investments in agricultural activities and services;
- conducive to increasing rural incomes and improving livelihoods.

4.5 Funding Requirements

The experience of the SPFS suggests that the cost to the public sector of enabling a poor small farmer's family to make the investments required to attain an adequate level of food security is about US$500. How this is spent will vary from country to country and farm to farm. Typically, however, it will include:

- Initial funding of US$300 to US$400 of improved farm inputs (such as seed and fertilisers), small-scale on-farm works, low-cost items of equipment (e.g. treadle pumps) and breeding stock (e.g. poultry, goats). Funds to meet these costs would be advanced on condition that farmers make a matching contribution in terms of labour and that, once production rises, an equivalent amount is deposited into community managed revolving funds to be used for further on-farm and community-level investments (e.g. in school gardens) and thereby ensure the programme's financial sustainability.
- Provision of support services aimed at empowering groups of farmers to diagnose problems, identify needs and opportunities for investments (including farm or community based agro-processing), test innovations and acquire the knowledge and skills to improve production and livelihoods through participatory approaches; sustainability of support services would be assured through the retention by farmers' groups of income from jointly managed demonstration and trial plots in order to defray future service costs. Typical start-up costs of such front-line facilitation services, provided by extension staff, other farmer facilitators or NGOs are US$30 to US$50 per family.
- Funds to meet costs incurred in creating an enabling policy and institutional environment at national level and at the level of regional bodies. Costs are assumed to range from US$50 to US$100 equivalent per family.

The effectiveness of these investments in on-farm development and related services is, of course, dependent on complementary investments in up-stream irrigation works, soil conservation, roads and other rural

http://www.ifad.org/operations/regional/2002/pf/pf.htm; IFAD Strategy for rural poverty reduction in Eastern and Southern Africa. http://www.ifad.org/operations/regional/2002/pn/pn.htm

infrastructure (as detailed in chapters 2 and 3). This also includes investments in up-stream and down-stream support infrastructure for irrigated and rain-fed crop production. Livestock and fisheries, such as applied research centres, seed multiplication centres, animal and fish breeding facilities, parent and grandparent stock facilities for poultry, animal feed mills, tree nurseries, processing facilities, e.g. slaughterhouses, canning factories, storage facilities, local and export market facilities, etc. Such facilities should be operated mainly by the private sector, or where appropriate, the public sector, such as municipal authorities. Programme effectiveness would also be enhanced to the extent that governments are able to put in place safety nets to broaden access to food, which in turn stimulate local markets. In the long term, any improvements must be underpinned by science and technology disseminated and adopted by farmers; Chapter 5 outlines some proposals for strengthening Africa's research and development capacities for agriculture.

The scale of such programmes must be massive if they are to have a meaningful impact on reducing hunger and poverty. For the purposes of estimating costs, a need is assumed to reach 15 million households in Africa by 2015, equivalent to 100 million people or half those now suffering from undernourishment. The country and sub-regional cost estimates are based on the number of undernourished persons estimated in the State of Food Insecurity (SOFI) 2001. The total cost of an Africa-wide community-based programme for improving small farmer performance would therefore be about US$7.5 billion of which about US$6.5 billion would be for national programmes for on-farm investment and support services, and US$1 billion would be for regional programmes (Table 23).

Detailed estimates of total costs and of a possible annual breakdown of costs are given in Appendix Table 6, showing a rise in annual commitments from around US$320 million per year in 2002 to US$600 million in 2015.

4.6 Regional Programmes for Food Security

While most actions required to enhance food security must be part of national food security strategies, achieving food security also requires attention to regional and global constraints. Accordingly, Regional Economic Organisations (REOs) in Africa have chosen to prepare and to mobilise resources for Regional Programmes for Food Security (RPFSs).

The RPFSs prepared by these REOs (notably AMU, CEN-SAD, CEMAC, COMESA, ECCAS, ECOWAS, IGAD, SADC, and UEMOA) in collaboration with FAO, complement and reinforce national policies and programmes by addressing those issues that are regional in character. In most cases, the RPFSs consist of three main components:

- trade facilitation;
- agricultural policies;
- support to national SPFS to increase production and productivity.

The relative importance of each component varies across the REOs depending on the natural, socio-demographic, economic, agricultural and food security characteristics of their member countries.

4.6.1 Trade facilitation

Trade facilitation and market access is expected to help reduce variability of food supply and increase opportunities for income generation through increased trade. Such trade facilitation measures would contribute to local and national specialisation through enhanced competition, and allow for a better expression of the comparative advantage of each of the member countries of the regional groupings. RPFS activities would address sanitary and phytosanitary barriers and technical obstacles to trade, promote adoption of

international *Codex Alimentarius* norms and standards and seek reduction and harmonisation of tariffs. Specific measures would be incorporated to benefit in particular small farmers and vulnerable sectors of the population. To some extent, this implies a new dimension for trade issues.

Some of the specific trade facilitation activities which need to be taken up include: commodity development programmes; transitory measures in response to the on-going trade liberalisation; compensatory measures in response to emerging trends in global commodity markets and trading environment. These activities aim to enhance the capacity of each member state of the grouping to participate in the process of globalisation with a view to ensuring food security, enhancing opportunities for agricultural trade to supply domestic and external markets and facilitating the incorporation of small farmers into the new economic environment.

4.6.2 Harmonisation of agricultural policies

Comprehensive food and agricultural policies at national levels and strategic policy frameworks at regional level are indispensable to achieving food security and harmonious rural development. The RPFSs would in most cases provide support to member countries in better defining priority lines of regional action plans for mutual benefit, based on comparative advantages and identification of policy issues whose success in one country depends on collaboration and support from the others. They would also contribute to harmonising policies on transboundary issues, such as diseases and pests, or affecting sustainable use of cross boundary natural resources (such as water and fisheries resources), as well as mobilisation of resources for addressing regional constraints to food security, agriculture and rural development.

4.6.3 Support to national programmes for food security for increased production and productivity

National efforts to improve regional programmes are reinforced by addressing regional issues so as to enhance the capacity of smaller countries to benefit from the strength of a group, achieve economies of scale through intra-group trade, and foster collaboration in areas relevant to food security, agriculture and rural development.

The full implementation of the RPFS on a scale which could contribute to reducing by about half the number of undernourished persons would require roughly US$1 billion by 9 Regional Groupings in Africa in the next 13 years.

Details of the annual resource requirements are presented in Appendix Table 7. During the FAO Regional Conference for Africa, held in February, 2002 in Cairo, Egypt, the participating member states of the REOs decided to mobilise resources for the implementation of the RPFS within the framework of NEPAD.

4.7 NEPAD and the Improvement of Food Security

The NEPAD framework offers Africa a potentially effective approach for achieving the World Food Summit goal of halving the number of undernourished people by 2015. But to do this will require bold and ambitious programmes, in the immediate future, by pressing for Africa to increasingly find capacity to prepare for and respond to the food and agricultural emergency fallout of disasters; and simultaneously embarking on longer-term investment in food security linked to national Poverty Reduction Strategies. These should give high priority to agricultural and rural development. Africa's REOs will no doubt continue to co-operate with donors and international institutions in their efforts to help Africa achieve its food security goals.
An essential element for success is partnership: NEPAD needs to encourage partnerships within Africa and between Africa and the international community in support of food security programmes. Within countries, the government, the commercial private sector, and civil society, including community-based organisations

need to find effective co-operation modalities that are mutually beneficial. Internationally, similar partnerships are needed involving funding and technical assistance agencies; public sector and private sources of funding; bilateral and multilateral partners. The partnerships need to mobilise energy based on long-term commitment: Africa's food insecurity will not be solved in one season, nor will it be solved by solutions parcelled out in enclave projects operating outside sustainable frameworks.

Text Box 12: Partnerships

If, as recently as a decade ago, governments in the Region saw themselves as the prime motors of economic development, today there is increasing recognition by the governments themselves that their direct role in economic activities is a more limited, though at the same time more strategically important in creating conditions for growth. It is a role which is focused particularly on the key area of establishing the policy, legal and institutional framework which enables the private sector to play the leading role in economic development, and in selectively investing in key public goods which will catalyse broad-based economic growth. This requires that governments in the Region increasingly establish strategic partnerships with a range of partners to achieve their development objectives, and that their investments are targeted particularly at reducing transaction costs both in public service and in the market place.

The main players in ensuring broad-based economic growth are smallholder producers themselves. Agricultural production services must not only effectively target smallholder producers, but must ensure that the services provided respond to the constraints they face and opportunities open to them. At the same time, there is need to strengthen the capacity of smallholder producers to define and articulate their requirements in terms of services; organise themselves to better access inputs, produce markets and production services and conduct their own agricultural experimentation; establish a strong voice for themselves in the policy and institution-building process. Supporting the development of producer groups associations is a crucial part of such an approach.

The private sector – beyond the small-scale producer – is also a key partner. The large-scale formal private sector - particularly agri-business, is in a number of countries of the Region probably the major development partner for smallholder producers. Future progress depends on a broad-based and equitable expansion of these relations - something that will only happen on the basis of mutual interest. The commercial private sector wants to make money. It can do so – and at the same time help poor farmers make more money, if it expands its commercial relations into a realm of self-organised smallholders who are aware of market options. More and more governments in Africa recognise the crucial role that the private sector must play, and are willing to undertake investments – in policies, institution-building as well in infrastructure – which reduce the transaction costs that the private sector faces in doing business with smallholder producers.

NGOs are increasingly recognised as having specialised skills in areas of crucial importance for promoting rural development – particularly in 'soft' areas such as participatory planning, capacity building, group development, etc. More and more governments in the Region are willing to work in partnership with suitably experienced NGOs operating as service providers: such arrangements are expected to be further strengthened in the future.

Partnerships in today's world also involve the donor community. Such partnerships must be built on respect by donors for the sovereignty of the countries involved, and by an explicit recognition that it is the governments of those countries which must co-ordinate the support and activities of the donors, within a consistent sect oral policy and strategic framework.

Partnerships exist not only at the national level; and indeed one of the areas in which NEPAD can add value is in supporting the development of two-way or larger partnerships across the continent – among national governments, sub-regional organisations, national farmers associations, and NGOs and private sector organisations in different parts of the continent. Such partnerships can provide the opportunity for lessons learnt in one location to be applied in another; the exchange of technologies, approaches and institutional arrangements; and the promotion of investment within and across the continent.

Source: Heinemann, IFAD

NEPAD may find it important to use partnerships for carrying out the following actions, to be undertaken with the full involvement of a diversity of African and international partner institutions:

- co-operation in planning and capacity building for preparedness and response capacity for food and agriculture problems arising from disasters;
- support to governments in up-dating National Food and Agriculture Strategies, linking these to national Poverty Reduction Strategies;
- assistance to governments in developing an enabling policy, legal and institutional environment for addressing food insecurity;
- assistance to governments and regional bodies in strengthening early warning systems and information on food insecurity as a basis for improved targeting;
- a progressive expansion of food security programmes within participating countries, enabling them to engage an increasing number of rural and peri-urban communities in expanding farm output and in improving their food security;
- assistance to countries and REOs in the identification and preparation of country-specific investment programmes for agricultural and rural development, including enhanced food security, consistent with the up-dated National and Regional Food and Agriculture Strategies;
- assistance in the mobilisation of required resources;
- expanded technical support for regional bodies to enhance their capacity to address the regional dimensions of food insecurity and implement the RPFS;
- assist member countries develop and implement proactive programmes to support the development of entrepreneurship among small-scale farmers and the emergence of a local private sector that could take up most of the upstream and downstream activities of interest to agricultural development.

Chapter 5

Agricultural Research, Technology Dissemination and Adoption

5.1 The Challenge

African political and scientific leaders have set a target to increase agricultural output by 6 percent a year for the next 20 years. Improvements in total factor productivity are expected to contribute about 3 percent to this, with the remainder coming from increased investment. Achieving a 3 percent annual growth rate of total factor productivity will be challenging. In no region of the world has total factor productivity increased over a sustained period of time by more than 2.5 percent per year. It will require larger investments in agricultural research, extension and education systems; and institutional reforms that will increase the efficiency and effectiveness of the spending on research and extension.

This chapter proposes a new framework for financing agricultural research that will result in increased and more stable funding for research institutions and programmes. It also recommends institutional reforms that promote a pluralistic and integrated system of agricultural research, extension and education that are responsive and accountable to farmers, agribusinesses, consumers and other stakeholders. The proposals build on the lessons learned from the Special Programme for African Agricultural Research (SPAAR), the Food and Agriculture Organization (FAO), the Consultative Group on International Agricultural Research (CGIAR) and many others, during efforts to help revitalise African agricultural research.

In addition to promoting a reform agenda, this chapter also draws attention to specific research themes for NEPAD agriculture. The NEPAD research programme will be comprised of four sub themes that will collectively contribute to testing the central hypothesis: "*that conservation and efficiency of use of soil and other natural resources will be optimised under conditions of market and/or policy and institution driven productivity*". The four research themes are:

- Integrated Natural Resource Management (also highly relevant to Chapter 2)
- Adaptive management of appropriate germplasm (long-term importance to Chapter 4)
- Development of sustainable market chains (essential if the Special Programmes for Food Security in Chapter 4 are to achieve objectives)
- Policies for sustainable agriculture (an important underlying need relevant to all chapters).

In addition, there is to be a cross-cutting initiative:

- Scientific capacity building.

The main thrust of the NEPAD Comprehensive Africa Agriculture Development Programme (CAADP), as evidenced in Chapters 2 to 4, is to emphasise those investments and interventions that can most rapidly reverse Africa's current state of crisis in terms of raising that region's production. This is to be based on the existing technologies, capacities and policy as well as institutional frameworks. The potential of Africa to produce and trade more can, however, be enhanced beyond the present levels if conditions are made more enabling and the search for such change must remain part of the longer-term agenda for agricultural development.

One part of the essential enabling conditions is adoption of appropriate technologies derived from research and development and supported by effective means to ensure adoption. It was with this in mind that the 9th June 2002 meeting of African Ministers of Agriculture in Rome recommended that agricultural research be incorporated into the CAADP and suggested other measures to enable research play its part.

5.2 Current situation

5.2.1 Agricultural productivity is low and falling

Unlike in other regions of the world, productivity of agriculture per worker in Africa has declined during the past twenty years. Value-added per worker averaged just US$365 during the 1990s (constant 1995 US$). This is 12 percent lower than in 1980, when value-added per worker stood at US$424. Average incomes per person also stagnated during the 1990s at just US$540, compared with US$629 in 1980 (constant 1995 US$). Raising the productivity of agriculture per worker can make a critical contribution to economic growth and alleviation of poverty by generating the surpluses that can be used for investment in agricultural and non-agricultural activities. Most of the countries in the world that have grown rapidly during the past 50 years have also experienced strong increases in agricultural productivity per worker.

Agricultural yields have also been level or falling for many crops in many countries of Africa. Significantly, yields of most important food grains, tubers and legumes (maize, millet, sorghum, yams, cassava, groundnuts) in most African countries are no higher today than in 1980. Cereal yields average 1,120 kilograms per hectare, compared with 2,067 kilograms per hectare for the world as a whole. Low productivity has seriously eroded the competitiveness of African agricultural products on world markets. Africa's share of total world agricultural trade fell from 8 percent in 1965 to 3 percent in 1996. Low productivity is the result of low investment in all the factors that contribute to agricultural productivity and effective use of available resources. To correct the problem will require Africa to significantly increase investment in agriculture. This in turn requires that the profitability of agricultural investments be increased and so made more attractive.

5.2.2 Increasing spending on agricultural research and extension

Increasing spending on agricultural research and extension can make a critical contribution to stimulating economic growth and reducing poverty in challenge in Africa. Investment in agricultural research and extension is a key factor in increasing agricultural productivity and thereby helping to stimulate growth, generate income, and reduce poverty. Growth in agricultural productivity can serve as an engine of growth for the economy by raising the incomes of producers who then spend the resources on rural non-tradable goods and services, such as housing (Mellor 2001). According to studies carried out in Africa (Delgado, Hopkins, and Kelly, 1998; and Block, and Timmer, 1995), adding $1 of new farm income results in a total increase of household income of US$2–3. By reducing the price of food, growth in agricultural productivity raises purchasing power thereby boosting the effective real incomes of consumers. Growth of agricultural output can also help to reduce child malnutrition at a rate of about half the original growth rate in productivity (Thirtle, van Zyl, Vink, 2001).

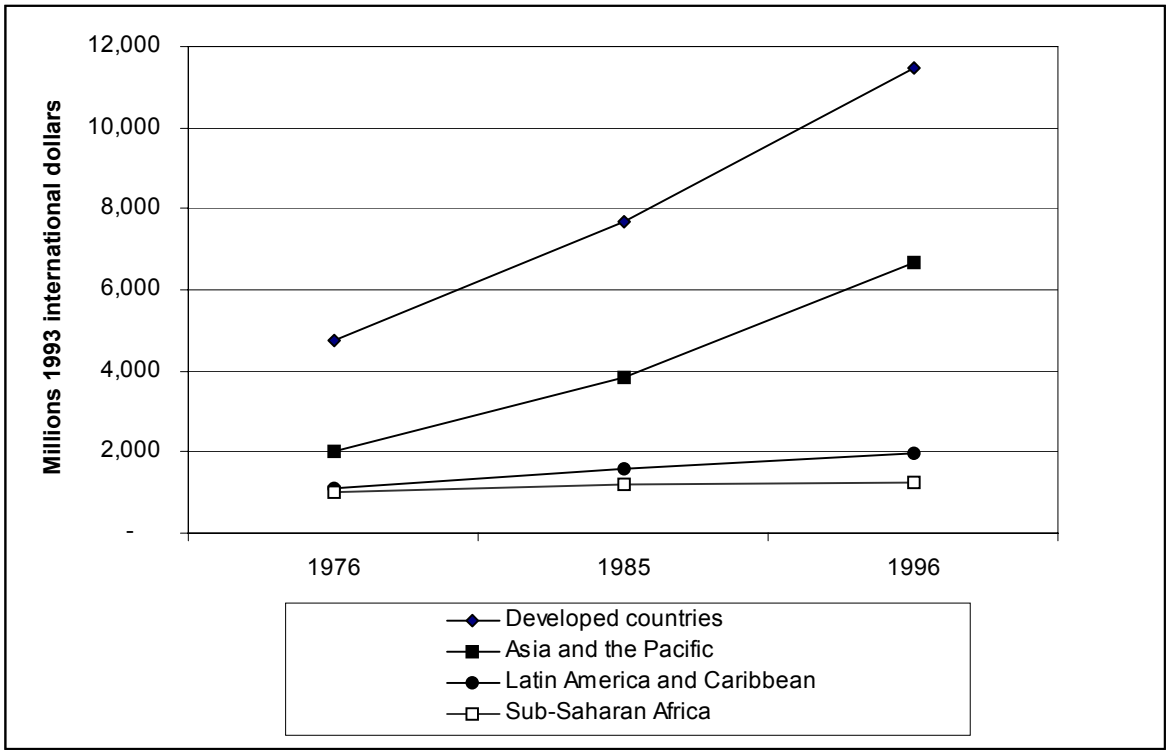
- A study in India examining the roles of various public interventions in promoting agricultural growth and poverty alleviation discovered that government investment in agricultural research and extension had a larger impact on economic growth than spending on other rural programmes, such as rural roads, irrigation, rural electrification, soil and water conservation, education, and health (Fan, Shenggen, Peter Hazell, and Sukhadeo Thorat, 1999). Moreover, it had a significant impact on reducing poverty, second only to rural roads.

- A study using data from Africa found that spending on agricultural research generated high payoffs in the region, with each dollar spent generating a median internal rate of return of 37 percent (Evenson, 2001). Research on pearl millet, maize, sorghum, potatoes, beans, wheat and cowpeas has generated returns ranging from 16 percent to 135 percent.

5.2.3 Spending on agricultural research in Africa is stagnant

Public spending for agricultural research in Africa stagnated in the 1980s and the 1990s at about US$1,200 million per year, slightly higher than the level reached in 1976 (Pardey and Beintema, 2001) (figure 1). This contrasts to the situation of the 1960s and 1970s when public spending on agricultural research more than doubled, from about US$360 million in 1961 to US$993 million in 1976.

Figure 1: Public agricultural research expenditures, 1976–1996



Source: Pardey and Beintema, 2001.

Public spending on agricultural research in Africa in comparison to agricultural GDP has also declined, from a peak in 1981 of 0.93 percent to 0.69 percent in 1991 (Pardey and Roseboom, 1998). By contrast, public spending in industrial countries on agricultural research amounted to about 2.4 percent of agricultural GDP in 1991.

5.2.4 Private sector research will not fill the gap

Unlike in other regions, the private sector is not increasing its research efforts in Africa as government spending declines. With a share of about 2 percent of total spending, the private sector plays an exceptionally small role in funding agricultural research in Africa. This is not likely to change soon because the potential

profits from conducting research on important crops in Africa are not sufficiently high to attract the interest of either domestic or international private firms. In industrial countries, private enterprises fund over 50 percent of agricultural research.

Why has support for agricultural research and extension in Africa declined, given its high payoffs? Reductions in government support for agricultural research and extension reflect in part pressures on African governments to reduce spending generally. But spending on agricultural research has also declined in proportion to total government spending, as priorities have shifted and governments question the value of research and extension given the lack of improvement in agricultural productivity in Africa. Similarly, donor support to agricultural research has declined because of shifting priorities, until very recently, away from agricultural production to environmental protection, health, education, water and sanitation, and the like. Many people question the need for continued public funding of agricultural research and extension, thinking that the world's food problems are solved, are constrained by matters other than research systems or extension services, or that the private sector will do the job. It is necessary to correct these perceptions and to maintain and increase support to these services, which are fundamental to maintain competitiveness of agricultural economies.

5.2.5 Agricultural research and extension services are not playing their important roles

In addition to being inadequate, resources for agricultural research systems and extension services are in many countries not being used effectively. Several factors appear to be important in explaining why.

Available resources for national agricultural research systems are spread too thinly over too many staff and programmes

Even while funding for agricultural research stagnated in the 1980s and early 1990s, the number of scientists of national agricultural research systems (NARS) and the scope of their activities continued to grow (Pardey, and Roseboom, 1998). To meet rising staff costs, many NARS have been forced to cut non-wage operating expenses, starving programmes of the many goods and services they need to be effective: laboratory supplies, equipment, spare parts, training, maintenance, fuel, and the like. However, these funds have not been adequate to maintain salaries at reasonable levels, leading to an increase in absenteeism as scientists take up other jobs to supplement their income. As a result, performance of research systems has suffered.

Regional and sub-regional collaboration in research programmes is not fully exploited

Although the move towards regional and sub-regional collaboration and integration has been strong in Africa, the scope for doing more is considerable. Funding of regional research activities still amounts to less than 2 percent of total spending on agricultural research. In a context of stable or declining resources, greater regional and sub-regional co-operation would enhance the efficiency and effectiveness of agricultural research in Africa. Linking NARS together within larger networks and strengthening partnerships with advanced research institutes and CGIAR centres would allow each national institute to specialise in a few areas of research, while benefiting from the research of others. This would enable NARS to benefit from economies of scale and to eliminate much wasteful, duplicative research.

Policies impede access to global knowledge and technology

In many countries import duties and non-tariff barriers impede the importation of seeds and improved plant stock. Quarantine laws and local rules on testing and release of agricultural technologies also slows and impedes adoption of global knowledge and technology.

Linkages between research systems, extension services, and farmers are weak

Linkages between farmers, extension agents, and research systems in Africa are weak. Often researchers have little interaction with extension services and farmers, and do not reflect their priorities in the research agenda. In some cases the national research programme is defined by donors or individual researchers and may have little relation to national objectives or farmers' needs. The lack of linkages has led in some cases to farmers' adopting less than 10 percent of the crop varieties which they are offered (Eponou, 1996). In other cases, farmers never learn about new technologies developed in the research systems because effective mechanisms to transfer innovations from research to the extension system do not exist. Finally, the extension services have often failed to reach farmers because their communication strategies are not effective. Thus, extension services often miss the farmers who would benefit the most from good advice, the women farmers who are responsible for the great majority of agricultural output in most African countries.

Small farmers lack ways to reduce risks of adopting new technologies

Even when farmers recognise that new technologies will raise productivity, they are often reluctant to bear the risks associated with new approaches. Approaches are needed to reduce risks that farmers face when adopting new technologies and to increase their access to sound rural financial services, including savings, credit, insurance.

Financing of research and extension services is not sustainable

Both research and extension services in Africa depend heavily on donor funding. Contributions from donors now provide more than 40 percent of all funds for agricultural research (Pardey, and Roseboom, 1998). This is up from 28 percent in 1986 and exceeds the level of any other region. Given the fragile economies and extensive demands on the public sector in many African countries, donor support for research and extension will continue to be important for some time to come. However, African research and extension managers must start building political support for their programmes among farmers, private firms, and other beneficiaries of more productive agricultural systems. They must start diversifying their sources of funds through producer levies, contract research, joint ventures with the private firms, and the like. Finally, they must open the research and extension systems to more providers, strengthening links between universities, non-governmental organisations, private firms, and others.

5.3 Elements of Sustainability

The elements of sustainability are well known. They involve strengthening political commitment; diversifying sources of income; reforming institutions; and ensuring that research and extension services give priority to promoting widely-shared growth and adoption of environmentally-sound technologies.

5.3.1 Political commitment

Africa's research and extension services will not be sustainable without the strong political support of a broad coalition of stakeholders. Without the support of stakeholders, adequate funding will not be forthcoming, difficult institutional reforms will not be undertaken, and the efficiency and effectiveness of agricultural generation and adoption will not increase.

5.3.2 Financial

Financial sustainability of research and extension services depends on their diversifying their sources of income. In the future, both research and extension services will have to become more demand driven and generate more resources from producers, consumers, agribusinesses, and others who directly benefit from the services. Levies from the sale of commodities and income from patents are likely to be important. Many NARS will be able to generate revenues by selling farm produce; providing consulting services to producers'

organisations, agribusinesses, and others; performing research under contract; entering into partnerships with private firms; and renting or selling under-utilised land and facilities. Extension institutions will provide their services under contract to farmers' groups and others. In some countries endowments and matching grant schemes may provide a stable source of finance for research and extension. Increasingly, funds will be provided on a competitive basis to improve the effectiveness and efficiency of research and extension.

Donor support is best used for developing the research infrastructure and human capital needed for long-term research and extension programmes. Donor support is also important in helping to build mechanisms for long-term financial sustainability of research and extension services.

5.3.3 Institutional

Wide-ranging reforms are required to achieve institutional sustainability of research and extension services. With due attention to the diversity of Africa's countries and their capacity to cope with reforms that depend on assumed presence or speedy emergence of an effective private sector, both the research and extension services have potential to be opened to more providers to increase competition and thus improve the quality and cost-effectiveness of services. Strengthening linkages among researchers, extension agents, educators, and farmers is critical to increase the relevance of research and extension and to facilitate quicker adoption of better technologies by farmers. Linkages can be strengthened by involving farmers, agribusinesses, and other stakeholders in setting priorities for the research agenda and in executing and evaluating programmes. Decentralising extension services to local governments and communities and reorienting incentive systems so that providers are accountable to farmers rather than to the central authorities will help. Bringing research closer to and into farmers' fields will also build ties between research, extension, and farmers.

Establishing sound systems of management and accountability, and systematically monitoring and evaluating programmes are both critical if institutions are to improve their performance, essential in increasing support of financiers. Proficient planning and sound management of funds help guarantee that funds for research and extension are focused on priorities, and that imbalances between wage and non-wage recurrent expenditures do not arise and disrupt programmes. Good accounting systems enable managers to provide appropriate reports to the treasury, the ministry of agriculture, and other financiers showing how funds have actually been spent. This helps in attracting new funding for research and extension from both traditional and new sources. Regularly monitoring and evaluating programmes and adjusting them to improve their design and implementation increases their impact and, again, support among financiers.

Remunerating staff adequately and instituting incentive structures that reward performance are important for institutional sustainability. Otherwise staff may decide to hold other jobs even while continuing to draw a salary from the public services. They may be motivated to attend field trips, training, conferences, and the like solely to supplement their earnings. They may leave research or extension altogether. Developing ways to properly reward staff, however, may not be easy. Many public research and extension systems will need to reduce numbers of staff substantially. Moreover, increasing the remuneration of highly performing staff above the (often low) civil service levels may be difficult. In some cases establishing autonomous or semiautonomous institutions may be necessary.

5.3.4 Environmental and social

About 70 percent of Africans rely on agriculture and natural resources for a part or all of their food and incomes. Yet, in many places environmental degradation and unsustainable exploitation of natural resources threaten to reduce the future productivity of agriculture and natural resources, undermining objectives to reduce poverty and increase food security. A major challenge for African countries is to ensure that agricultural growth is widely shared and does not degrade the underlying natural resource base. Research and extension services can make a powerful contribution in achieving these objectives by targeting small farmers and by generating and disseminating technologies that promote sound management of natural resources. They

must make a great effort and recruit more women so as to reach women farmers and their organisations and to address the special constraints they through research and extension programmes.

5.4 Road to Sustainability

It is clear what reforms are needed to increase the efficiency, effectiveness, and sustainability of research and extension services. Specific reforms of national level research and extension services, and of regional and sub-regional research systems have been elaborated by FARA and its partners, from which extracts are given below.

5.4.1 Technology generation: reform agenda at the national level

***Reforms of research institutions**:* The large majority of public research institutions have restructured their managerial and governance systems to become more responsive and accountable to stakeholders (clients, farmers, agribusinesses and consumers) and to introduce sound financial and accounting systems. A recent SPAAR study of the scope and depth of institutional innovations in agricultural research in 41 countries found that many were applying the principles identified as important for strengthening operations. About 95 percent of institutions were involved in regional collaboration and integration; 84 percent had strengthened linkages between research, extension and farmers; 73 percent had institutionalised a strategic planning process; 66 percent had improved their institutional and management capacity; and 39 percent had developed sustainable financing mechanisms.

Many agricultural research institutions have moved away from the classic public service model towards more market-oriented, client-responsive approaches. In Côte d'Ivoire agricultural research and extension services have been partially privatised. In Uganda responsibility for delivering extension services has been completely decentralised to local governments. In Kenya a new research outreach programme empowering farmers and their organisations in technology delivery is being piloted. In Kenya, Uganda, South Africa, Zimbabwe, Mali and Tanzania private firms are conducting or funding research on most commercial crops.

A growing number of semiautonomous or autonomous research institutions, including the Kenya Agriculture Research Institute, the National Agricultural Research Organisation of Uganda, the Ethiopian Agricultural Research Organisation, and the Senegal Institute for Agricultural Research, are formulating agricultural research programmes in close collaboration with farmers and agricultural extension staff to identify production constraints and adapt technologies to farmers' requirements and circumstances. Research institutions now include stakeholders (representatives of national agricultural research institutes, universities, non-governmental organisations, farmers' organisations, agribusinesses and others) on their governing boards. They are also managing their activities using principles from modern business administration to link inputs to performance and outputs. Burkina Faso, Ethiopia, Ghana, Kenya, Mali, Senegal, Tanzania and Zambia have taken steps to bring their infrastructure, staff and operational costs into balance and improve incentives to researchers, rewarding those who perform at top levels.

However, these institutional reforms need to be deepened in the countries that have introduced them, and extended to countries that have not. The key reforms that need to be deepened and extended include:

- *Involving all key stakeholders in the governance of agricultural research and extension institutions* - Participation is especially important in setting priorities, planning and programming, and monitoring and evaluating activities and results. Special efforts and approaches will be needed to reach resource-poor, subsistence farmers than commercial farmers.

- *Diversifying sources of income* - African research and extension services must deepen and extend reforms to increase the level and stability of resources that finance their activities. For example, the Sustainable

Financing Initiative, spearheaded by SPAAR and the United States Agency for International Development (USAID), is helping research institutions find and test new ways of collecting and disbursing funds. Mechanisms being explored include:

- Collecting fees from the distribution of improved seeds and other technologies generated through research
- Securing contracts for research
- Obtaining royalties from intellectual property rights
- Commercialising research
- Obtaining grants from foundations
- Co-financing projects with private firms, producer groups, NGOs, and investment agencies
- Increasing governments' contributions from domestic revenues, including through funds made available under the Highly Indebted Poor Country Initiative (HIPC).

- *Expanding use of competitive funding mechanisms* - Awarding grants on a competitive basis can improve the efficiency and quality of research by opening up the predominantly public sector research systems to competition from other actors in agricultural research, such as universities, and the private sector. Competitive grant schemes may also attract private resources to research by increasing confidence of potential financiers that resources will be used effectively.

- *Opening up the agricultural research system to more actors* - Most countries have yet to make the special effort needed to increase the participation of universities, NGOs, and civil society in the agricultural research. Contracting out research and establishing public-private partnerships can help open the research system to more actors. A highly promising model for partnerships is the joint-venture developed between the Institute for Genome Research in the United States and the Kenya-based International Livestock Research Institute, to develop control methods for the East Coast Fever, a disease that kills one million cows in the region each year.

- *Provide resources to users' groups that they can use to purchase services* - To make research more responsive to farmers' needs, governments can provide earmarked resources to farmers' organisations and other users of research outputs, that the recipients can use to purchase services tailored to their needs.

- *Linking agricultural research to extension services* - Existing institutional barriers between technology development and technology transfer must be broken down so as to promote the two-way flow of information between farmers, extension services, and research bodies.

- *Providing attractive salaries and benefits* - Research institutions will have to provide attractive salaries and benefits if they expect to attract and retain highly qualified staff.

- *Systematically monitoring and evaluating programmes* - Systematically monitoring and evaluating research and extension services allows decision-makers to assess whether programmes are effectively meeting their objectives and to quickly correct problems and adjust programmes. Good quality, independent monitoring and evaluation can also help increase support of financiers for programmes. Given the long-term payoffs of research and extension and the multiple factors influencing national economic growth and reduction of poverty, most monitoring and evaluation efforts will have to focus on process and outputs rather than on programme impact. Still, governments and development partners should periodically submit programmes for comprehensive external analysis of impacts.

***Policies to encourage innovation*:** To encourage innovation, the following four types of policies are important:

Formulating science and technology policy*:* to promote innovation, facilitate trade in technology, protect the public from potential risks of new technologies, and define the expected future roles of the public and private service providers and their interaction, the comparative advantage and mandates for central, sub-national, and local research institutes, and the role of universities.

Protecting intellectual property rights*:* While rules about intellectual property rights (IPRs) are controversial, such rules are becoming increasingly important as the role of the private sector in international agricultural research grows and biotechnology becomes more important. Clear rules protecting IPRs are important for three main reasons. First, they encourage domestic innovation and encourage the transfer of technologies based on assurance that the recipient country will provide protection for patents and corporate health, safety, and efficacy data as well as being able to recoup their investments in proportion to their scale and risk.

Harmonising standards and regulations for seed certification and trade in plants and animals: Harmonising standards for seed certification and agricultural trade will bring significant benefits by facilitating exchange of seeds, planting materials, and animals among countries and by reducing transaction costs for firms. Harmonising standards will also foster development of a regional market for seeds, plants and animals, which will allow firms to benefit from economies of scale.

Investing in capacity building for the long term*:* Capacity development is a process of planned organisational change that is intended to enhance the efficiency, effectiveness, and sustainability with which an organisation pursues its strategy, accomplishes its mission, achieves its goals, and delivers value to stakeholders. Capacity development may include the acquisition of resources, but it must also include learning how to nurture, integrate, and deploy resources to achieve strategic goals. African research needs to pay great attention to all these dimensions of capacity development.

5.4.2 Technology adoption: reform agenda at the national level

Extension institutions: Many countries have reformed their extension services to improve their relevance to farmers, and increase their efficiency, effectiveness, and impact. In many countries extension services are moving from a supply-driven approach with government as the sole provider of advice, to a much more flexible and pluralistic demand-driven system. Key reforms include decentralising administration of field extension services; improving linkages among farmers, educators, researchers, extension agents and others; and increasing the independence and flexibility of extension services by creating small and semiautonomous unit within government ministries. However, more needs to be done to deepen and extend the reforms, with due sensitivity to the differing capacities and attributes of African countries to adjust. The following are particularly important:

- *Decentralising responsibility and funding for field extension services* - Decentralising responsibilities and resources for extension to local governments, communities, or producers' organisations gives farmers a bigger role in designing, funding, governing, executing, and evaluating extension programmes. It also improves responsiveness and accountability of extension agents. The shift of responsibilities and accountabilities helps ensure that farmers receive the services they want.

- *Contracting some or all field extension services* - Contracting extension services from non-governmental organisations, and private groups, universities, input suppliers, or farmers' organisations can improve efficiency of delivery and accountability of extension agents, especially where a choice of providers is available. Governments should set and enforce standards for qualifications and performance, establish a registration system of agricultural service providers as professionals, and provide training.

- *Sharing costs between national and local government and farmers* - Progressively shifting costs of extension services away from national budgets means sharing them among national governments, local

government, farmers' associations, non-governmental organisations, donors, and farmers makes financing of extension services more sustainable and less dependent on national budgets.

- *Systematically monitoring and evaluating programmes and their impacts* - Careful tracking of agreed indicators to measure progress focuses attention on results; it should involve poor farmers to ensure that programmes meet their needs.

Mechanisms to encourage farmers to adopt new technologies: Poor farmers operating on the edge of survival can ill afford to take the risks of adopting new approaches even if they correctly perceive the likely benefits. Text box 13 gives the smallholder perspective on knowledge, information and technology. Several approaches can reduce the risks that farmers face, and thus encourage them to adopt promising technologies.

- *Promote the development of financially sound rural financial services* - Expanding access to rural financial services, including credit, savings, insurance, and collateralisation of fixed and moveable property, can provide farmers with the finance they need to adopt new technologies. Governments should promote development of rural financial services, reduce their transaction costs, and improve incentives to save.

- *Support voluntary producers' organisations that reduce risks and costs of adopting technology* - By procuring inputs and market outputs more efficiently and effectively than many small farmers acting alone, producers' organisations can reduce the costs and risks to farmers of adopting new technologies for production, processing, and marketing. Governments can create an enabling environment for producers' organisations to and can provide technical assistance to such associations.

- *Share risks and costs of adopting new technologies by offering matching grants to producers' organisations and other groups* - Early adopters demonstrate to others the benefits of new technologies, and they also bear high risks. The public sector can share risks by providing matching grants to people willing to try and demonstrate new technologies, perhaps through community driven development programmes.

Text Box 13: Creating a Better Knowledge, Information, and Technology System for Smallholders

The issue of smallholder development is not only organisational empowerment, but also knowledge empowerment. The limitations of traditional "agricultural extension" - with its centrally controlled services that dictated the "appropriate" path of smallholder development - have been recognised, and the approach has been largely abandoned. But little has replaced it.

Smallholders need to effectively interact with a broad range of to access a range of technology and information suppliers, both public and private. Globally, the private sector is increasing its role in technology supply, and this will also occur in Africa (as it already has done among large-scale producers). But the practical impediments to private sector technical service providers emerging efficiently - and spontaneously - in rural Africa are daunting. First, it is not at all self-evident that there are private sector operators who could provide meaningful technical assistance in many rural areas. Second, if knowledge is to be developed and acquired efficiently, suppliers of technology and information require organised and knowledgeable purchasers. Smallholders are extremely unprepared - whether through civil society or other user organisations - to articulate their requirements in a focused and forceful way and to evaluate the recommendations they will receive from different sources. Finally, the poorest among them just do not have the purchasing power to pay - either for services provided or for the technologies extended and sold.

In a number of countries in Africa, smallholders are being assisted to develop relations with new and more diverse suppliers - in a context of support to the rural poor to use services according to their own interests. However it is clear that the public sector will also continue to play an important role in rural technology

development. In particular, it must develop and extend support in those areas that draw the least attention from commercial suppliers - improved soil and water conservation practices, low input technologies for the marginal areas, and the like; and it must support the organisation of poor farmers to access private services. At the same time, it must become increasingly accountable to the users of those services – the farmers themselves.

Technology decisions are also economic decisions: they involve commitments to particular products at a given price that can only be made rationally in the context of good quality information about markets - as well as good organisation to access them. The issue therefore is no longer one of "extension", but of information systems that respond to the requirements of smallholder producers engaged in production, trade, and technology exchange. Smallholders can no longer be approached as "advice takers". They must be reconstituted as seekers after diverse sources of information and as evaluators of what they receive. They must be supported to enhance their capacity to make their own informed decisions - including through such learning-based systems as Farmer's Field Schools.

Source: Heinemann, IFAD

5.4.3 Strengthening Regional and Sub-regional Research Systems

Reforms are needed to strengthen the regional and sub-regional research systems. Many of the reforms that are needed echo those required to enhance the efficiency and effectiveness of the NARS. The most important reforms are presented below.

Including all stakeholders in planning and collaborative activities: As for NARS, involving all key stakeholder groups in the planning and governing of the Forum for Agricultural Research in Africa (FARA) and sub-regional research systems is critical to ensure the research activities are relevant and responsive to the needs of producers, and that the activities complement rather than duplicate activities of NARS and other organisations active in agricultural research.

Achieving sustainable financing*:* To ensure that financing of FARA and sub-regional organisations is stable and sustainable, member countries must provide an increasing share of resources, with the long-term objective of eventually phasing out external funding. One goal is that within five years, member countries or NARS should provide all funding for core activities. External partners can facilitate the transition to self-sufficiency by channelling most of their funds for regional and sub-regional agricultural research through member countries.

Expanding use of competitive grants*:* Pooling resources for regional or sub-regional research and then allowing service providers to compete for funding is a promising way of boost the productivity of African agricultural research. Several programmes are already underway. With the assistance of the European Union (EU) and the USAID, the Association for Strengthening Agricultural Research in Eastern and Central Africa (ASARECA) has established a sophisticated regional competitive fund. Le Conseil Ouest et Centre Africaine pour la Recherché et le Développement Agricoles (CORAF/WECARD) is establishing a similar fund, with assistance from the EU, France and the African Development Bank. These programmes should be expanded wherever feasible.

Building long-term capacity*:* As with NARS, regional and sub-regional research systems need to build capacity for the long-term. An important starting point is for regional and sub-regional organisations to examine their roles in relation to the NARS and other research providers to ensure that they address national problems and concerns and add value to ongoing national efforts. The objective for the next generation of regional and sub-regional programmes is to effectively integrate national programmes and resources through a division of labour among national institutions and programmes and through creation of integrated regional teams.

Facilitating policy dialogue between countries on technology issues: A key role of FARA and sub-regional organisations is to facilitate dialogue between countries on technology issues.

Systematically monitoring and evaluating the impacts of programmes: Systematically tracking agreed output and outcome indicators would provide research managers with the information they need to adjust programmes so that they become increasingly effective.

5.4.4 Even with these reforms, more funding is needed

African political leaders affirmed their commitment to a technology-led transformation of the African agricultural sector as part of the New Partnership for Africa Development (NEPAD) endorsed by the meeting of the Organisation of African Unity in July 2001 and by a follow-up meeting in South Africa in January 2002. Increasing spending on agricultural research and extension and improving the performance and efficiency of research centres and extension services are key priorities for the new agenda set for Africa. The goal is to double the current annual spending on agricultural research in Africa within 10 years. This means spending will need to increase by an average of 7.2 percent a year during the next decade.

Current funding flows for research and extension services: The current funding of research and extension in Africa operates at four distinct levels through a variety of financial instruments.

1. International agricultural research institutions: Funding for international agricultural research institutions operating in Africa comes through grant mechanisms:

- A *multi-country* non-competitive grant mechanism to support international agricultural research centres of the CGIAR

- A *sub-regional* competitive grant mechanism, through which projects are selected competitively on the basis of scientific merit (this applies to programmes funded by the EU), and

- *National* grant mechanisms to support advanced academic and research institutions. Funds to support the operations of the CGIAR system come from members' contributions. Members include industrial and developing countries, foundations, and international and regional organisations. Industrial countries, specifically the members of the Development Assistance Committee of the Organisation for Economic Co-operation and Development, contribute more than two-thirds of CGIAR financing. The World Bank assumes the role of donor of last resort.

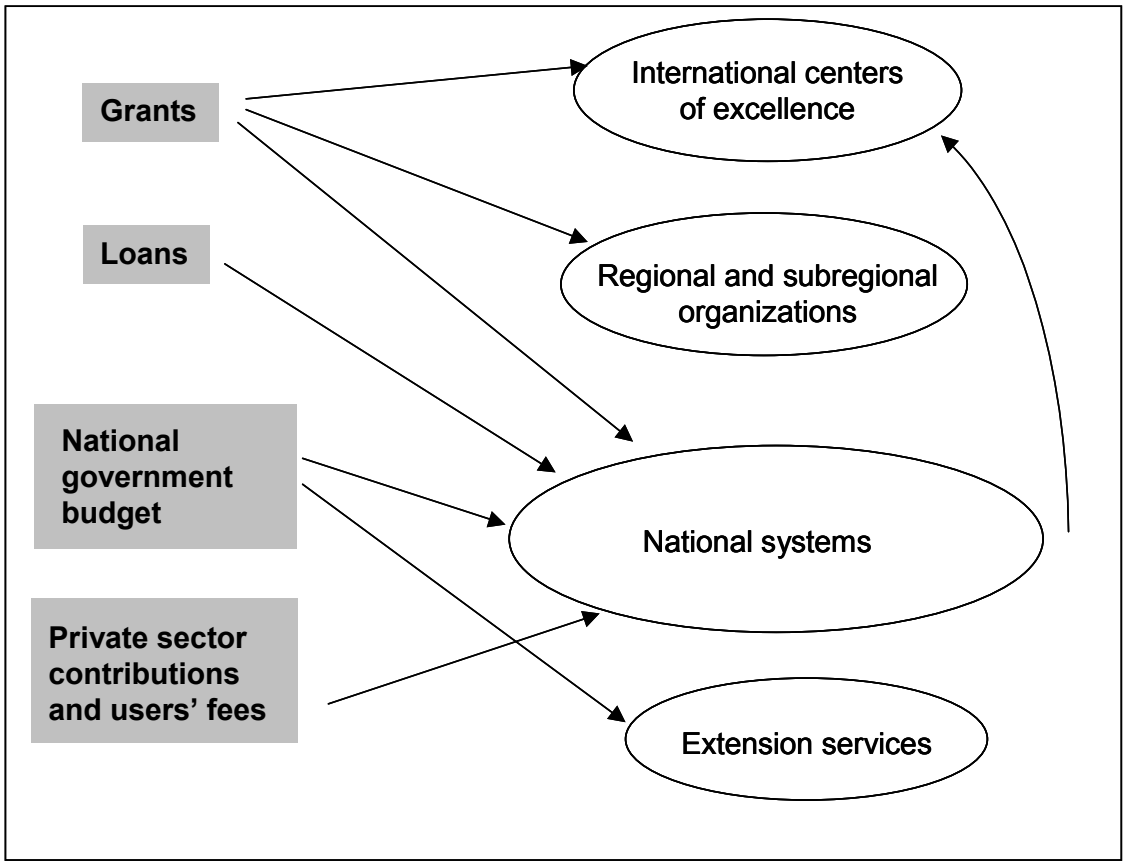
2. Regional and sub-regional organisations: Funding for regional and sub-regional organisations comes from grants of bilateral and multilateral donors. The African member states bear some operating costs as well as substantial in-kind contributions comprising facilities and staff.

3. National agricultural research systems*:* Funding for national institutions and programmes come from loans, grants from donors, government budgetary allocations, and fees from users. Loans from the World Bank are by far the most important source of funds for most countries. Domestic resources are particularly important in Botswana, Mauritius, and South Africa.

4. ***Extension services:*** Most funding for extension services comes from government budgetary allocations.

The current funding framework is represented schematically in figure 1.

Figure 2: Current funding flows for research and extension services



The adequacy and stability of funding for have become major concerns for stakeholders. Moreover, little progress has been made in co-ordinating funding for activities at various levels, despite the improvements made in creating regional networks and programmes, and managing funding for regional activities.

Goal

The goal of the proposed financing framework is to promote a research system that is efficient, effective, and has rapid and widespread impact on agricultural productivity. This will be achieved by giving farmers, agribusinesses, and other clients a much greater role in funding and governing the system. It will require increased government commitment to and leadership for agricultural research.

Objectives

The first objective of the new funding framework is to increase the level and stability of funding for agricultural research at the international, regional and sub-regional levels, and country levels. The second is to achieve a better balance in resource allocations to strengthen NARS (the weak links of the research and development system). The third is to encourage institutional reforms that will increase the impact of research, including through regional integration and harmonisation of research programmes in the three main agro-

geopolitical regions of Sub-Saharan Africa and through stronger partnerships with advanced academic and research institutions.

Components

Proposed new funding framework: Objectives and instruments - The proposed new system will have four interrelated components:

1. National agricultural research institutions - Funding for the national institutions will come from:

- Allocations from national budgets, income from contract research, and users' fees
- Donors' grants and loans channelled through a sub-regional funding facility.

2. Sub-regional organisations - Funding for the core and programme activities of the sub-regional organisations will come through two distinct mechanisms:

- Grants to fund the core functions of sub-regional organisations and the regional collaborative networks and programmes. Funds for core activities will come from earmarked grants of donors matched by country contributions. Funds for regional networks and programmes will come from a mix of grants and loans provided by member countries. They will be allocated through a competitive bidding process using regional competitive funds.
- Funds to the sub-regional organisations to allow them to buy services tailored to their specific needs from the CGIAR centres and other advanced research centres. These funds will be additional to the resources earmarked for the CGIAR. This approach will support the ongoing efforts of the CGIAR to align and tailor its programmes to regional needs. The sub-regional organisation and the international agricultural research centre operating in the region must jointly decide on the definition and implementation of the programme and its monitoring and evaluation arrangements. The existing planning and oversight structures in the CGIAR system and the sub-regional organisations must be used to ensure that research projects are relevant and of high quality. This new approach must first be piloted and then scaled up.

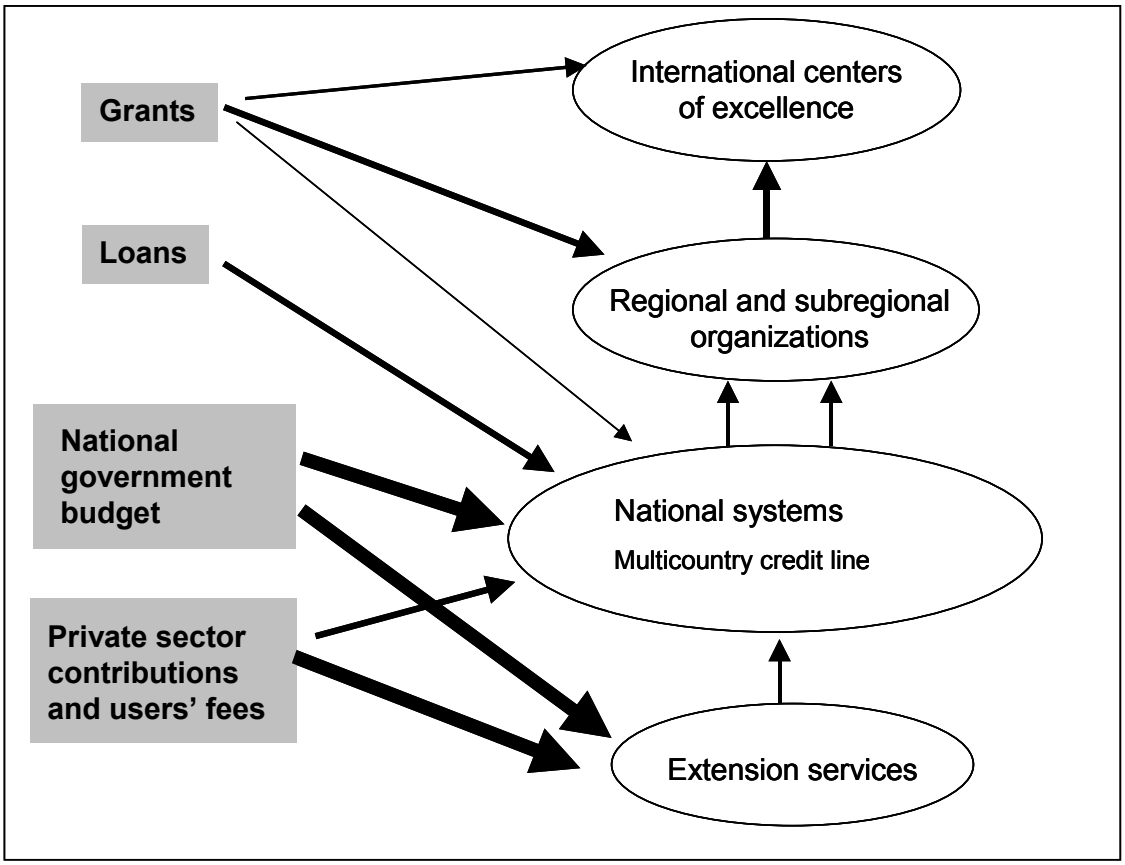
3. FARA - Funding for the core activities of FARA will come from grants donors. FARA should remain a lean and flexible organisation with a limited budget.

4. CGIAR - Funding for core activities of the CGIAR will come from grants, including system-wide initiatives and challenge programmes. Funding of the CGIAR system must be maintained at no less than the current level. Incentives and a competitive mechanism must be introduced to increase impact of the centres' operations.

Extension services - Funding for extension services will come from government budgetary allocations, private firms, and users' fees.

The new funding framework is represented schematically in figure 3.

Figure 3: New funding flows for research and extension services



Deepening institutional reforms to improve the impact of research

The new financing system will encourage countries to deepen and expand the ongoing institutional reforms to improve the relevance and impact of research. It will encourage institutions to be more responsive and accountable to stakeholders by (a) providing flexible financing for specific, demand-driven services to local, national, and regional stakeholder groups; (b) making greater use of competitive grants to allocate funds for research; (c) improving the monitoring and evaluation of programmes to strengthen linkages between inputs, outputs and impact; and (d) involving stakeholders in designing, implementing, monitoring and evaluating programmes. By financing regional and sub-regional research programmes, it will help in increasing the impact of small national research programmes. By allowing all qualified organisations to compete for funding, it will help mobilise the intellectual resources and capacity of non-governmental organisations, rural organisations, universities, and private agribusinesses as providers of research, extension and advisory services.

Who will support the new system?

The new system must be supported by a consortium of donors and governments. A core group of funding agencies and countries must take the lead in advocating for increased funding. The new financing system must be viewed and accepted as the appropriate approach for supporting the renewed CGIAR's Africa agenda and for the New Partnership for African Development (NEPAD). A small portion of the multi-country IDA funds may be used for capacity building of regional and sub-regional research systems.

Implementation

It is envisaged that implementation of the proposed institutional reforms and new funding framework can proceed as follows:

National, regional, and sub-regional organisations will lead the process - African policy makers and research managers will further develop the concept and translate it into an action plan. Under the leadership of FARA, they have already established a task force whose main responsibility is to prepare a framework for action built from the African vision for agricultural research and development, the Durban Declaration, and this chapter. This framework for action will be presented as the response of the African agricultural research community to NEPAD.

National agricultural research policies and strategies will be developed and provide guidance for the reform agenda - The reform agenda should address institutional and policy issues related to both technology generation and transfer (and training whenever possible). Research policies and strategies should be developed as key elements of the national development agenda and specified as national priorities. A road map for sustainable financing should be derived from these policies and strategies. This should be based on the continued financial commitment of the government as well as on a firm support by the rural stakeholders (local governments, local communities, agribusinesses, and producers' associations). Leadership must come from within the national research and farming communities. The World Bank and bilateral donors will provide both intellectual and financial support for these national efforts.

The road to sustainable financing for regional and sub-regional organisations involves several steps:

- *Strengthening governance structures and strategic planning processes*. Research systems must become more inclusive, focus more on solving farmers' expressed problems, and build more effective partnerships with the entire research community.

- *Focusing on programmes that add value to national and international programmes, and systematically monitor and evaluate impact*.

- *Pursuing ongoing efforts to establish regional endowed funds and competitive funds and explore opportunities for alternative funding sources and mechanisms*. Leadership to ensure sustainable regional collaborative efforts must come from both NARS managers and agricultural policy makers, such as the Conference of Ministers of Agriculture. As part of the drive for sustainability of sub-regional organisations, this proposal opens an option for sub-regional organisations to purchase services from CGIAR centres, advanced research institutions, private firms, or others to address specific issues and to provide technical and scientific backstopping to networks. The EU, which has built a solid regional programme, could continue to provide leadership and help co-ordinate all external contributions according to need.

Current efforts initiated by the CGIAR centres operating in Africa in collaboration with the sub-regional organisations to rationalise and align their programmes to regional needs and strategies must be consolidated and reflected in their governance and funding processes. A key objective is to establish a unique priority-setting process at the sub-regional level under the responsibility of the sub-regional organisation. Under the new partnership arrangement, programmes to build regional capacity (training and development of advanced research infrastructure) should be a high priority. Likewise, national, regional, and sub-regional organisations could draw on the system's technical and legal capacity to handle or build capacity on new or sensitive issues such as intellectual property rights and biotechnology.

5.5 The NEPAD Agricultural Research Agenda

The Forum for African Agricultural Research (FARA), with its member sub-regional organisations the Association for Strengthening Agricultural Research in East and Central Africa (ASARECA), the Conseil Ouest Africain Pour la Recherche et le Developpement Agricoles/ West and Central African Council for Agricultural Research and Development (CORAF/WECARD) and Southern Africa Centre for Co-operation in Agricultural Research and Training (SACCAR) have developed a 'Vision for African Agricultural research' and supported the NEPAD's call for 6 per cent annual growth in agricultural productivity in order to stem and reverse the decline in food production and incomes of the rural poor in Africa.

This vision has been adopted by FARA in its strategy for catalysing innovation and change in agricultural research in Africa (FARA 2002). In May 2001, FARA, its sub-regional members and the CGIAR centres issued 'The Durban Statement' reconfirming their full support for the African Vision and called "on the international research system, including the CGIAR Centres and advanced research institutions to forge more effective and efficient partnerships with African NARS and achieve greater programmatic integration"

5.6 Challenges and Opportunities for Agricultural research in Africa

Africa's natural resources are rapidly being degraded because the required increased production is being derived from extensification because markets are not rewarding intensive management. This degradation is manifested most noticeably in deforestation, genetic erosion and soil degradation, and particularly loss of organic matter, under agricultural and pastoral use. This degradation influences many other resources and environmental services of importance to sustainable development. It leads to serious distortions in the hydrological balance, impaired access to water resources, continuing loss of plant genetic resources and encouragement of noxious weed populations. In extreme cases, the loss is irreversible, resulting in the extinction of races of precious indigenous food crops and other useful plants. It is estimated that about 0.7 percent of forests in Africa are lost each year. Degradation of cropland is severe in Africa, affecting more than 65 percent of cropped area. Degradation of pastureland is also severe, affecting 31 percent. The loss to the continent's economy from these sources is incalculable.

Soil degradation indicated by nutrient depletion and loss of organic matter, resulting from erosion and extraction and loss in excess of return, has direct negative influence on agricultural productivity. This may be the single most important constraint to food security in Africa. Despite proposals for a diversity of solutions and the investment of much time and resources by a wide range of institutions it remains an intransigent problem.

There is growing acceptance that the agricultural research problems remain intractable because of the failure to deal with the issue in a sufficiently holistic way. For example, soil fertility decline is not a simple problem of nutrient depletion but interacts pervasively over time with a wide range of other biological and socio-economic constraints to sustainable agro-ecosystem management. It is thus also a problem of inappropriate germplasm and cropping system design, of interactions with pests and diseases, of the build up of noxious weeds that reach chronic proportion and are difficult to control such as striga, of the linkage between poverty and land degradation, of often, perverse national and global policies with respect to incentives, and of institutional failures. Tackling agricultural research issues thus requires a long-term perspective and holistic approach of the kind embodied in the concepts of integrated agricultural research that embraces the full range of driving factors and consequences of soil degradation – biological, physical, chemical, social, economic and political and a strong emphasis on understanding and seeking to manage the processes that contribute to change.

Africa faces two major challenges. The first is to ensure that its natural resources serve as the basis for economic growth that will result in more active and sustainable participation in the global economy. The

second is to ameliorate the degradation of the natural resources and erosion of biodiversity in order to improve systems' resilience. These challenges are made all the more daunting by the fact that it is not sufficient to simply stop the degradation. Consistent efforts must be made in the short- to medium-term to build up the resources to levels never before attained in order to meet the demands of a population growing at more than 3 percent a year.

As labour is one of the principal inputs to agricultural productivity in smallholder farming systems in Africa anything that can be done to improve its efficiency will improve livelihoods and any reduction in drudgery (less hoeing and hand shelling post-harvest which are often women's work) will facilitate human and social capital acquisition. This will require development of appropriate training materials and aids for both households and artisans.

The NEPAD agricultural research programme will address the need to make the paradigm shift away from a silver bullet and principally commodity-driven technological package approach to a truly integrated agricultural research approach and to ensuring that researchers (national and international) work together with smallholders and extension agencies, the private sector and NGOs to have impact on the ground. The Programme's governance and funding mechanisms will be organised through FARA and its members, ASARECA, CORAF/WECARD and SADC/SACCAR, to provide incentives for scientists to make fundamental changes rather than presenting old approaches in a new ways. The Programme will reflect the urgency of achieving intensification at rates in excess of population growth

5.6.1 Goals, Purposes and objectives

Goal: The partners in agricultural research see their role in Africa by the year 2020 as having contributed to the goals of the African agricultural research community of attaining food security and poverty alleviation through research, policy support and capacity building based on the environmentally sound management of natural resources.

Purpose: To overcome the constraints to sustainable use of Africa's natural resources with improved technologies and policies that will enable resource-poor smallholders and livestock producers in Africa to achieve sustainable improvements in their livelihoods and thereby secure the future of Africa's children.

Objectives: (i) to design technologies, policies and institutional options that provide solutions to the acceleration of poverty and resources degradation in the Africa (ii) to test the adoptability of these options in a totally participatory and iterative fashion, from farm to regional scale (iii) to develop appropriate mechanisms for the wide scale dissemination and adoption of the technologies and for implementation of sustainable and supportive policy and institutional options (iv) to empower resource-poor farmers in Africa to manage their natural resources and systems in a sustainable manner in the face of change.

5.6.2 Research Components

The programme will be comprised of four sub themes that will collectively contribute to testing the central hypothesis: "*that conservation and efficiency of use of soil and other natural resources will be optimised under conditions of market and/or policy and institution driven productivity*". The four research themes are:

- Integrated Natural Resource Management (also highly relevant to Chapter 2)
- Adaptive management of appropriate germplasm (of long-term importance to Chapter 4)
- Development of sustainable market chains (essential for the Special Programmes for Food Security in Chapter 4 to achieve objectives)

- Policies for sustainable agriculture (important underlying need to support all chapters).

In addition, there is to be a cross-cutting initiative:

- Scientific capacity building.

Each of these is given in summary form below; the details are available with FARA for use in the context of the operationalisation of the CAADP and of FARA and partners' own plans.

Integrated Natural resource management

The entry point for the management of the natural resource base for agriculture will be at the soils and water levels – this makes the research directly applicable to pillar No. 1 (Chapter 2).

Traditional elements of increasing nutrient and water use efficiency and building long-term fertility through soil organic matter lie at the heart of this agenda but are integrated with management of hydrological regime, pests and other elements of above- and below-ground biodiversity. A key new element in this research agenda will be bridging spatial and temporal scales, from the plot, farm, landscape and regional scales. The Integrated Natural Resource Management (INRM) approach will be driven by a few dominant system variables, including soil fertility and water management. In addition to coping with the short and long term consequences of declining soil fertility and poor water control, the INRM approach includes assisting farmers to cope with aggravated weed pressure, overt losses from insect damage, post-harvest mechanisation and poor labour use efficiency, devalued formal services for knowledge, little or no credit and input support and an insufficiently developed marketing infrastructure.

A wide range of hypotheses will be tested. By linking good soil and water management practices to whole-farm requirements for sustainable and profitable production this research will provide change agents in the public and private sectors and the farmers themselves with menus of options and means for determining which are most appropriate for their own circumstances. It will also internalise participatory approaches to research for development in African national agricultural research and extension services and the NGO community. Tangible impacts will be:

- Optimal efficiency of use of inorganic and organic inputs.
- Increased quality and health of the soil and water resources.
- User-friendly models for assessing new production systems
- Improved soil, water and biodiversity management and conservation
- Decreased /reversed trends in deforestation, nutrient depletion, soil erosion, genetic diversity erosion, water pollution
- Higher on-farm profitability
- Better system resilience to severe shocks such as drought, floods etc.
- Improved extension materials and methods for individuals, farmer field schools and research groups

Adaptive management of appropriate germplasm

This component will build on plant and livestock research that is aimed at developing high yielding animal breeds and plant varieties that are resistant to diseases and pests, adapted to the biophysical constraints of different eco-regions of sub-Saharan Africa, including to low soil fertility, drought and other features of climate change. This includes indigenous breeds and varieties with adaptive characteristics and species domesticated to take advantage of niche markets for African farmers. This work will be linked directly to component INRM, identifying and adapting germplasm that can be used to contribute to testing INRM hypotheses. It will include analysis of the trade-offs between different enterprises and of the trade-offs between increased productivity and increased adaptation to environmental stresses. The benefits will be assessed in terms of both sustainably increased incomes and capital accumulation.

The products of this component will be firstly farming systems made more resilient by the use of the most appropriate mixes of traditional and non-traditional and exotic and indigenous species, varieties and breeds that are best suited to the economic and ecological circumstances of the producers. This is an important, and for livestock possibly the only, means of conserving farm plant and animal biodiversity. These products will contribute to the tangible impacts outlined above. The corresponding impacts will be:

- Higher profitability of farming at the individual farm level
- Enhanced human and animal health and nutrition
- Higher agricultural production at the regional and national levels
- Enhanced capacity of farmers to manage their systems in a sustainable manner
- Increased investment in soil fertility management
- Better labour use efficiency.

Development of sustainable market chains

Poorly understood and poorly organised market chains, poor linkage among elements and individual elements missing or poorly organised (e.g., for farm inputs) severely limit agricultural development in Africa. The market constraints that farmers encounter when attempting to diversify their production in order to stabilise and increase their incomes have been well documented by IFPRI. These constraints are related to lack of access to market information, information asymmetry between producers and sellers, poorly organised input markets to name but a few. The objective here is to increase market opportunities for smallholders, thereby increasing their incomes and income stability, by focusing on (i) niche markets, and (ii) improved input delivery systems.

The research will test the hypotheses that inadequate input and output markets are important elements of poverty traps in Africa; and that cash crops are more important than staple crops for raising income levels of farmers. It will produce recommendations for improving smallholder access to markets through better information, organisation and more effective and efficient delivery systems. The corresponding impacts will be:

- Improved farm gate prices
- More market opportunities for smallholders
- Incentives for adopting improved natural resource management practices

Policies for sustainable agriculture

Research in this component will focus on the interface between technological change, institutional change and policy environments. This will ensure that a policy framework is put in place that will ensure food security

and promote agricultural production while ensuring that production is based on a broad genetic base and is ecologically sustainable. Since there are few possibilities of expanding acreages, especially if water catchments and other vital environmental services are to be preserved, achieving the targets set in the African Vision for Agricultural Research will require intensification of agriculture. Policy research will be a critical component that will bear on the development, adaptation and dissemination of new technologies for accomplishing the purposes of the targets set in the African vision for agricultural research. Key policy problems that will be addressed include instruments to address the trade-offs between private and social costs and between benefits of soil, water and vegetation management at different scales, i.e., farm, community, national, and river basin scales.

The objective will be to generate policy options and implementation mechanisms that result in increased incomes, food security, fair trade and sustainable land use through the adoption of sustainable practices. This will include better informing policy makers and building their adaptive management capacity. A considerable number of hypotheses will be tested.

In addition, new international markets involving transfer payments for land users providing ecosystem services (biodiversity, carbon sequestration, watershed protection functions) are being developed and smallholders in Africa could benefit from such markets if unanswered research questions are answered. As far as transfer payments are concerned, these provide a very unique opportunity to link the private sector with smallholders in Africa, through carbon offset mechanisms. There are very few cases of such mechanisms in place in Africa but an example is provided by the NGO FACE, which is facilitating an arrangement between farmers in Uganda, who have been rehabilitating very degraded lands in the vicinity of Mt Elgon National Park, with the private sector in the Netherlands that is prepared to invest funds in tons of sequestered carbon in the south, particularly when this is done in a manner that benefits small-scale farmers and enables them to adopt sustainable practices.

Scientists engaged in this programme will benefit from interactions with colleagues engaged in climate change research to ensure that their research will not duplicate but rather add value, especially by improving knowledge of field and pasture level soil carbon sequestration.

This research will result in policy makers having access to viable options for promoting and enabling the adoption of technologies and marketing strategies for sustainable poverty alleviation. This in turn will result in reduced land degradation and enhanced livelihoods for the rural poor.

The development of viable systems of transfer payments will provide opportunities for the private sector in industrial countries, especially multi-nationals, to contribute to improving farming practices in Africa. This would provide African countries with win-win solutions for matching local returns with national benefits in negotiations over the extraction of raw materials. Impacts will be:

- Enhanced rural livelihoods
- More sustainable and more profitable agricultural sector
- Enhanced natural resource base for long-term production, in particular with respect to biodiversity, land, soils and water
- Enhanced capacity of policy-makers

Scientific capacity building:

Over the past 30 years there has been significant progress in building human and material capacity for agricultural research in Africa, However, capacity still falls far short of meeting Africa's needs. Improvements are required not only in the amount and quality of technical resources but also in research programme planning, systems management and governance. There is need for revitalising degree-training programmes in order to capitalise on the rich academic resources in African universities.

The focus in this problem area is on building the capacity of researchers in Africa to encompass new approaches involved in agricultural research. This will involve multi-disciplinary approaches incorporating social research as well as encompassing the different biophysical disciplines. The object is to enable Africans to set up working networks to set agendas which focus on the needs of the end-users taking account of both endogenous and exogenous constraints. The programme will support the use of improved methodologies and will encourage a move away from research aimed at generating publications to that which addresses priority problems and which demonstrates a clear route to impact at the client level. In addition to providing opportunities for research for postgraduate degrees the Programme will provide opportunities for postdoctoral training and research management at all levels. It will also address the need to build the capacity of change agents to promote new approaches to agricultural research.

An important goal stated in the African Vision for Agricultural Research is 'to achieve a cadre of qualified, experienced and motivated agricultural research and development specialists, managers, and policy makers to lead the region towards achieving its long-term goals'.

A consultative process to assure that training responds to African needs has been established through the FARA-SRO-CGIAR-NARS Training Group. This NEPAD programme will contribute to:

- Enhancing NARS capacities in agricultural research, which will incorporate appropriate elements of sustainable use of genetic resources, integrated pest management, policy research, biotechnology, information technology, technology dissemination and farm-level impact assessment;

- Assisting NARS to develop systems for increased public awareness and resource mobilisation;

- Organising training for more efficient use of human resources, available physical facilities and priority setting;

- Developing NARS skills in managing organisational change and managing partnerships.

Concept Generation:

Initiation of the New Partnership for Africa's Development (NEPAD) in October 2001 coincided with the culmination of long consultations between regional scientists themselves and with the CGIAR Centres on improving the impact of agricultural research in Africa. Those consultations had led, in creative steps, to the formation of the sub-regional organisations for strengthening agricultural research (SROs); ASARECA, CORAF/WECARD and SACCAR, which jointly established the regional Forum for Agricultural Research in Africa (FARA). The establishment of FARA completed the chain linking African agricultural scientists to the Global Forum for Agricultural Research (GFAR). Through FARA, all NARS in Africa are committed to the African Vision for African Agricultural Research.

In response to the Vision for African Agricultural Research and the 3rd CGIAR System Review, the CGIAR Centre Directors Committee convened meetings with African partners—Meeting of Minds I in Nairobi in

May 1999; Stakeholder Meeting in Beijing, 22 May 1999; Meeting of Minds II in Abidjan in September 1999; Meeting of Minds III Nairobi in March, 2001. These meetings brought together senior representatives from African national and regional research organisations and their colleagues in the CGIAR Centres. Since 2001 numerous meetings have been held, in the context of the regional integration of the activities of the CGIAR and its partners in West and Central Africa and in Eastern and Southern Africa. Representatives from NARS, farmers' organisations, NGOs, SROs and non-CGIAR international institutions contributed to these meetings.

This series of meetings was characterised by a new atmosphere of partnership and optimism that the required impact will be realised through collaboration, which will be facilitated by the three strong sub-regional agricultural research organisations of NARS. This NEPAD agricultural research programme thus represents the current status of this long series of consultations amongst the major stakeholders and provides the opportunity to move from discussion to action.

The NEPAD Programme will be built on programmes and partnerships, which will be established through collaborative research between the FARA, CGIAR centres the NARS members of ASARECA, CORAF/WECARD and SACCAR and the wide range of collaborations that exist with advanced research institutions globally. A key feature of the NEPAD Programme is that these collaborations will be enhanced on the basis of equity among all partners who have shared commitments to excellence in science and to capacity building for all scientists.

5.6.3 Co-ordination and Governance

Specific details for governance and management of the NEPAD agricultural research programme will be developed through the extensive consultations leading to final approval. However the guiding principles have been developed and agreed in the extensive discussions among national, regional and international partners over the past years. These conform to the principles set out in the Durban Statement, i.e.

- Inclusive partnerships, which reach out to producer, agribusiness, and consumer organisations, as well as other development-oriented non-governmental organisations.
- Substantive agenda based on programmatic priorities
- Operational efficiency based on competition and decentralisation
- Mutual respect and shared credit

The establishment of FARA has provided an effective forum for co-ordinating work by national, regional and international partners in development of proposals and, in future, management and governance of agricultural research programmes in Africa. We propose a flat management arrangement that will ensure minimal bureaucracy. But it will allow for different approaches that are appropriate for North Africa and for East and Central Africa, West and Central Africa and Southern Africa to enable them to be consistent with the priorities of ASARECA, CORAF/WECARD and SADC/SACCAR respectively.

The NEPAD Steering Committee (NSC) would provide overall oversight and leadership. FARA's leadership will ensure that the NSC has sufficient authority to make binding decisions on the collaborators. The NSC will meet in full session once a year to receive reports from the sub-regional Steering Committees, which will meet a minimum of once a year and more frequently if necessary.

It is likely that the NSC will establish an independent Programme Advisory Committee (PAC) to provide independent scientific advice. Further discussion is required on whether there should be just one PAC or if

there should be sub-regional PACs. Once that is decided FARA will lead consultations with stakeholders on the membership.

Day to day management and planning will be entrusted to sub-regional organisations to ensure sub-regional integration and harmonisation of the NEPAD agricultural research process.

5.6.4 Creating an enabling environment for Agricultural Research for Development

The purpose of the NEPAD agricultural research programme is to increase agricultural output and rural household incomes. The programme promotes the sharing of knowledge, the development of partnerships and the transfer of high-impact technologies. The programme should work through African governments; businesses, trade associations, farmer groups and other organisations that help small farmers and agricultural enterprises become more productive. By helping these organisations learn about the productive and profitable technologies available and policy approaches that have worked elsewhere; the programme supports their work and promotes the adoption of improved agricultural policies, programmes and strategies

Expanding partnerships with policy makers, private sector and NGOs

There will be need to work hard to consolidate the agricultural research partnerships and expand them, this will have to go beyond agric-based organisations to encompass the social care groups like the NGO's and farmers organisations based in the rural areas. The NGO's have become part of a "dynamic partnership in fighting rural poverty" because they are flexible, innovative and strong advocates for the social, economic and political advocates for the poor. Historically the public sector research organisations have not worked closely with the NGO's and this is an area that the NEPAD implementing research organs should try to improve the NGO/NARS relationship for the good of the rural people basically.

Traditionally Africa has had a pro-public sector research approach, often regarding the private sector as capitalistic and exploitative. Even when private sector effort is made, most of it turned out to be the Quasi-private organisations commonly called the parastatals. Most likely the next decade belongs to countries that will be able to attract private interstate and /or out state investors. The role of governments should be more on the policy reforms so that investors feel secure and are therefore encouraged to bring back the profits in the country or region. Private sector is generally self-driven and it will thrive where the business guidelines are clear. It is therefore important that NEPAD and its co-ordinating and implementing organs, FARA, SROs, IARC and the NARS take a clear position of supporting private sector for rural development and creating the appropriate partnerships between the public and private sectors. Efforts should be made to formally create a private sector and NGO committee to enhance the partnerships of researchers from the NARS, SROs and the IARCs with these two organs of development to provide policy and programme options to increase employment and income for Africans through expanded and efficient partnerships. Possible areas of sectoral focus should include agri-business development, agricultural marketing and credit, and support to the telecommunications sector.

Information sharing and its role in market development

Efforts should be made in enhancing the communication capacity among the NARS researchers many of whom are positioned in rural Africa. The programme should strongly advocate for investment in communication technology and to co-ordinate the preparation of communication master plan, probably regionally based as well as ensuring that the link with NEPAD initiative on infrastructure is made use of strategically aimed at facilitating the integration of Internet technologies into the Information and Communication Management operations of the FARA, SROs, IARCs and NARS networks, programmes and projects.

For effective co-ordination of research, communication is a prerequisite and that is the logic of this project whose objectives are:

- Reduce the cost of communication within the NARS.
- Improve information exchange among research networks through the use of modern Information and Communication Technologies (ICTs).
- Enhance research capacity of the NARs through improved communication and access to information from within the NARs and from the global research systems.
- Make information about the activities of the ASARECA networks, programmes and projects available on the Internet.
- Assist in building local capacity to support Internet connectivity.

It is envisaged that provision of electronic connectivity should have considerable impact on the quality and cost of doing agricultural research in Africa. For agricultural research institutions, a direct result will be the considerable reduction in the cost of communication, that is, lessened expenditure on telephone, fax, and courier services. For the network members easier and faster means of information exchange should lead to enhanced research capacity. Further, scientists will be able to access the information available on the Internet and also to get in contact with their peers in the global agricultural research systems.

An important output of the project is the enhancement of opportunities available to scientists, policy makers, extension workers, private sector, NGOs and farmers' organisations, for accessing virtual libraries and exchanging information. This should improve the technology transfer process and thus have direct impact on the productivity and income of farmers in the region.

Marketing and trade

In any case it becomes rather difficult to do marketing and effective commodity exchanges if communication is encumbered. Therefore, it is a primary responsibility to ensure that communication systems are not left undeveloped even as we consider investing in other equally important areas of agriculture and agricultural research.

It has been said that the world is drowning in information but starving in knowledge. For Africa one can in fact extend the observation and argue that even information generation is inadequate, a very disadvantageous situation for Africa in many ways. Historically the colonisation of Africa left the continent with a legacy of language and cultural divide, which in a way still persists even as Africa tries to reunite and strengthen itself as a trading block. The paradox of it all is that Africa still has to obtain and process its information through the clearinghouses of Europe and America basically, making it somewhat vulnerable when it comes to orienting itself for competitive positioning. If the situation were to change Africa would have to reorganise the way it acquires and processes information especially when it intends to use the same for comparative advantage.

One of the most critical researchable areas therefore for Africa is the development of applicable and accessible Market intelligence to enable Africa to promote intercontinental trade to the advantage of its peoples. In the past Africa has been a raw material source for other economies who value add to the materials through manufacturing process and then sell the same to Africa at an expensive price. If indeed information was available in the right format it is possible that Africa will turn the same into products for trade. Its only when it gets to this stage that Africa can become a key player in global trade giving it a chance for the anticipated growth and alleviation of poverty. NEPAD and it implementing organs have a major role to play

in the process of passing the right information for the available opportunities for growth. Currently it would seem that there is limited profiling of agricultural trade within Africa and one of the most critical roles that FARA could play would be to enhance the cataloguing of agricultural trade working in tandem with other efforts like FAO and AU

For agro business to grow fast enough for the target of 2020 to be met the information processing will have to be faster than it has been before. In many circumstances the African Governments are yet to fully liberalise the availability of the Internet and it will take the counsel of a product-oriented group like FARA to show the link between information flow and growth. If FARA works closely with others it could enhance the possibility of triggering the intra-Africa Trade and investment resources mobilisation.

Role of African women in rural development

Special attention must be given to the vital food-producing and entrepreneurial roles of women in rural and urban African communities. African women account for substantial amounts of production in both the informal and formal sectors. Research has shown that women entrepreneurs not only reinvest in their businesses but also place high value on social investments in their communities. Historically, African women have engaged in international commerce and trade. If indeed rural Africa has any chance the producers must have adequate information on which to base their decisions. They must also have hope that they will finally have compensation for their labour.

So far there are very few African set ups providing this very basic information and one of the most important roles FARA can play is to promote the investment in information kiosks through the NARS, making a cultural norm that the NARS will endeavour to provide both production and trade information. The efforts of the FAO statistical data need not be repeated but it can be localised to fit the situation and utilisation.

More importantly the provision of information to producers and processors allows them to enter the policy debate. Africa has suffered greatly from external policy formulation, which obviously has not succeeded. Research on agricultural market reforms has shown that the liberalisation programmes adopted by many developing countries in the past two decades have had limited success in developing private, efficient, and competitive agricultural markets. Instead, transactions costs and risks remain high, and policies designed to improve incentives for agricultural production often have had little impact on small farmers and the rural poor, especially in sub-Saharan Africa.

Evidence suggests that a major reason why past reforms have had limited impact is that institutional and structural deficiencies have not been properly addressed. In particular, four main types of institutions can contribute to well-functioning agricultural markets:

- Marketing institutions such as co-operatives, farmers' and traders' associations, credit clubs, commodity exchanges and contract farming;

- Infrastructural institutions such as those regulating or maintaining public goods, including roads, communication networks, extension services, storage facilities, and market information services;

- Regulatory institutions such as laws regarding market conduct and enforcement of contracts, ownership rules and property rights, and grades and standards; and

- Government and political institutions that have the capacity to monitor the emergence of markets and support their development.

FARA maybe able to stimulate some of the growth areas by providing examples of success. Much too often Africa only receives gloomy news of failure and deprivation, perhaps a bank of positive information may provide hope and reinvigorate determination to the struggling rural poor.

5.7 Investments in Agricultural Research and extension

The New African Initiative calls for major new investment funding in agricultural research from development agencies, the private sector and African governments. The goal is to double the current annual spending on agricultural research in Africa within 10 years. This means spending will need to increase by an average of 7.2 percent a year during the next decade. With this rationale, total investment requirement for Agricultural Research, Technology Dissemination and Adoption to support activities at the national, sub-regional and regional levels is estimated at US$4.598 billion by 2015, reflecting a rise of 7.2 percent in annual commitment from US$0.199 billion in 2002 to US$0.496 billion in 2015.

The immediate investment requirements (2002-2005) – including overhead cost of 10 percent – would amount to some US$0.9 billion, while short-term requirements (2006-2010) would amount to some US$1.513 billion and medium-term requirements (2011-2015) would total some US$2.167 billion (see Appendix table 10).

5.7 Next Steps

The challenge now is to reach consensus on the proposed concept among stakeholders of the international and African agricultural research systems. The concept was discussed first in the context of the African Caucus, which met in October 2000 prior to the annual meeting of the CGIAR. It was further developed and validated by the FARA General Assembly and Executive Committee at its 2001 meetings. The concept has been used to formulate a proposal for a FARA programme to fit within the framework of NEPAD.

A consensus was reached in the World Bank through internal consultations on the CGIAR reform process. The World Bank's Africa Region has taken a particular interest in establishing the proposed multi-country funding facility. Once an agreement is reached with interested African countries, staff will start designing a multi-country agricultural research programme (MARP) for Africa. The MARP will be structured as a horizontal adaptable programme loan that will consist of individual operations in African countries. To be eligible to participate, countries must commit to (a) implement institutional reforms, (b) collaborate regionally, (c) develop arrangements for decentralised implementation, (d) provide adequate domestic resources to finance their share of the costs, and (e) develop strategic plans for agricultural research.

Because building effective agricultural research systems is a medium and long-term challenge, the MARP will be phased over an estimated period of 20 to 25 years. Phase 1 will provide resources for an initial period of five years to help as many countries as possible implement institutional reforms. Subsequent phases will be designed to strengthen linkages among national, regional and international institutions, take advantage of economies of scale, and accelerate the dissemination of knowledge. The ultimate goal of the MARP is to increase agricultural productivity, accelerate growth, generate income, reduce poverty, and contribute to sustainable natural resources management.

In the wider research community, the challenge is to move from consensus building to action. The concept was presented and discussed with a broad range of partners during the recently concluded Plenary of the FARA. Especially important are consultations with the EU and European countries, the Africa Development Bank, the USAID, and the International Fund for Agricultural Development.

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TEXT TABLES

TEXT TABLES : EXECUTIVE SUMMARY

Table 1: Orders of Magnitude for Africa's Contribution to Investment

For the moment, the summary tables giving total investments specifically exclude investment needs for **agricultural research, technology dissemination and adoption.** The estimates for this pillar are given in Appendix Table 10; they have been developed by the Forum for Agricultural Research in Africa (FARA) and arrive at investment needs for the period 2002-2015 of some US$ 136.2 billions. The estimate fails to fit into the context of an overall NEPAD priority investment programme investment estimate of only US$240 billions over the same period – they would make research alone represent some 60 percent of total NEPAD agricultural investment. Put another way, the investment in research, technology and extension would nearly equal the combined total proposed for land and water, rural infrastructure, trade-related capacities, and food security. Accordingly, as indicated in Appedix table 10, this estimate of research investment (including for the projects indicated in chapter 5), and which are yet to be discussed by the main constituencies, will need a reassessment before integration into overall totals.

Objective of investment	**Investment (US$ billion)**							
	Immediate: 2002-2005		Short term: 2006-2010		Medium term: 2010-2015		**Total: 2002-2015 ****	
	Total	Africa	Total	Africa	Total	Africa	**Total**	**Africa**
Investment:								
Land and water investment	10	4	20	10	7	4	**37**	**18**
Rural infrastructure	22	9	35	17	32	18	**89**	**44**
Trade-related capacities for improved market access	0.8	0.3	1.5	0.6	0.5	0.3	**2.8**	**1.5**
National Food Security	1	0	3	1	3	2	**7**	**3**
Regional food security	0	0	0.5	1	0.5	0	**1**	**1**
Sub-total	***34***	***13***	***60***	***30***	***43***	***24***	***137***	***67***
Operations & Maintenance:								
Land and water	2	1	12	6	18	10	**32**	**17**
Rural infrastructure	7	3	13	6	17	9	**37**	**18**
Sub-total	***9***	***4***	***25***	***12***	***35***	***19***	***69***	***35***
Humanitarian, etc.:								
Safety nets and emergencies	***12***	***5***	***13***	***6***	***10***	***6***	***35***	***17***
Total	**55**	**22**	**98**	**48**	**88**	**49**	**241**	**119**
Annual total	**13.9**	**5.5**	**19.4**	**9.6**	**17.0**	**9.8**	**16.9**	**8.5**

Note: In this table, the ratio of Africa's contribution has been kept the same for all objectives of investment. In reality, Africa's capacity to invest varies according to whether heavy infrastructure or emergencies etc. is involved. Such detail, however, can be taken up at planning stage. The function of this table is to provide indicative magnitude of the investment envelope Africa could plan towards.

*** Because of rounding off, the numbers do not necessarily add up to the exact totals for each column or row to the reference numbers in Appendix Table 1.*

TEXT TABLES : CHAPTER 1

Table 2: Estimates of Overall Investment

Objective of investment	Estimated investment US$ billions (rounded)			
	Immediate (to 2005)	Short term (2005-2010)	Medium term (2010-2015)	Total
Land and water	10	20	7	37
Land and water systems operations and maintenance	2	12	18	32
Other rural infrastructure	22	35	32	89
Other rural infrastructure operations and maintenance	7	13	17	37
Trade-related capacities for improved market access	0.8	1.5	0.5	2.8
Safety nets and emergencies	12	13	10	35
National programmes for food security	1	2	3	6
Regional programmes for food security	0	1	0	1
All investment	**55**	**96.5**	**87.5**	**240**

Table 3: A Possible Scenario Regarding Financing Sources for Agriculture under NEPAD

Source of investment	Share of total investment (%)			
	Now (base estimate)	Immediate future (2002-2005)	Short term (2006-2010)	Medium term (2011-2015)
Africa				
Public domestic sources	35	35	40	40
Private domestic	n.a.	5	10	15
Sub-total	***35***	***40***	***50***	***55***
External				
Concessional assistance (i.e. ODA)	52	45	35	30
Non-concessional loans	13	10	10	5
Foreign direct Investment (private)	n.a.	5	5	10
Sub-total	***65***	***60***	***50***	***45***
Total	**100**	**100**	**100**	**100**

Table 4: Gross Estimates of Investment by Source

Source of investment	**Share of total investment (US$ billion)**		
	Immediate future (2002-2005)	Short term (2006-2010)	Medium term (2011-2015)
Africa			
Public domestic sources	19.6	38.8	35.5
Private domestic	2.8	9.7	13.2
Sub-total	***22.4***	***48.5***	***487***
External			
Concessional assistance (i.e. ODA)	25.2	33.9	26.4
Non-concessional loans	5.6	9.7	4.4
Foreign direct Investment (private)	2.8	4.9	8.8
Sub-total	***33.6***	***48.5***	***39.6***
Total	**56**	**97**	**88**
Annual	8.4	15.7	7.9

TEXT TABLES : CHAPTER 2

Table 5: Soil Constraints

	Total area ('000 km²)	Hydromorphy ('000 km²)	%	Low Nutritient Reserve ('000 km²)	%	Aluminium Toxicity ('000 km²)	%	High P-fixation ('000 km²)	%
Sub-Saharan Africa	23 621	1 904	8	3 714	16	4 366	19	982	4
North Africa and Near East	12 379	79	1	292	2	1	0	0	0
Asia and Pacific	28 989	3 083	11	1 105	4	3 906	14	1 395	5
North Asia, East of Urals	21 033	4 735	23	11	0	732	4	0	0
South and Central America	20 498	2 086	10	982	5	8 019	39	3 016	15
North America	21 410	3 388	16	0	0	2 219	10	1	0
Europe	6 557	1 059	16	44	1	545	8	0	0
World	**134 487**	**16 262**	**12**	**6 148**	**5**	**19 788**	**15**	**5 393**	**4**

Table 6: Unit Investment Costs, US$

Regional Economic Organization	Large irrigation schemes	Rehab. of large irrigation schemes	Small irrigation schemes	Inland valley bottoms	Soil and water conservation	Land improvement
UMA	6 000	2 000	2 000	600	300	100
UEMOA	15 000	5 000	4 000	600	300	100
ECOWAS	10 000	3 000	3 000	600	300	100
COMESA	10 000	3 000	3 000	600	300	100
IGAD	10 000	3 000	3 000	600	300	100
CEMAC	10 000	3 000	3 000	600	300	100
CEN-SAD	10 000	3 000	3 000	600	300	100
CEEAC	10 000	3 000	3 000	600	300	100
SADC	9 000	3 000	2 500	600	300	100

Table 7: Estimated Investments in Irrigation in Main Regions, US$ million

Region	1960's	1970's	1980's	1990's	1960-2000[39]
Asia (Developing)	17 005	27 308	46 315	114 168	204 797
Africa	3 177	4 270	10 544	18 815	36 806
Latin America & The Caribbean	3 152	7 124	11 259	19 855	41 390
Total	**23 334**	**38 702**	**68 119**	**152 838**	**282 992**

[39] Although the estimated value of investments in Africa is similar to that in Latin America and the Caribbean during the period, the irrigated area in Latin America more than doubled and increased in Africa by 50 percent. The estimated investment cost per hectare in Latin America and the Caribbean, however, is almost half of the cost in Africa.

Table 8: Projections for Water Management and Land Improvements 2015

Regional Economic Grouping	Area to be developed/rehabilitated (1 000 ha)				Estimated Investment Cost (US$ million)			
	On-farm and small scale irrigation development including land improvement	Rehab. of large scale irrigation schemes	Large scale irrigation schemes	**Total**	On-farm and small scale irrigation development including land improvement	Rehab. of large scale irrigation schemes	Large scale irrigation schemes	**Total**
UMA	3 925	481	333	**4 739**	1 708	980	2 060	**4 748**
UEMOA	3 718	86	71	**3 875**	1 564	385	1 023	**2 972**
ECOWAS	11 244	181	138	**11 563**	4 073	683	1 733	**6 489**
COMESA	12 274	2 509	1 242	**16 025**	5 534	5 944	7 676	**19 154**
IGAD	7 610	1 202	221	**9 033**	3 683	3 101	2 352	**9 136**
CEMAC	1 647	24	33	**1 670**	814	85	378	**1 277**
CEN-SAD	16 162	2 604	1 435	**18 766**	6 719	6 124	9 158	**22 001**
CEEAC	2 838	157	68	**2 996**	1 370	486	722	**2 578**
SADC	7 742	589	248	**8 579**	3 298	1 764	2 269	**7 331**

Table 9: Projections for Water Management and Land Improvement to 2015

Regional Economic Grouping	Area to be developed/rehabilitated (1 000 ha)				Estimated Investment Cost (US$ million)			
	On-farm and small scale irrigation development including land improvement	Rehab. of large scale irrigation schemes	Large scale irrigation schemes	**Total**	On-farm and small scale irrigation development including land improvement	Rehab.of large scale irrigation schemes	Large scale irrigation schemes	**Total**
UMA	3 925	481	333	**4 739**	1 708	980	2 060	**4 748**
UEMOA	3 718	86	71	**3 875**	1 564	385	1 023	**2 972**
ECOWAS	11 244	181	138	**11 563**	4 073	683	1 733	**6 489**
COMESA	12 274	2 509	1 242	**16 025**	5 534	5 944	7 676	**19 154**
IGAD	7 610	1 202	221	**9 033**	3 683	3 101	2 352	**9 136**
CEMAC	1 647	24	33	**1 670**	814	85	378	**1 277**
CEN-SAD	16 162	2 604	1 435	**18 766**	6 719	6 124	9 158	**22 001**
CEEAC	2 838	157	68	**2 996**	1 370	486	722	**2 578**
SADC	7 742	589	248	**8 579**	3 298	1 764	2 269	**7 331**

Table 10: Annual Investment and Maintenance Requirements to 2015 (US$ million)

	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
	Immediate					Short term				Medium term				
Investments														
Large scale irrigation	0	0	0	0	1 359	2 718	2 718	2 718	1 359	1 359	679	679	0	0
Rehabilitation of large scale irrigation	1 780	1 780	1 780	1 780	1 780	0	0	0	0	0	0	0	0	0
Small scale irrigation	0	394	788	788	788	788	788	788	788	394	394	394	394	394
Wetland and Inland valley bottoms	0	0	0	0	218	435	435	435	218	218	109	109	0	0
Water harvesting, soil & water conservation	46	69	115	115	115	115	172	172	230	230	230	287	287	115
Land improvement	0	102	203	203	203	203	203	203	203	102	102	102	102	102
Total investment	***1 826***	***2 345***	***2 886***	***2 886***	***4 463***	***4 259***	***4 317***	***4 317***	***2 797***	***2 302***	***1 513***	***1 571***	***783***	***610***
Operation and maintenance (O&M)														
Large scale irrigation schemes	0	0	0	0	136	408	679	951	1 087	1 223	1 291	1 359	1 359	1 359
Rehabilitation of large scale irrigation schemes	134	267	401	534	668	668	668	668	668	668	668	668	668	668
Small scale irrigation schemes	0	79	236	394	552	709	867	1 025	1 182	1 261	1 340	1 419	1 498	1 576
Wetland and Inland valley bottoms	0	0	0	0	7	20	33	46	52	59	62	65	65	65
Water harvesting, soil and water conservation	2	5	9	14	18	23	30	37	46	55	64	76	87	92
Land improvement	0	2	6	10	14	18	22	26	30	33	35	37	39	41
Total O&M	***135***	***352***	***652***	***952***	***1 394***	***1 845***	***2 299***	***2 752***	***3 066***	***3 298***	***3 459***	***3 623***	***3 715***	***3 801***

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Table 11: Road Infrastructure in Africa, by Sub-region

	North Africa	Dry Sahelian Belt	Gulf of Guinea	Central Africa	East Africa	Southern Africa	Islands	Sub-Saharan Africa	Africa
Roads – total (1 000 Km)	273	134	320	312	234	765	52	1 817	2 090
Roads – paved (1 000 Km)	177	19	82	41	21	113	8	284	461
Roads – unpaved (1 000 Km)	97	115	239	271	213	651	44	1 533	1 630
Share paved roads (%)	65	14	26	13	1	15	15	15.6	22
Km Roads/ 1 000 pop.	2.0	1.40	1.97	3.69	10	7.68	3.10	2.8	2.7

Table 12: Road Infrastructure in Africa compared to other developing regions

Region	Total Roads	Paved Roads	Unpaved Roads	% Paved

.....000' kms				
Africa	2 750	572	2 178	27
North Africa	274	177	97	65
Sub Saharan Africa	1 817	284	1 533	16
Developing Countries	14 256	4 806	9 450	34
Latin America and the Caribbean	3 235	534	2 701	17
East Asia	2 118	703	1 414	33
South Asia	3 858	1 700	2 158	44

Table 13: Infrastructure – Africa in World Perspective

Aspect of infrastructure 1996/98	Africa			Asia		Latin America/ Caribbean	World
	Sub-Sahara	North Africa	All Africa	South	East & Pacific		
Landlocked population %	28	na	20	2	0	3	n.a.
Population at 100km or less from the sea (%)	19	na	27	23	43	42	n.a.
Roads (km/1 000 inhabitant)	2.8	2.0	2.7	3	1	6	5
Rail line/1 000 inhabitant	92	101	94	0,06	0,12	0,21	0,20
Rail freight /million inhabitant	210	na	260	431	2 642	192	8 992
Air freight (million ton-km)	912	na	1 226	1 299	13 305	4 301	98 431
Maritime freight capacity	55 680	na	58 588	30 343	60 964	163 490	505 378
Airports with paved runways	504	219	723	325	547	1 384	10 821
Electricity generation capacity (kw/inhabitant)	0.11	na	0.14	0.28	0.28	0.29	0.51

Table 14: Rural Road Networking in Selecting African Countries in the Humid and Semi-Humid Tropics (HST)

Country	Total (Km)	Density (Km/1 000 km^2)	
		Existing	India 1950
Benin	4 066	36	291
Cameroon	18 000	38	168
Central African Republic	14 400	23	33
Congo	200	1	47
Congo (Republic Democratic)	84 100	36	110
Côte d'Ivoire	30 224	94	258
Equatorial Guinea	450	16	103
Gabon	2 400	9	30
Ghana	4 000	17	429
Guinea	11 500	47	161
Guinea-Bissau	1 404	39	186
Liberia	3 615	33	159
Madagascar (1/2)	19 750	67	137
Mozambique (1/2)	6 725	17	135
Nigeria (3/4)	67 425	97	718
Sierra Leone	5 767	80	391
Tanzania (1/3)	20 760	66	181
Togo	4 181	73	447
All Countries Above	**298 967**	**63**	**388**

Table 15: Existing Stock of Roads to Rehabilitate and New Roads to 2015 ('000 km)

	Existing Roads ('000 km)			Roads to Rehabilitate[a] ('000 km)			New Roads to 2015 ('000 km)		
	Paved	Unpaved	Total	Paved	Unpaved	Total	Paved	Unpaved	Total
North Africa	58	580	**638**	40	406	**446**	0	0	**0**
Dry Sahelian Belt	4	104	**108**	3	73	**76**	34	403	**437**
Gulf of Guinea	16	215	**231**	11	150	**161**	44	602	**646**
Central Africa	8	244	**252**	6	171	**177**	26	222	**248**
East Africa	4	192	**196**	3	134	**137**	55	612	**667**
Southern Africa	23	586	**609**	16	410	**426**	10	146	**156**
Islands	2	40	**42**	1	28	**29**	5	46	**51**
Total	115	1 961	**2 076**	80	1 372	**1 452**	174	2 031	**2 204**

Note: ([a]) Based on estimated 70 percent of existing roads.

Table 16: Investments for Rural Infrastructure and Trade-related capacities for improved market access

	Unit Cost	Total Cost (million USD)	Share (%)
Rural infrastructure			
Storage			
Dry storage	155	2 727	
Cool storage	3 210	5 116	
Total Storage		***7 842***	***8.4***
Marketing			
Rural marketing facilities		436	
Markets for fruits/vegetables	360	5 737	
Total marketing		***6 173***	***6.6***
Processing			
Cereals milling	180	5 066	
Fruits/vegetables	1 190	7 586	
Total processing		***12 652***	***13.5***
Livestock Infrastructure		**1 373**	**1.5**
Fisheries Infrastructure		**645**	**0.7**
Rural Roads			
Rehabilitation – paved		4 005	
Rehabilitation – unpaved		10 292	
Construction – paved		17 417	
Construction – unpaved		30 447	
Total rural roads		***62 162***	***66.4***
Sub-Total Rural Infrastructure		***90 848***	***97***
Trade-related capacities for improved market access		**2 786**	**3**
Total Costs		**93 634**	**100**

Table 17: Maintenance Requirements for All Categories of Rural Infrastructure

Maintenance	Maximum annual (US$ M)	Cumulative total (US$ M)
Storage	196	1 470
Marketing	154	1 157
Processing	316	2 373
Rural roads	3 054	31 865
Total	**3 720**	**36 865**

Table 18: Projections of Total Investment Requirements for Rural Infrastructure and Trade-related capacities for improved market access by 2015

	Total investment (million US$)							
	Storage	**Marketing**	**Processing**	**Livestock**	**Fisheries**	**Roads**	**Market Access**	**Total**
North Africa	1 638	1 252	2 657	144	30	5 065	174	10 960
Dry Sahelian Belt	1 725	1 358	2 783	452	25	10 086	580	17 009
Gulf of Guinea	1 413	1 129	2 273	178	255	15 137	580	20 965
Central Africa	294	233	474	73	42	7 479	290	8 885
East Africa	1 210	965	1 948	322	150	15 872	406	20 873
Southern Africa	1 271	1 005	2 049	172	113	7 087	406	12 103
Islands	291	231	469	33	30	1 435	348	2 837
Total	**7 842**	**6 173**	**12 652**	**1 373**	**645**	**62 162**	**2 786**	**93 634**

Table 19: Annual Investment and Maintenance Requirements to 2015 (US$ million)

Investments	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**
- Crop Storage	183	500	645	645	704	580	752	752	693	548	519	519	489	317
- Crop Marketing	104	361	418	418	442	392	592	592	569	511	499	499	488	288
- Crop Processing	316	818	1 068	1 068	1 170	956	1 209	1 209	1 107	858	807	807	756	503
Sub-Total	***602***	***1 679***	***2 131***	***2 131***	***2 315***	***1 928***	***2 553***	***2 553***	***2 369***	***1 917***	***1 825***	***1 825***	***1 733***	***1 108***
- Livestock	20	50	100	120	140	150	150	150	150	150	120	75	0	0
- Fisheries	0	50	50	100	120	150	150	25	0	0	0	0	0	0
- Rural Roads	1 672	2 866	5253	5 253	5 253	5 253	4 305	3 590	4 786	4 786	4 786	5 983	5 983	2 393
- Market Access	114	195	237	234	332	317	322	322	208	171	113	117	58	45
Total invest.	**2 409**	**4 840**	**7 771**	**7 838**	**8 160**	**7 798**	**7 479**	**6 640**	**7 513**	**7 024**	**6 844**	**8 000**	**7 774**	**3 546**
Maintenance														
- Agric. Infra.	48	95	143	190	238	286	333	381	429	476	524	571	619	667
- Rural Roads	1 498	1 618	1 738	1 857	1 977	2 097	2 216	2 336	2 456	2 575	2 695	2 815	2 934	3 054
Total maint.	**1 546**	**1 713**	**1 880**	**2 048**	**2 215**	**2 382**	**2 550**	**2 717**	**2 884**	**3 051**	**3 219**	**3 386**	**3 553**	**3 721**

Table 20: Projections by Source of Financing (Excluding trade-related capacities for improved market access)

	Total investments (US$million)	**Public Investments**		**Private Investments**	
		(%)	**Amount**	**(%)**	**Amount**
Crop Storage	7 842	17	1 363	83	6 479
Crop Markets	6 173	54	3 304	46	2 869
Crop Processing	12 652	0	0	100	12 652
Livestock Infrastructure	1 373	80	1 099	20	275
Fisheries Infrastructure	645	80	516	20	129
Road Rehabilitation	14 298	93	13 269	7	1 029
New Roads	47 864	85	40 904	15	6 960
Sub-total roads	62 162	86	54 173	13	7 989
Total	**90 848**	**67**	**60 455**	**33**	**30 393**

Table 21: Projections by Source of Financing (Excluding Trade-related capacities for improved market access)

	Total investments (US$million)	International ODA		Domestic Resources			
				Private Sources		Governments	
		(%)	Amount	(%)	Amount	(%)	Amount
Crop Storage	7 842	10	818	83	6 479	7	545
Crop Markets	6 173	32	1 983	46	2 869	21	1 322
Crop Processing	12 652	0	0	100	12 652	0	0
Livestock Infrastructure	1 373	50	687	20	275	30	412
Fisheries Infrastructure	645	50	323	20	129	30	194
Road Rehabilitation	14 298	66	9 494	7	1 029	26	3 775
New Roads	47 864	55	26 544	15	6 960	30	14 359
Sub-total roads	62 162	58	36 038	13	7 989	29	18 134
Total	**90 848**	**44**	**39 848**	**33**	**30 393**	**23**	**20 607**

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Table 22: Population, Per Capita Dietary Energy Supply and Prevalence of Under-Nourishment

Regional Groupings	Total population		Per capita dietary energy supply		Number of people undernourished		Proportion of undernourished in total population	
	1990-92 (millions)	1997-99 (millions)	1990-92 (millions)	1997-99 (millions)	1990-92 (millions)	1997-99 (millions)	1990-92 (millions)	1997-99 (millions)
Africa	595.1	710.3	2 322	2 382	173.1	200.1	29	28
Sub-Saharan Africa	474.5	572.4	2 120	2 190	167.7	194.0	35	34
AMU	65.2	74.9	3 031	3 036	3.1	3.8	5	5
CEN-SAD	260.1	310.9	2 635	2 769	43.9	42.2	17	14
CEMAC	24.2	29.2	2 061	2 196	9.2	8.6	38	29
COMESA	229.4	335	1 988	1 971	68.8	124.1	30	37
ECCAS	84.7	102.6	2 038	1 885	33.9	52.6	40	51
ECOWAS	174.8	211.1	2 377	2 589	37.5	32.1	21	15
IGAD	74.7	152.6	2 023	1 981	28.4	63.5	38	42
SADC	124.2	151.9	2 014	1 902	52.7	77.2	42	51
UEMOA	55.1	66.4	2 268	2 336	14.3	15.9	26	24

Note: because some countries are members of more than one regional grouping, totals for regional groupings exceed the continental totals.

Table 23: SPFS Funding Requirement Based on Regional Groupings

Regional Groupings	Total population	Number of people undernourished	No. of People Targeted for National Community led Food Security	Cost*
	1997-99 (millions)	1997-99 (millions)	2015 (millions)	2015 (000 US$)
AFRICA	710.3	200.1	100	6 500
AMU	74.9	3.8	1.9	123
CEN-SAD	310.9	41.1	20.5	1 336
CEMAC	29.2	8.7	4.4	283
COMESA	335.0	120.3	60.2	3 910
ECCAS	102.6	51.1	25.5	1 659
ECOWAS	211.1	31.7	15.9	1 030
IGAD	152.6	60.7	30.3	1 972
SADC	151.9	80.0	40.0	2 601
UEMOA	66.4	16.0	8.0	520

Note: Tables 19-20: Some countries are members of more than one Regional Economic Organisation (REO). As a result of this duplication, the sum of the individual REO figures exceeds the figures for Africa as a whole.
**Cost estimates are based on SPFS experience to-date, amounting to US$65 per person (approximately US$435 per family, excluding investments made at regional level, equivalent to US$65 per family).*

ANNEXES

ANNEX 1: Consideration of the NEPAD Comprehensive Africa Agriculture Development Programme by the Meeting of African Ministers of Agriculture

FAO Headquarters, Rome, Italy
(9th June 2002)

BACKGROUND

African Ministers of Agriculture met at FAO Headquarters in Rome, Italy on 9th June 2002 under the auspices of the FAO Regional Conference for Africa, which held the special follow-up session meeting to review the Comprehensive Africa Agriculture Development Programme (CAADP) prepared by FAO in co-operation with the NEPAD Steering Committee.

At its substantive session held in Cairo, Egypt 4-8 February 2002, the Twenty-second Session of the FAO Regional Conference for Africa had discussed the New Partnership for Africa's Development (NEPAD) and, *inter alia,* through resolution ARC/02/RES recommended that FAO extend support to the NEPAD process.

The Conference noted that the CAADP was designed in recognition of the fact that African agriculture faces a major crisis, with large numbers of people facing food shortages, net dependency on imports and food aid, and frequent disasters requiring emergency food and agriculture interventions. In view of this crisis situation, the CAADP focussed on investment into three mutually reinforcing "pillars" that can make the earliest difference to Africa's situation, which are: (i) extending the area under sustainable land management and reliable water control systems; (ii) improving rural infrastructure and trade-related capacities for improved market access ; and (iii) increasing food supply and reducing hunger in Africa.

The first pillar focuses on irrigation and water management in order to disengage African agriculture from dependence on unpredictable rainfall; the second one promotes rural infrastructure to reduce the cost of providing inputs and of extracting produce thus making African agriculture more competitive; the third pillar stresses direct promotion of more productive ways of agriculture especially among small-scale farmers, both male and female, the poorest segment of the society. The CAADP also pays attention to the growing frequency and severity of disasters and emergencies with disruptive effects of food and agricultural situations and to the need for better market access for Africa's products both internally and globally.

To combat these ills afflicting Africa's agriculture and to achieve the sector's early revival, the CAADP proposes investment till 2015 of about US$241 billion, including provision for maintenance and operations (US$69 billion), and funding for emergencies and safety nets (US$35 billion); of this total it has been suggested in the CAADP that Africa itself could potentially fund about half the total needs. These estimates were also presented in terms of the immediate future 2002-2005 of some US$ 56 billion; the short term 2006-2010 at US$ 97 billion; and the medium term 2011-2015 at US$ 88 billion. The annual average investment is, at US$17 billion, lower than Africa's annual agricultural import bill.

The Conference welcomed and endorsed the CAADP and agreed on the need to quickly operationally it. It offered guidance to member governments on a wide range of aspects of operationalisation and action to revitalise African agriculture. Its report, which is in a draft being finalised, states:

SUMMARY OF PRINCIPAL CONSIDERATIONS

By way of areas of emphasis, the Conference:

1. Underscored its belief that as the mainstay of the African economy, agriculture should be mainstreamed and linked to development of other sectors and programmes under NEPAD. It also called for agriculture to adopt environmentally sustainable practices.
2. Emphasised that the implementation of the NEPAD activities be carried out in an integrated manner and in full collaboration with individual countries as well as with the existing regional and sub-regional institutions.
3. Recognised the need to address issues of concern to small island states, of land-locked countries and of those threatened with land degradation and desertification.
4. Highlighted the importance of developing the institutional and human capacity and the involvement of small producers, and particularly rural women in the NEPAD process.
5. Requested that sub-sectors of fisheries, livestock, and forestry be given adequate attention in the NEPAD efforts.
6. Called for political commitment to address areas of potential conflict and development of mechanisms for management of shared natural resources, including water.

RECOMMENDATIONS

Noting the commitment of Africa under NEPAD to take responsibility for its own development, the Conference addressed its recommendations principally to the Governments of Africa and to its Regional Economic Organisations. It recommended:

1. As the next step, to prepare a plan of action incorporating national and regional plans, to include the timeframe for the implementation of the programme, as well as the specification of the expected outputs and performance indicators.
2. To prepare projects for financing at the regional, sub-regional and national levels under the framework of the CAADP priorities and that in doing this, attention be given to country and sub-regional diversity.
3. To devise a concerted strategy involving the Ministers for Agriculture, Finance and Planning for raising the funding of agriculture and rural development in order to enhance the proper funding of NEPAD agriculture-related programmes. In this connection, the Meeting noted that a target of 25 percent of annual national budget was adopted by the 21st Regional Conference for Africa held in Yaoundé in February 2000. The countries should also approach traditional and new partners for supporting African efforts in implementing the CAADP.
4. To highlight and incorporate agricultural research into the CAADP while exploring the possibility of creating sub-regional centres of excellence and an agricultural trust-fund for research and development.
5. That the NEPAD Steering Committee, operating through the initiating country responsible for agriculture – currently Egypt - establish a committee to follow-up this Ministerial Meeting in order to provide political oversight, monitor the implementation of CAADP and to facilitate the engagement of all countries in the future NEPAD developments on agriculture.
6. To cast the NEPAD efforts for development within the framework of the countries' poverty reduction and food security strategies, which are presently the most agreed upon frameworks for country-owned initiatives targeted at poverty reduction.

7. To prepare a proactive plan of action for enhancing the role and contribution of the private sector and civil society in the implementation of NEPAD agricultural programmes including in upstream and downstream agriculture-related activities.

Furthermore, the Conference:

8. Drew attention to the serious intention and commitment of Africa to allocate increased domestic resources for agriculture and rural development and urged the international community to play its part in supporting African countries in formulating projects and programmes to bring to reality the continent's vision of a prosperous agriculture, thereby reducing hunger and poverty.
9. Called upon FAO to maintain its co-operation with NEPAD Secretariat in the spirit of the Cairo Regional Conference resolution (ARC /02/RES) as the process moves towards operationalisation of Action Programmes."

ANNEX 2: Extracts from the G8 Africa Action Plan released at the G-8 summit in Kananaskis (Canada) that are directly relevant to NEPAD agriculture

G8 Africa Action Plan

We, the Heads of State and Government of eight major industrialised democracies and the Representatives of the European Union, meeting with African Leaders at Kananaskis, welcome the initiative taken by African States in adopting the New Partnership for Africa's Development (NEPAD), a bold and clear-sighted vision of Africa's development. We accept the invitation from African Leaders, extended first at Genoa last July and reaffirmed in the NEPAD, to build a new partnership between the countries of Africa and our own, based on mutual responsibility and respect. The NEPAD provides an historic opportunity to overcome obstacles to development in Africa. Our Africa Action Plan is the G8's initial response, designed to encourage the imaginative effort that underlies the NEPAD and to lay a solid foundation for future cooperation.

. . . . . Our Action Plan focuses on a limited number of priority areas where, collectively and individually, we can add value.

. . . . . .

III. Fostering Trade, Investment, Economic Growth and Sustainable Development

Generating economic growth is central to the NEPAD's goal of mobilizing resources for poverty reduction and development. . . . . the particular importance of infrastructure has been emphasized by our African partners – including as a domain for public-private investment partnerships, and as a key component of regional integration and development. In order to achieve adequate growth rates, Africa must have broader access to markets. The launch of multilateral trade negotiations by World Trade Organization (WTO) members in Doha, which placed the needs and interests of developing countries at the heart of the negotiations, will help create a framework for the integration of African countries into the world trading system and the global economy, thus creating increased opportunities for trade-based growth. We are committed to the Doha development agenda and to implementing fully the WTO work programme, as well as to providing increased trade-related technical assistance to help African countries participate effectively in these negotiations. With these considerations in mind, we commit to:

3.1 Helping Africa attract investment, both from within Africa and from abroad, and implement policies conducive to economic growth – including by:

. . . . . .

3.2 Facilitating capacity-building and the transfer of expertise for the development of infrastructure projects, with particular attention to regional initiatives.

3.3 Providing greater market access for African products – including by:

- Reaffirming our commitment to conclude negotiations no later than 1 January 2005 on further trade liberalisation in the Doha round of multilateral trade negotiations taking full account of the particular circumstances, needs and requirements of developing countries, including in Africa;

- Without prejudging the outcome of the negotiations, applying our Doha commitment to comprehensive negotiations on agriculture aimed at substantial improvements in market access,

reductions of all forms of export subsidies with a view to their being phased out, and substantial reductions in trade-distorting domestic support;

- Working toward the objective of duty-free and quota-free access for all products originating from the Least Developed Countries (LDCs), including African LDCs, and, to this end, each examining how to facilitate the fuller and more effective use of existing market access arrangements; and,

- Ensuring that national product standards do not unnecessarily restrict African exports and that African nations can play their full part in the relevant international standard setting systems.

3.4 Increasing the funding and improving the quality of support for trade-related technical assistance and capacity-building in Africa – including by:

. . . . . .

- . . . . . Assisting African producers in meeting product and health standards in export markets; and,

- Providing technical assistance to help African countries engage in international negotiations, and in standard-setting systems.

3.5 Supporting African efforts to advance regional economic integration and intra-African trade – including by:

. . . . . .

- Working towards enhanced market access, on a WTO-compatible basis, for trade with African free trade areas or customs unions;

- Supporting the efforts of African countries to eliminate tariff and non-tariff barriers within Africa in a WTO-consistent manner; and,

- Supporting efforts by African countries to work towards lowering trade barriers on imports from the rest of the world.

3.6 Improving the effectiveness of Official Development Assistance (ODA), and strengthening ODA commitments for enhanced-partnership countries – including by:

. . . . . .

VII. Increasing Agricultural Productivity

The overwhelming majority of Africa's population is rural. Agriculture is therefore the principal economic preoccupation for most of Africa's people. Agriculture is central not only to the quality of life of most Africans, but also to the national economy of nearly all African states. Increased agricultural production, efficiency and diversification are central to the economic growth strategies of these countries. In support of the NEPAD's growth and sustainable development initiatives on agriculture, we commit to:

7.1 Making support for African agriculture a higher international priority in line with the NEPAD's framework and priorities – including by:

- Supporting the reform and financing of international institutions and research organisations that address Africa's agricultural development priority needs;

- Supporting efforts to strengthen agricultural research in Africa as well as research related to issues and aspects that are of particular importance to Africa; and,

- Working with African countries to improve the effectiveness and efficiency of ODA for agriculture, rural development and food security where there are coherent development strategies reflected in government budget priorities.

7.2 Working with African countries to reduce poverty through improved sustainable productivity and competitiveness – including by:

- Supporting the development and the responsible use of tried and tested new technology, including biotechnology, in a safe manner and adapted to the African context, to increase crop production while protecting the environment through decreased usage of fragile land, water and agricultural chemicals;

- Studying, sharing and facilitating the responsible use of biotechnology in addressing development needs;

- Helping to improve farmers' access to key market information through the use of traditional and cutting edge communications technologies, while also building upon ongoing international collaboration that strengthens farmers' entrepreneurial skills;

- Encouraging partnerships in agriculture and water research and extension to develop, adapt and adopt appropriate demand-driven technologies, including for low-income resource-poor farmers, to increase agricultural productivity and improve ability to market agricultural, fish and food products;

- Working with African countries to promote property and resource rights;

- Supporting the main-streaming of gender issues into all agricultural and related policy together with targeted measures to ensure the rights of women for equal access to technology, technical support, land rights and credits;

- Working with African countries to support the development of agricultural infrastructure including production, transportation and markets; and,

- Working with African countries to develop sound agricultural policies that are integrated into Poverty Reduction Strategies.

7.3 Working to improve food security in Africa – including by:

- Working with African countries to integrate food security in poverty reduction efforts and promote a policy and institutional environment that enables poor people to derive better livelihoods from agriculture and rural development;

- Working with appropriate international organisations in responding to the dire food shortages in Southern Africa this year;

- Working with African countries to expand efforts to improve the quality and diversity of diets with micro-nutrients and by improving fortification technologies;

- Supporting African efforts to establish food safety and quality control systems, including helping countries develop legislation, enforcement procedures and appropriate institutional frameworks; and,

- Supporting efforts to improve and better disseminate agricultural technology.

VIII. Improving Water Resource Management

Water is essential to life. Its importance spans a wide range of critical uses – from human drinking water, to sanitation, to food security and agriculture, to economic activity, to protecting the natural environment. We have noted the importance of proper water resource management. We note also that water management is sometimes at the centre of threats to regional peace and security.

We also appreciate the importance of good water management for achieving sustainable economic growth and development, and therefore we commit to:

8. Supporting African efforts to improve water resource development and management – including by:

- Supporting African efforts to promote the productive and environmentally sustainable development of water resources;

- Supporting efforts to improve sanitation and access to potable water;

- Mobilizing technical assistance to facilitate and accelerate the preparation of potable water and sanitation projects in both rural and urban areas, and to generate greater efficiency in these sectors; and,

- Supporting reforms in the water sector aimed at decentralization, cost-recovery and enhanced user participation.

Updated: 2002-06-27

Source: http://www.g8.gc.ca/kan_docs/afraction-e.asp

ANNEX 3: Provisional list of actions required to achieve success in agricultural development under NEPAD

National Level

i) Increasing capacity to support farmer productivity

Highlight the important role that agriculture plays in food security and economic welfare of rural people affecting over 70 percent of the population in most African countries. Set targets for the required capacities and deliverables. Governments should commit themselves to review their national research and extension systems and implement the reforms required to improve national research capacity and efficiency. Extensive reviews and analyses of national agricultural research systems in Africa over the past 20 years indicate that funding for agricultural research will need to double from the current allocation of US$ 1 billion annually in the next 10 years. The additional funding is required to train scientists, with more at PhD level (a target of 12,000 scientists compared to the present 8,000 has been recommended), rehabilitate and restructure research institutions and to strengthen the extension services.

ii) Establishment of partnership between public and private sector for increased investment

Promote collaboration between the public and private sectors in post-harvest management – storage, distribution, processing and marketing, should be given strong emphasis and support. The public and private sectors should be encouraged to share costs and risks to assist smallholders in the adoption of new technology through poverty reduction programmes and debt relief. Increased attention should be given to national food security programmes during discussions regarding poverty reduction and debt relief. There should also be a commitment to use matching grants or other appropriate interventions to assist smallholders in adopting new technology when needed, while taking due care to minimize distortions.

iii) *Increase the efficiency and use of water supply for agriculture* by establishing small-scale irrigation facilities, improving local water management, and increasing the exchange of information and technical know-how with other countries in the region.

iv) *Improve the security of land tenure for traditional and modern farming*. By introducing appropriate land reform.

v) *Enhance agricultural credit and financing schemes*, through improvement of access to credit by small-scale and women farmers.

Regional Level

Review the structures and programmes of regional and sub-regional institutions. Where appropriate establish research programmes and/or institutions on specific crops and livestock species. Seek to increase funding for early warning systems, where such exist, or solicit new funds to establish such facilities. Ensure that strategies are in place for food emergencies. Promote intra-and inter-regional trade by adopting international sanitary and phyto-sanitary standards and by reducing, or eliminating tariffs on cross-border trade through harmonisation of agricultural policies and strengthening of regional synergies developed under the south-south cooperation.

International Level

Establish capacity to:

Develop new partnership to address donor fatigue for individual high profile agricultural projects.

Promote cooperation with developed countries carrying out and developing research and development capabilities in agriculture.

Promote access to international markets by improving equality of African produce and agricultural products, particularly processed products to meet the standards required by those markets.

Support African networking with external partners in the areas of agricultural technology and know-how, extension services and rural infrastructure.

Support investment in research in the area of high yielding crops and durable preservation and storage methods.
Provide support for building national and regional capacity for multilateral trade negotiation including food sanitation and other agricultural trade regulations.

Key issues to be considered in implementing the CAADP

Building on a solid knowledge base

The national strategies in many countries offer a sound base already in place to develop programmes and projects, which reflect the collective aspirations of their people.

There are also now the regional agricultural strategies based on the findings and key policy recommendations emerging from the national strategies of the member countries of such organisations. At the regional level the strategies have been developed further into regional programmes for food security to complement the national efforts.

Deepening policy reform

Policy reform and harmonisation and complementarily with sectors other than agriculture is needed, in order to help lift agriculture and household income onto a higher growth path. In the light of the decision by African Heads of State to dissolve the OAU and create an African Union based on, among other things**,** the principles of effective economic governance, there is now an opportunity to articulate Agricultural Policies and imperatives at a continental level.
Work will need to be undertaken to establish the building blocks towards the establishment of institutional capacity for deepening policy reform. Uppermost in the action steps is the need for a forum of Ministers of Agriculture on the African continent to serve as a decision making body that then reports to the relevant organ of the African Union. Such a council would need to have the necessary supporting technical structures and appropriate leadership for the pillars of the CAADP.

Access to and investment in land and water resources

Land distribution is considered to be a potent instrument for poverty reduction. Small farms provide steady livelihood for the poor, use labour intensively, and can be highly productive if macro-economic policies are right as has been demonstrated by a number of Asian countries. Secure property rights create incentives for long term investment and sustainable land use. Policies supporting equitable distribution of land, in some Asia and Latin American countries have been shown to improve access to credit, boost agricultural productivity and reduce poverty. In this regard, gender bias and obstacles to women's access to land deserves priority attention and prompt actions. Despite lingering constraints and difficulties, agrarian reform programmes have already been initiated in some African countries. Another lingering constraint in many African countries is the fragmentation of holdings—a major competitive disadvantage under the new environment of market liberalisation.

Problems and issues associated with water resources are varied and complex. The problem of water access in Africa and particularly in Sub-Saharan Africa is not the quantity of water available but its uneven distribution across regions, seasons, gender, and income groups. Competing demand for urban households versus the rural areas, and industrial uses versus agriculture are increasingly causing social tensions. This tension is also apparent across national boundaries in some of the major river basins of Africa. Low efficiency in water use is also a major constraint. In North Africa where dependence on surface and underground water is very high rate of water resource degradation, e.g. underground water mining and water pollution are an increasing threat to future sustainability of agricultural production in the region.
NEPAD can benefit from taking stock of the proposed Africa land and water initiative under CAADP and the Integrated land and water management action programme led by the World Bank.

Capitalizing on existing initiatives

There are various national and sub-regional initiatives which are currently at the resource mobilization stage as well as regional research centres in Africa where a lot of experiences and achievements must be energized through NEPAD.
The challenge is to identify which ones relate most closely to the pillars of the CAADP; internationally, examples are the World Bank's strategy document for sustainable rural development; the FAO Special Programme for Food Security; the programmes of the Forum for Agriculture Research in Africa (FARA).

Facilitating investment

There is an urgent need to increase domestic savings rates in Africa. According to the World Bank gross domestic savings rates in many countries are barely 5 percent or less of the GDP, relative to levels of 20 percent or more in even poor Asian countries. Improving rural people's access to credit and improving rural financial infrastructure will help mobilize savings. Most of the private sector, on-farm investment will have to come from farmers' own current income. An increase in both public and private agricultural investment therefore depends fundamentally on rising earnings and savings for farmers.

Agricultural Credit versus Rural Financial Services
Improved access to durable financial intermediation services may facilitate the financing of viable investments, can enhance the productivity of assets, and thus enables rural people to make better use of existing resources such as land, labour, and management skills. These should learn from the performance of earlier schemes that have failed to prove sustainable.

Importance of Domestic Savings Deposit Services

In the new market environment there is a trade-off between the requirements of rural households to have access to durable financial services at reasonable costs and the difficult challenge which financial institutions face to cover fully the high costs and risks which are associated with rural financial intermediation. There is evidence, however, that viable and sustainable rural financial institutions are able to service low-income rural clients, both directly by increasing their outreach as well as indirectly by financing larger entrepreneurs and facilitating local employment creation. Therefore, initiatives, which support the operation of viable and competitive financial services providers in rural areas, are extremely important.
At all-Africa level, some estimates suggest that for each dollar of capital inflow to Sub-Sahara Africa from the rest of the world, a dollar and six cents flowed out – this needs priority attention.

Adequate Rural Finance Policies and Investment Finance Strategies

An enabling environment, right policies, the availability of profitable rural investment opportunities, and the capability of local communities and clients themselves to plan and use their money effectively are equally critical in the process of developing effective rural financial services.

Strategies for Resource Mobilization

Developing a communication strategy
A communications activity is essential for constituency building for agriculture and for drawing the attention of potential investors to opportunities. It must be done early.

World Bank initiative on African Agricultural Research and Development (Increasing Effectiveness and Financial Sustainability)

This initiative aims to increase the effectiveness of agricultural research through institutional and financial reforms of the African Technology Development and Transfer System (TDT). The ideas are reflected in Chapter 5 and they need to be funded.

On ground implementation of projects
This needs to follow prioritization at subregional levels and lower, as set out in Chapter 1.

APPENDIX TABLES

Appendix table 1: Details of Investment Requirements by Objective and Time Horizon

Investment Item	Investment estimate US$ billion														
	Immediate				Short term					Medium term					Total
Years 20.	02	03	04	05	06	07	08	09	10	11	12	13	14	15	
Investments															
Land and Water	1.8	2.4	2.9	2.8	4.5	4.3	4.3	4.3	2.8	2.3	1.5	1.6	0.8	0.6	36.9
Rural Infrastructure	2.3	4.5	7.4	7.4	7.6	7.2	6.9	6.1	7.2	6.7	6.6	7.8	7.7	3.5	88.9
Trade-related capacities for improved market access	0.2	0.2	0.2	0.2	0.3	0.3	0.3	0.3	0.3	0. 1	0.1	0.1	0.1	0.1	2.8
National food security	0.3	0.3	0.4	0.4	0.4	0.5	0.5	0.5	0.5	0.5	0.5	0.6	0.6	0.6	6.5
Regional Food security	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	1.0
Sub-total	***5.1***	***7.4***	***10.9***	***10.8***	***12.9***	***12.4***	***12.1***	***11.9***	***10.9***	***9.7***	***8.8***	***10.2***	***9.3***	***4.9***	***137.3***
	34.2				60.2					42.9					137.3
Operations and maintenance															
Land & water	0.1	0.4	0.7	1.0	1.4	1.9	2.3	2.8	3.1	3.3	3.5	3.6	3.7	3.8	31.6
Rural infrastructure	1.6	1.7	1.9	2.1	2.2	2.4	2.5	2.7	2.9	3.1	3.2	3.4	3.5	3.7	36.9
Sub-total	***1.7***	***2.1***	***2.6***	***3.1***	***3.6***	***4.3***	***4.8***	***5.5***	***6.0***	***6.4***	***6.7***	***7.0***	***7.2***	***7.5***	***68.5***
	9.5				24.2					34.8					68.5
Safety nets, food & agriculture emergencies, disasters and humanitarian															
Nominal provision – all needs	3.0	3.0	3.0	3.0	2.5	2.5	2.5	2.5	2.5	2.0	2.0	2.0	2.0	2.0	34.5
Sub-total	***3.0***	***3.0***	***3.0***	***3.0***	***2.5***	***2.5***	***2.5***	***2.5***	***2.5***	***2.0***	***2.0***	***2.0***	***2.0***	***2.0***	***34.5***
	12.0				12.5					10					34.5
Grand Total	**9.8**	**12.5**	**16.5**	**16.9**	**19.0**	**19.2**	**19.4**	**19.9**	**19.4**	**18.1**	**17.5**	**19.2**	**18.5**	**14.4**	**240.3**
	55.7				96.9					87.7					240.3
Summary of investment estimates (US$ billion)															
Investments	5.1	7.4	10.9	10.8	12.9	12.4	12.1	11.9	10.9	9.7	8.8	10.2	9.3	4.9	137.3
Operations and maintenance	1.7	2.1	2.6	3.1	3.6	4.3	4.8	5.5	6.0	6.4	6.7	7.0	7.2	7.5	68.5
Food & agriculture emergencies, disasters and humanitarian: nominal provision	3.0	3.0	3.0	3.0	2.5	2.5	2.5	2.5	2.5	2.0	2.0	2.0	2.0	2.0	34.5
Total	**9.8**	**12.5**	**16.5**	**16.9**	**19.0**	**19.2**	**19.4**	**19.9**	**19.4**	**18.1**	**17.5**	**19.2**	**18.5**	**14.4**	**240.3**
	55.7				96.9					87.7					240.3
Investment estimates by planning horizon (US$ billion)															
Land and water + rural infrastructure	34.2				60.2					42.9					137.3
Operations & M.	9.5				24.2					34.8					68.5
Safety nets, food + agric. emergencies.	12.0				12.5					10.0					34.5

Total	**55.7**	**96.9**	**87.7**	**240.3**

Appendix table 2: Investment Projections for Water, Land and Rural Infrastructure and Trade-related capacities for improved market access (by Geographical Sub-Region) (US$ billion)

Region	On-farm and small-scale irrigation, and land improvement	Rehab. of large irrigation schemes	Large scale irrigation schemes	Sub-totals (water & land)	Storage	Marketing	Processing	Rural Roads	Trade-related capacities for improved market access	Sub-totals (rural infrastructure & trade-related capacities for improved market access)	Totals
North Africa	1.62	2.95	6.59	11.16	1.64	1.25	2.66	5.07	0.09	10.71	**21.87**
Dry Sahelian belt	3.37	3.25	2.63	9.25	1.73	1.36	2.78	10.09	0.30	16.26	**25.51**
Gulf of Guinea	2.79	0.33	0.68	3.80	1.41	1.13	2.27	15.14	0.30	20.25	**24.05**
Central Africa	0.80	0.30	0.40	1.50	0.29	0.23	0.47	7.48	0.15	8.62	**10.12**
East Africa	2.59	0.43	1.10	4.11	1.21	0.96	1.95	15.87	0.21	20.2	**24.31**
Southern Africa	2.41	1.45	1.87	5.74	1.27	1.01	2.05	7.08	0.21	11.62	**17.36**
Islands	0.81	0.19	0.32	1.32	0.29	0.23	0.47	1.43	0.18	2.6	**3.92**
Total	**14.39**	**8.90**	**13.59**	**36.88**	**7.84**	**6.17**	**12.65**	**62.16**	**1.44**	**90.26**	**127.14**

Appendix table 3: Investment Projections for Water, Land and Rural Infrastructure and Trade-related capacities for improved market access (by Regional Group) (US$ million)

Regional Group	On-farm and small-scale irrigation, and land improvement	Rehab. of large irrigation schemes	Large scale irrigation schemes	Sub-totals (water & land)	Storage	Marketing	Processing	Rural Roads	Trade-related capacities for improved market access	Sub-totals (rural infrastructure & trade-related capacities for improved market access)	Totals
CEEAC	1 370	486	722	2 578	5 488	5 074	6 976	9 418	27	26 983	29 561
CEMAC	814	85	378	1 277	486	601	946	2 389	15	4 437	5 714

CEN-SAD	6 719	6 124	9 158	22 001	1 998	854	3 628	20 967	33	27 480	49 481
COMESA	5 534	5 944	7 676	19 154	1 902	1 122	3 595	26 298	45	32 962	52 116
ECOWAS	4 073	683	1 733	6 489	1 159	1 109	2 556	20 141	39	25 004	31 493
IGAD	3 683	3 101	2 352	9 136	1 154	847	2 256	16 073	18	20 348	29 484
SADC	3 298	1 764	2 269	7 331	754	436	1 467	15 836	36	18 529	25 860
UEMOA	1564	385	1 023	2 972	2 034	2 726	4 069	4 393	15	13 237	16 209
UMA	1 708	980	2 060	4 748	459	238	515	239	3	1 454	6 202

Appendix table 4: Annual Investment and Maintenance Requirements to 2015 (US$ million)

	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Investments														
Land & Water Developments	1 826	2 345	2 886	2 886	4 463	4 259	4 317	4 317	2 797	2 302	1 513	1 571	783	610
Rural Infrastructure	2 275	4 545	7 384	7 384	7 568	7 181	6 857	6 143	7 155	6 703	6 611	7 808	7 716	3 501
Trade-related capacities for improved market access	114	195	237	234	240	186	122	75	15	15	7	0	0	0
Total Investments	**4 215**	**7 085**	**10 507**	**10 504**	**12 271**	**11 626**	**11 296**	**10 535**	**9 967**	**9 020**	**8 131**	**9 379**	**8 499**	**4 111**
Operation & Maintenance														
Land & Water Developments	135	352	652	952	1 394	1 845	2 299	2 752	3 066	3 298	3 459	3 623	3 717	3 801
Rural Infrastructure	1 546	1 713	1 880	2 048	2 215	2 382	2 550	2 717	2 884	3 051	3 219	3 386	3 553	3 721
Total Operation & Maintenance	**1 681**	**2 065**	**2 532**	**3 000**	**3 609**	**4 227**	**4 849**	**5 469**	**5 950**	**6 349**	**6 678**	**7 009**	**7 270**	**7 522**

Appendix table 5: Projections by Source of Financing for Land and Water investments

	Contribution %			US $ million			
	Public Sector	**ODA**	**Private Sector**	**Public Sector**	**ODA**	**Private Sector**	**Total**
Large irrigation schemes							
Non- LIFDCs	100	0.0	0.0	3,155	0	0	3,155
LIFDCS	60	40	0.0	6,260	4,174	0	10,434
Rehabilitation of large irrigation schemes							
Non- LIFDCs	90	0.0	10	1,488	0	165	1,653
LIFDCS	50	40	10	3,914	2,609	725	7,248
Small irrigation schemes							
Non- LIFDCs	20	0.0	80	273	0	1,091	1,364
LIFDCS	10	10	80	782	521	5,214	6,518
Wetland and Inland valley bottoms							
Non- LIFDCs	20	0.0	80	25	0	102	127
LIFDCS	10	10	80	246	164	1,639	2,049
Water harvesting, soil and water conservation							
Non- LIFDCs	20	0.0	80	91	0	366	457
LIFDCS	10	10	80	221	147	1,470	1,838
Land improvement							
Non- LIFDCs	100	0.0	0.0	381	0	0	381
LIFDCS	60	40	0.0	991	660	0	1,651
Total				**17,827**	**8,276**	**10,773**	**36,875**
					48%	22%	29%

Notes: Just as for rural infrastructure investments (Tables 21 (a), 21(b), the likelihood of private sector participation to the degree assumed here will need country by country assessment, given that historical involvement has been weak except in a few countries. The same will apply to ODA expectations, given the tendency for aid to go to only a few countries. For more conservative expectations of possible progression of all-Africa shares of public, private funding as well as internal vs. external funding, see text Tables 3, 4.

Appendix table 6: Annual Funding Requirements for National SPFS, based on Regional Economic Organization Groups (US$ million)

	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	Total
SPFS: Sub-total National programmes grouped by regional organisation	**320**	**340**	**360**	**380**	**440**	**450**	**460**	**470**	**480**	**520**	**540**	**560**	**580**	**600**	**6 500**
AMU	6	6	7	7	8	9	9	9	9	10	10	11	11	11	124
CEN-SAD	66	70	74	78	90	92	95	97	99	107	111	115	119	123	1 336
CEMAC	14	15	16	17	19	20	20	20	21	23	23	24	25	26	283
COMESA	193	205	217	229	265	271	277	283	289	313	325	337	349	361	3 910
ECCAS	82	87	92	97	112	115	117	120	123	133	138	143	148	153	1 659
ECOWAS	51	54	57	60	70	71	73	74	76	82	86	89	92	95	1 030
IGAD	97	103	109	115	133	136	140	143	146	158	164	170	176	182	1 972
SADC	128	136	144	152	176	180	184	188	192	208	216	224	232	240	2 601
UEMOA	26	27	29	30	35	36	37	38	38	42	43	45	46	48	520

Note: Some countries are members of more than one Regional Economic Organisation (REO). As a result of this duplication, the sum of the individual REO figures exceeds the figures for Africa as a whole.

Appendix table 7: Annual Funding Requirements for Regional SPFS (i.e. RPFS)

	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	Total
SPFS Regional Programmes Sub-total:	**27**	**30**	**32**	**35**	**64**	**65**	**65**	**72**	**86**	**98**	**98**	**98**	**115**	**115**	**1 000**
AMU	0	1	2	4	5	4	4	4	5	5	5	5	5	5	55
CEN-SAD	5	5	5	5	10	10	10	10	15	15	15	15	20	20	160
CEMAC	2	2	2	3	4	4	4	4	5	5	5	5	5	5	55
COMESA	0	2	3	3	8	8	8	8	10	10	10	10	10	10	100
ECCAS	0	0	0	0	2	4	4	5	5	10	10	10	10	10	70
ECOWAS	5	5	5	5	10	10	10	15	15	20	20	20	20	20	180
IGAD	5	5	5	5	7	7	7	7	8	8	8	8	10	10	100
SADC	5	5	5	5	8	8	8	8	8	10	10	15	15	15	120
UEMOA	5	5	5	5	10	10	10	10	15	15	15	15	20	20	160

Appendix table 8: Total Annual Funding Requirements for National Programmes and Rural Economic Organization (US$ million)

	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	Total
SPFS: Sub-total national programmes grouped by regional organisation	**320**	**340**	**360**	**380**	**440**	**450**	**460**	**470**	**480**	**520**	**540**	**560**	**580**	**600**	**6 500**
SPFS: Sub-total regional groupings	**27**	**30**	**32**	**35**	**64**	**65**	**65**	**72**	**86**	**98**	**98**	**98**	**115**	**115**	**1 000**
Total National Programmes and Regional Groupings	**345**	**365**	**390**	**410**	**499**	**510**	**530**	**541**	**563**	**630**	**650**	**670**	**690**	**710**	**7 500**

Appendix table 9: Africa Estimates of Investments (Both Sub-Saharan and North Africa Included)

Year *	Estimated agricultural investment (US$ billion)		
	Based on inter-year change in asset value**	Based on ration agric. spending in total ***	Average
1990/91	**2.58**	**3.88**	**3.23**
1991/92	**10.57**	**3.57**	**7.07**
1992/93	***3.34***	***4.49***	***3.91***
1993/94	**4.54**	**3.41**	**3.98**
1994/95	**5.30**	**3.27**	**4.29**
1995/96	**5.87**	**3.15**	**4.51**
1996/97	**4.75**	**3.55**	**4.15**
1997/98	**3.00**	**3.27**	**3.13**
1998/99	**1.87**	**2.79**	**2.33**

* The asset-based estimates are from differences between calendar years and are presented for the concerned years (e.g. 1990/91); for the ratio-based estimates calendar years apply (e.g. 1990).

** Show high inter-year variability; degree of reliability uncertain. Assumed to include all assets, both private and public.

*** Refer to public investments. To get Africa totals, North Africa (estimated at near historical average of about 20 percent of total Near East) added to Sub-Saharan totals. Agriculture share of total public spending in 1999 for North Africa assumed at 3.5 percent rather than the 1.1 percent reported.

Appendix table 105: First approximation - details of Research and Extension Investment Requirements by Objective and Time Horizon[40]

Investment Item	Investment estimate US$ billion														
	Immediate				Short term					Medium term					
Years	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	Total
Investments															
Natural Recourses Management	1.8	2.4	2.9	2.8	4.5	4.3	4.3	4.3	2.8	2.3	1.5	1.6	0.8	0.6	36.9
Adaptive management of appropriate germplasm	2.3	4.5	7.4	7.4	7.6	7.2	6.9	6.1	7.2	6.7	6.6	7.8	7.7	3.5	88.9
Development of sustainable market chains	0.2	0.2	0.2	0.2	0.3	0.3	0.3	0.3	0.3	0. 1	0.1	0.1	0.1	0.1	2.8
Policies for sustainable agriculture	0.3	0.3	0.4	0.4	0.4	0.5	0.5	0.5	0.5	0.5	0.5	0.6	0.6	0.6	6.5
Scientific capacity building	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	1.0
Sub-total	*4.6*	*7.4*	*10.9*	*10.8*	*12.9*	*12.4*	*12.1*	*11.9*	*10.9*	*9.7*	*8.8*	*10.2*	*9.3*	*4.9*	*136.2*

[40] These estimates of research investments including for the projects indicated in chapter 5, are from FARA and are yet to be discussed by the main constituencies. If accepted as they stand, the research investment would be equal to about 60% of all other NEPAD agricultural investment for the other "pillars" put together. There is clearly need to re-look at the proposed investment costs for research.