Introduction by Charles Runge, honorary secretary of the Royal Agricultural Society of the Commonwealth

Sustaining agriculture in the Commonwealth: The challenge by Chris Emerson and Martin Wallis of the Farmers’ World network

Growing for the future by Unilever
he world signed up to reducing global poverty level when leaders agreed the Millennium Development Goals at their summit in 2000. The first of these goals is to halve extreme poverty and hunger by the year 2015. Consider these statistics: Of the world’s 6.2 billion people, 1.2 billion live on less than US$1 a day and 799 million of these are in the developing world and malnourished. The Food and Agriculture Organisation (FAO) estimates that 153 million children under the age of five are malnourished. Of these, six million die as a result of hunger each year.

It is clear that the world is not meeting that most basic of priorities – feeding itself. The FAO estimates that the calorific intake per person should be 2,350 kilocalories per day. Some 54 countries fall below this minimum – most in sub-Saharan Africa, where the Commonwealth has 19 members. And yet, world food production figures show that theoretically enough food is available for 2,805 kilocalories per day. The problem is in unevenly distributed and poor countries cannot afford to make up the shortfall by importing.

At their own summit in Coolum, Australia, in 2002, Commonwealth leaders stressed the Millennium Development Goals and declared their ‘determination to work to eliminate poverty, and to promote people-centred and sustainable development.’ The Royal Agricultural Society of the Commonwealth (RASC) itself has been concerned, since its inception nearly 50 years ago, with hunger and poverty. Its own contribution has been to concentrate on what are known today as transfer of technologies through agricultural show societies. Some of these shows have developed to the point where they rank as world expositions on developments in agricultural practice and productivity. It is therefore appropriate that contemporary issues concerning agriculture are the focus of this first in a series of Commonwealth Reports.

The RASC asked the Farmers’ World network (FWn), an organisation of British farmers seeking to improve the lives of their overseas counterparts, to address on its behalf the case for improving sustainable agriculture using a broadfront approach. FWn has done this through a framework of sustainable livelihoods, and considering the barriers to such sustainability and relevant strategies. In analysing why some agriculture systems may be failing, it includes links to health, conflict, environmental degradation, biodiversity, and physical and financial capital, among others. It also argues for greater access to international markets for developing country produce, enabling poor countries to sell commercial agriculture produce to pay for food imports. It stresses that better domestic governance systems, and allocation of resources to key areas including rural infrastructure, health and training are part of this broadfront approach.

Unilever’s important contribution to this report is an example of best practice from a good global corporate citizen and shows how sustainable agriculture initiatives and corporate objectives can complement each other. Unilever’s concern is how farming can be more productive, protect the environment, preserve natural resources and contribute to rural communities. It is illustrated by examples where it directly influences agricultural practices for the good of farmers, the corporation and for consumers.

The RASC is delighted to recommend both essays as important contributions to discussions on agricultural sustainability and its links with poverty, development in general and the importance of international, national and corporate action for the sake of the world’s peoples.
Sustaining agriculture in the Commonwealth: The challenge
BY CHRIS EMERSON AND MARTIN WALLIS OF THE FARMERS’WORLD NETWORK

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Sustainable agriculture in the Commonwealth: The challenge

CHRIS EMERSON AND MARTIN WALLIS OF THE FARMERS’WORLD NETWORK PROPOSE THAT POVERTY, DISEASE, SCARCITY OF RESOURCES AND THE ACTIONS OF WORLD ORGANISATIONS ALL CONTRIBUTE TO THE CHALLENGE OF ACHIEVING SUSTAINABILITY IN AGRICULTURE.

“The first cause of hunger and malnutrition is poverty”


Hunger and malnutrition continue to be widespread in developing countries in the Commonwealth, despite the resolution shown by the food and agriculture organisation in 1943. Why does hunger persist? Because the root cause – poverty – persists. And poverty and sustainability are interlinked. Academics and development professionals have been debating the full definition of sustainable agriculture for many years, and there is still not full agreement. One of the first attempts at a definition came from the United Nations Food and Agriculture Organisation (FAO) in their description of sustainable agriculture and rural development:

“The management and conservation of the natural resource base, and the orientation of technological and institutional change in such a manner as to ensure the attainment and continued satisfaction of human needs for present and future generations. Such sustainable development...conserves land, water, plant and animal genetic resources, is environmentally non-degrading, technically appropriate, economically viable and socially acceptable.”

Den Bosch Declaration and Agenda for Action on Sustainable Agriculture and Rural Development. Report of the Conference, 1991 (3)/1.8

There is a fundamental difference of opinion in the interpretation of sustainable agriculture in terms of whether the emphasis should be on the production aspects or on natural resource conservation. Protagonists of intensive agriculture, agricultural biotechnology and free trade favour the argument that agriculture is not sustainable if it does not feed the world, and they cite the millions of people who are starving and malnourished as justification to further intensify agriculture. This group also cites the successes of the Green Revolution in improving agricultural yields, and is optimistic about the potential of agricultural biotechnology.

The alternative perspective is that food security is not solely dependent on agricultural productivity, and that by placing greater emphasis on the conservation of land, water, plant and animal genetic resources, more people will have access to food, and the potential for sustaining or enhancing productivity levels will be maintained. This group points to the mounting problems of agricultural pollution, soil erosion and degradation, loss of agricultural biodiversity and inequitable access to the means of production and exchange as causes for concern.

This latter perspective is broadly accepted and adopted by a significant number of development organisations and academics. One of the leading voices in the UK on sustainable agriculture is Jules Pretty, formerly at the International Institute for Environment and Development, and now leading the Centre for Environment and Society (University of Essex):

“The basic challenge for sustainable agriculture is to make better use of available biophysical and human resources. This can be done by minimising the use of external inputs and by utilising and regenerating local or internal resources more effectively. A more sustainable agriculture systematically pursues five goals:

• Thorough integration of natural processes such as nutrient cycling, nitrogen fixation, soil regeneration and pest-predator relationships into agricultural production processes, so ensuring profitable and efficient food production whilst increasing natural capital

• Minimisation of the use of those external and non-renewable inputs that damage the environment or harm the health of farmers and consumers, and a targeted use of the remaining inputs used with a view to minimising costs

• Improvement in the welfare and quality of life of farm animals

• Full participation of farmers and other rural people in all processes of problem analysis, and technology development, adaptation and extension (including a greater use of farmers’ knowledge and practices in combination with new technologies emerging from research), leading to an increase in local self-reliance and social capital

• Enhancement of both the quality and quantity of wildlife, water, landscape and other public goods of the countryside" (Source: Pretty 1998)

Throughout the Commonwealth there is clear evidence that there are problems with existing agricultural systems. Basic indicators show widespread failings both in the availability of food supplies, and in the depletion of natural resources. For example in Malawi the average daily per capita consumption of kilocalories was lower in 1998 (2,226) than it was in 1980 (2,246). According to the Convention on Biological Diversity, more than 90 per cent of crop varieties have been lost from farmers’ fields in the past century.

Methodology

In trying to understand how and why agricultural systems in the Commonwealth might be failing, it is necessary to take a comprehensive look at all of the elements that impact upon the sustainability of agriculture. The UK Department for
International Development (DFID) has developed a framework approach for analysing such complex interactions. The Sustainable Livelihoods Framework identifies five core asset categories or types of capital upon which livelihoods are built (Table 1), and these are equally applicable to the sustainability of farming and agriculture. Increasing access to these assets—which can take the form of ownership or the right to use—is the challenge.

**Human capital**
Given long-term concerns over the rapid escalation of the global population, particularly in less developed countries, it might seem strange to consider the availability of human capital as a serious limitation on agricultural productivity. However, raw population statistics do not tell the whole story. In many parts of the Commonwealth there is a shortage of labour. Some of this shortage is due to civil unrest (see Social capital), some is a result of economic migration (people leaving the countryside to seek employment in the cities), but some is also due to illness.

**Big challenges**

**Health**
A fit and healthy working population is imperative for development. The gap between rich and poor countries in terms of public health provision is stark and widening, at a time when old and new challenges are threatening the welfare and productivity—if not the very survival—of tens of millions of people in developing countries.

**Resources**
In the industrialised countries of the Commonwealth, health spending is around six per cent of GDP, and GDP per capita is over $PPP* 20,000. In the developing countries of the Commonwealth, spending on health ranges from 0.8 to 3.6 per cent of GDP in sub-Saharan Africa, 0.4 to 4.5 per cent in the Caribbean, 2.5 to 4.8 per cent in the Pacific region, and 0.7 to 1.7 per cent in most of the Asian bloc. GDP per capita ($PPP) ranges from 490 to 7,000 in much of sub-Saharan Africa and South Africa 9,400, 3,600 to 9,000 in much of the Caribbean, 1,600 to 5,000 in the Pacific region, and 1,600 to 2,300 in most of the Asian bloc (Malaysia $PPP 9,000).

**Old challenges**
For both malaria and TB, official data may reflect only a fraction of the true number of cases. Malaria is endemic in many regions of Commonwealth sub-Saharan Africa—Ghana, Gambia, Zambia, Malawi and Mozambique have the highest incidences (15,000–35,000 cases per 100,000 people). Recorded cases of TB are highest (200–500 cases per 100,000 people) in South Africa, Namibia, Botswana, Lesotho, Zimbabwe and Malawi. In the Pacific region, high rates of malaria (1,700 per 100,000) are recorded in the Solomon Islands, and TB is prominent in Papua New Guinea (278 per 100,000). In Asia, malaria is common in Sri Lanka (1,111 per 100,000) and TB is recorded at 123 cases per 100,000 in India. Meningitis also poses a major health threat in many regions of the developing world.

Potable water, displaced persons
Outbreaks of cholera are not uncommon where access to safe, potable water is limited. In much of sub-Saharan Africa only 50 to 60 per cent of people have access to improved water sources, in the Caribbean region the figure is 80 to 90 per cent, in the Pacific region 50 to 90 per cent, and in Asia 80–100 per cent. Water-borne diseases are also commonly recorded where there are massive population displacements due to civil strife. Four Commonwealth African countries alone (Tanzania, Zambia, Uganda and Kenya) are host to 1.375 million refugees. A total of 2.38 million refugees have fled six African countries (Burundi, Sudan, Angola, Sierra Leone, DRC and Rwanda). Both India and Pakistan have large refugee populations.6

* PPP (Purchasing Power Parity) aims to give a single price for similar products in two countries. One PPP dollar has the same purchasing power in a domestic economy as one US dollar has in the US economy.

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**Table 1: The five core asset categories upon which livelihoods are built**

<table>
<thead>
<tr>
<th>Capital</th>
<th>Specific agricultural relevance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Human capital</td>
<td>In developing countries labour can be affected by illness (increasingly HIV/AIDS, migration etc)</td>
</tr>
<tr>
<td>Social capital</td>
<td>Civil unrest has devastated social structures and disrupted farming and agricultural trade etc</td>
</tr>
<tr>
<td>Natural capital</td>
<td>Soil fertility, agricultural biodiversity, access to land, access to water etc</td>
</tr>
<tr>
<td>Physical capital</td>
<td>Trade-related infrastructure (transportation of crops to appropriate markets), access to market information, relevant technology – for example to support plant breeding</td>
</tr>
<tr>
<td>Financial capital</td>
<td>Trade may be local and international, or refer to diversification strategies etc</td>
</tr>
</tbody>
</table>

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6. * Reports Farmers’ World network
The new challenge: HIV/AIDS

There are 40 million people living with HIV – about 95 per cent of which are in developing countries. An estimated 68 million people will die of AIDS by 2020. In the worst affected countries, HIV/AIDS will reduce economic growth by one to two per cent.

Seventy per cent of all adults living with HIV are in Africa. In the 27 most affected African countries, seven million agricultural workers, as described later, have died from AIDS since 1985, and 16 million more deaths are likely in the next two decades (Source: FAO). Seven southern African countries now have a prevalence rate of over 20 per cent. Just 0.1 per cent of the 28.5 million of people living with HIV/AIDS in Africa have access to HIV/AIDS drugs. In Asia and the Pacific, an estimated 6.6 million people (3.97 million in India) have HIV/AIDS. An Indian generic drug manufacturer has offered a triple-cocktail for US$350 per patient per year. Nine out of the 12 countries with the highest HIV prevalence in the Americas are in the Caribbean basin. In Latin America and the Caribbean 11 of 24 countries surveyed have policies, regulations or laws that guarantee access to anti-retrovirals as a human right.

The provision of affordable anti-retrovirals alone is not an adequate response to the HIV/AIDS pandemic. Of equal importance are awareness-raising about HIV/AIDS and its impact on sustainable livelihoods, improved nutrition and food security, and the upgrading of both urban and rural health infrastructure to deliver follow-up medical and clinical services.

Ministers from 25 developing countries reached a consensus to finalise agreements on access to medicines for diseases such as HIV/AIDS, TB and malaria. During an informal meeting of the World Trade Organisation (WTO) in Sydney, the trade ministers managed to reach a consensus on the key issues of the Trade-Related Aspects of Intellectual Property Rights (TRIPS) agreement and how the WTO would allow equitable access to medicines in the developing world without contravening property rights. Kofi Annan, UN secretary-general, urged the trade ministers to “propose, without delay, a longterm solution” to increase developing countries’ access to affordable medicines and vaccines for deadly diseases such as HIV/AIDS, TB and malaria.

Africa: The challenge of HIV/AIDS for food security and nutrition

Tony Barnett, professor of development studies at the University of East Anglia, is a leading authority on the impact of AIDS on rural communities in less-developed countries. His analysis of the current situation reflects the following:

“The HIV/AIDS epidemic has profound effects on agriculture as the infection is concentrated in those age groups which would normally supply most of the labour needed in labour intensive agricultural systems.

Field observations reveal broadly that there tends to be a decrease in area cultivated, and in the range of cash crops, relish crops and food crops (notably the substitution of labour-intensive crops by less demanding crops) – resulting in lower quality household diet. There is also a trend to decreases in numbers of small stock, and increased incidences of insect, animal and possibly viral pests as cultivated area declines and ecological control breaks down.

Recent studies in Malawi, Namibia and Kenya show the main factors which affect food security are: loss of labour, delayed agricultural activities and depletion of household reserves. Rich households are more able to cope with the stress of sickness without having to change their crop mix, but about a quarter of the poor and very poor households had to change their crop mix. In addition, illness and death lead to more extensive fallowing.

A study in Kenya in 2001 shows that HIV/AIDS has a different impact at farm and family level according to age structure and gender profile. The death of a prime-age (20-45 years old) household head decreases the area of land cultivated by 20 per cent, and the death of a spouse also has a negative effect upon area cultivated. Significant gender differences appear when the cultivated land is divided into three crop categories – cereals, root crops, and high-value crops. Food crop cultivation for household consumption is primarily the responsibility of women in most parts of eastern and southern Africa, while typical “cash crops” such as coffee, tea, sugarcane and export-oriented horticultural products are primarily men’s activities. Thus the gender of deceased members may affect the allocation of land to different categories of crops.

The current upswing in food insecurity in southern Africa is due to a complex of factors: long and short term climatic factors, poverty and civil disorder which drive patterns of behaviour (migration for work or to flee violence) that are known to increase rates of sexual partner change, and the impact of HIV/AIDS on traditional coping mechanisms and farming systems.”
Gender
The role of rural women in producing food should not be underestimated. According to the Food and Agriculture Organisation of the United Nations (FAO):
“Both women and men play critical roles in agriculture throughout the world, producing, processing and providing the food we eat. Rural women in particular are responsible for half of the world's food production and produce between 60 and 80 per cent of the food in most developing countries. Yet, despite their contribution to global food security, women farmers are frequently underestimated and overlooked in development strategies.”

Women can find it harder than men to get access to credit and to be taken seriously by officials and politicians, and they can face discrimination in disputes over land or access to natural resources. Addressing these inequalities must be a priority if one is looking to maximise the potential of all agricultural production.

Social capital
Civil unrest is often the most visible problem – with wars, coups, military unrest and civil disobedience clearly evident across many countries, even throughout the Commonwealth. For example, the current political instability in Zimbabwe is causing massive upheaval to the country’s agriculture and economy. But though it is clearly evident it is perhaps one of the most difficult challenges for sustainable agriculture to overcome. There is often little or nothing that farmers can do about the upheaval, and problems can be long-lasting, with unrest resulting in:

- Human displacement – with families, communities and sometimes races being dispersed and scared to return
- Loss of agricultural biodiversity – with farmers dependent on farm-saved seeds being unable to harvest their crops there is a great risk of irretrievably losing a huge wealth of biodiversity preserved in landraces that have been carefully selected over generations
- Loss of indigenous knowledge – just as illnesses such as HIV/AIDS can wipe out the knowledge of generations, so can civil unrest, with the young being taken from the land to fight, rather than staying with their families to learn the skills and knowledge to farm the land
- Loss of market place – at an international level, once the major multiple retailers have seen supply chains disrupted, for commercial reasons they are likely to seek replacement sources for their produce, so that even if communities are able to rebuild their farming systems successfully they might find that they no longer have the market to sell their produce

While the vexed question of “good governance” continues to tax the minds of the international donor community and the financial institutions, and little can be done by farmers or NGOs based in developing countries to address civil unrest, a number of development programmes do focus on initiatives that encourage farmers to cooperate and collaborate across a wide area. Farming in the Commonwealth, as in the UK, can be a solitary activity, so programmes that seek to unite farming communities can be beneficial in enhancing their stability and sometimes avoiding some of the pressures that can lead to local divisions and unrest. This is witnessed by the Kenyan C-MAD case study (page 8).

Natural capital
The degradation of natural resources is one of the symptoms of unsustainable agriculture. Evidence of this can be easily found the world over. Soil erosion, land degradation, deforestation, low soil fertility and other natural resource depletion episodes are commonplace. Some represent more of a threat to the sustainability of agriculture than others and there seems to be particular concern over the impact in a reduction in the availability of water, as Kydd et al state:
“Smallholders’ access to natural resources is being challenged...in the drier parts of the world increased output, and particularly intensification of yields, is dependent on access to water which is becoming scarcer and more expensive...”
This poses the question, “…where poorer farmers do not have access to water (because water may not “come with the
Case studies

Kenya: Community mobilisation against desertification (C-MAD) programme
The C-MAD programme works in a “low-potential” region of South Nyanza, western Kenya. The programme area has a single rainfall season, and the land is badly degraded owing to overgrazing and deforestation. The project began as a straightforward tree-planting effort, and expanded to incorporate soil conservation, soil fertility and organic farming methods. It now focuses on whole farm improvements. The social processes incorporate a number of participatory learning methods, farmer-based research groups, a strengthening of community and village groups, and collaboration with government and non-government research and extension agencies.

It works on some 1,000 hectares with about 500 farmers, who have seen maize yields improve from about two to four tonnes/ha. Income has also increased for many farmers following the cultivation of fruit (citrus, orange, mango, pineapple). The project reports increased local employment through growth in demand for on-farm labour. The cultivation of vegetables in home gardens has further improved domestic food security. The project also reports reduced child mortality and improved health and nutritional status.

(Source: Peter Omondi, C-MAD)

Belize: The Chalillo Dam Project
Belize’s electricity industry has been auctioned off as part of the privatisation of public utilities being urged by the IMF and the World Bank. Plans to build a hydro-electric dam at Chalillo on the upper Macal River valley will cost US$30 million, flood 11km2 and obliterate over 2,000 acres wildlife habitats – host to eight species which are on the IUCN Red List of Threatened Species. The Environmental Impact Assessment contract was awarded to AMEC, whose report was described by the Natural Resources Defense Council in Washington as one of the worst they had ever seen. Stan Marshall, CEO of Fortis, the main contractor, insists his company is the subject of a smear campaign by environmental terrorists.

Environmental considerations aside, the Chalillo dam project is questionable on other grounds. Fortis is not liable to pay compensation for loss of life as a result of the operation of the dam – a major worry for the local population. And there are concerns about foreign corporate control of water rights and charges, excessive electricity prices, dubious geological site foundations in a seismically active zone, and potentially serious human health hazards from sediment and “toxic swamps” following dam construction. And finally, the dam is not necessary to meet the electricity needs of Belize. An alternative, renewable energy source is available – 400,000 tonnes of bagasse (a sugar cane by-product) are produced each year in Belize.

Multifunctional benefits of the project include:
- Farmers have acquired new skills for food production
- Local institutions have been strengthened in tackling their own problems
- Transformative training has increased confidence among local people, particularly poorest groups
- Increased involvement of women in community decisionmaking
- Greater capacity amongst farmers to articulate their needs to service providers, and research and extension systems have become more responsive to farmers’ needs

(Source: Intermediate Technology Development Group)
In farming there is a serious debate over the appropriate level of response to water shortages. Large scale dams and vast irrigation projects can have significant environmental and social impacts, yet small-scale approaches can have limited benefits. Today, around 3,800 km$^3$ of fresh water is withdrawn annually from the world’s lakes, rivers and aquifers. This is twice the volume extracted 50 years ago. Agriculture accounts for about 67 per cent of withdrawals, industry uses 19 per cent and municipal and domestic uses account for nine per cent.

By the end of the 20th century, there were over 45,000 dams in over 150 countries. About one fifth of the world’s agricultural land is irrigated, and irrigated agriculture accounts for about 40 per cent of the world’s agricultural production. Half the world’s large dams were built exclusively or primarily for irrigation, and an estimated 30 to 40 per cent of the 271 million hectares of irrigated lands worldwide rely on dams. Dams are estimated to contribute between 12–16 per cent of world food production.

However, dams, inter-basin transfers, and water withdrawals for irrigation have fragmented 60 per cent of the world’s rivers. In Africa, the changed hydrological regime of rivers has adversely affected floodplain agriculture, fisheries, pasture and forests that constituted the organising element of community livelihood and culture.

In India and China together, large dams could have displaced between 26–58 million people between 1950 and 1990. Little or no meaningful participation of affected people in the planning and implementation of dam projects – including resettlement and rehabilitation – has taken place. Environmental Impact Assessment is recorded for less than 40 per cent of dams commissioned in the 1990s. With few exceptions, there has been little or no monitoring of the physical, social and environmental effects of dams.

By 2025 there will be approximately 3.5 billion people living in water-stressed countries, so what are the best options to try to restore adequate access to water? Two case studies, in Belize (page 9) and Malawi (page 11), reflecting the different approaches of the large and small-scale alternatives, show the clear preferred option of local communities. However as demand for water continues to grow there must be a doubt over whether such small-scale solutions will be enough on their own, or rather whether it would be better to change the way in which largescale projects are planned, implemented and managed.

**Biodiversity**

Agricultural biodiversity is the result of the interaction by smallholder farmers, herders and artisanal fisherfolk with other species over millennia. Selecting and managing these for local nutritional, social and economic needs has produced the agricultural biodiversity on which humanity depends. Food production systems need to be rooted in sustaining agricultural biodiversity so that farmers everywhere can continue to provide food and livelihoods and maintain life on Earth.

At a time of unprecedented changes in society, population and the environment, agricultural biodiversity also provides some security against future adversity, be it from climate change, war, industrial developments, biotechnological calamities or ecosystem collapse. There is greater strength in diversity than in susceptible uniformity. A diversity of varieties, breeds and species will ensure that there will continue to be agricultural production whatever the threat, and hidden in the genetic code of today’s crop plants and livestock are many invisible traits that may become useful in confronting future challenges.

However, agricultural biodiversity is under threat from changes in production systems. More than 90 per cent of crop varieties have been lost from farmers’ fields in the past century. Animal breeds are also disappearing at the rate of five per cent per year (FAO 1998). In place of this diversity of farmers’ varieties, consumers are being provided more and more with homogeneous, uniform, food commodities produced from a limited range of varieties developed and owned by plant breeding companies.

To survive, humanity will need to make sure that the genes of our crops, livestock, other food species and the agricultural biodiversity of which they are a part, are continuously under development in farmers’ fields. Backup storage of these genes, frozen in time in international gene and semen banks and free of the threat of patenting, will keep a limited part of the diversity in the public domain and accessible to all farmers and growers. Vigilance is required, however, to safeguard these resources from contamination by genetically modified organisms both in gene banks and in farmers’ fields, especially those in areas where crops originated.

The global community must also ensure these genetic resources are freely available to all forever. Farmers’ actions, publicly-funded gene banks, the Seed Treaty and consumer choice for diversity in their food will, together, provide opportunities and incentives for a more food secure future. With official support and through a virtuous circle of consumers supporting farmers to produce the diversity of nutrients, textures and tastes that consumers want and need, agricultural biodiversity will thrive.

Agricultural biodiversity is the basis of the world’s food supply, farm livelihoods and landscapes and is humanity’s insurance against future threats to food and farming. A growing number of initiatives are being put in place to ensure the living preservation of agricultural biodiversity. The Kenyan seed fair case study shows one such initiative (page 12).
Malawi: Providing appropriate technology
Aid agencies estimate that about 3.2 million Malawians are currently faced with hunger due to regional food shortages. Efforts to mitigate the impact of erratic rainfall on agricultural production in drought-prone southern Malawi have begun to bear fruit through the provision of 80 simple treadle pumps (costing about US$27 each) to lessen the impact of drought on the southern Mlolo area. The pedal-powered pumps allow for irrigation farming during the dry season or when rainfall is insufficient for crops. This allows for the cultivation of winter crops on land that was previously barren during the dry season. One of the beneficiaries of the treadle pump project is 58-year-old Wanderford Chilomo. “Now things are working for me,” Chilomo said. He boasted that he could now comfortably support his family of three with the yields from his crops. “Last year I got three bags of maize…I eat from here all the time. I really can't complain about hunger since I secured the treadle pump. All I need now is a granary. But I can assure you that I don't complain about hunger,” he said while showing off his field of maize, bananas, cassava and sugarcane.

Another Mlolo resident benefiting from the NGO’s intervention is 26-year-old Violet Tembo, Chilomo’s niece, who previously had to borrow a treadle pump from her uncle. This year she has her own treadle pump, courtesy of the project. “I dug my own well for two days. Now you can see this green maize. I don’t expect hunger in the days ahead,” Tembo said. She grows rice, cassava and sweet potato.

The most vulnerable families in the area – such as female-headed households and those affected by HIV/AIDS – also received supplementary food supplies as part of this project. “For years, the community has survived on handouts from the government or NGOs. And that, from our perspective, is not sustainable.” according to Marion Chindongo, regional manager for World Vision in southern Malawi, who are implementing this project. “For the first time in the Mlolo community, farmers received money for themselves because they had grown seed,” she added. The NGO was also assisting the farmers to produce seed. “On average, each farmer received US$267 [from seed sales]. I think it is a breakthrough for the southern region of Malawi,” said Layton Vasulu, the NGO’s former agricultural supervisor at Mlolo. Chindongo said World Vision was working with the government to duplicate the success in other areas.

New food crops such as rice, potatoes, sorghum, millet, beans and groundnuts have been introduced. These crops provide three main benefits: they produce high yields, mature quickly and make better use of limited water so they are less vulnerable to erratic rainfall.14

Zimbabwe: Chivi Food Security Project
This ITDG project is located in southern Zimbabwe, which falls into Zimbabwe’s lowest categories of agricultural potential, and where drought occurs in three out of every five years. An approach which combined low-cost regenerative technologies with building farmers’ capacities to participate in research, extension and within group structures has meant that now farmers report that their yields have more than doubled (up 100 per cent) since the project was initiated in 1991. The main technologies are water harvesting (tied ridges and infiltration pits) and the adoption of clay pipes and ferro-cement rings for subsurface irrigation of women’s vegetable plots. Some 35 women’s garden clubs for raising and selling vegetables are now effective and families have become food secure with the greater range of produce spread through the year. According to some community participants, “food security is no longer a problem.”
Commonwealth country agricultural systems display marked differences in how complex and comprehensive their industry infrastructures are, and what level of technological support is utilised. This is as true for the physical infrastructure essential for ensuring the provision of appropriate transportation to enable farmers to get their produce harvested – and sent to market or to processing – as it is for the financial infrastructure necessary to ensure that there is adequate and appropriate investment in agricultural research. There is concern that much investment is now being focused on high-technology approaches to agricultural issues, which may only be of use and relevance to the richest, largest farms, but not necessarily to the vast majority of resource poor farmers.

There is an obvious attraction in trying to pursue quick-fixes to agricultural problems. The most obvious example of this at the moment is with genetic modification (GM) technology. Analysis of the potential impact of GM shows both potential benefits and problems, as summarised by Kidd et al:

“The upside opportunities from GM include:

- Increases in the productivity and sustainability of the staple food farming of the poor, through raising and/or stabilising yields while being able to limit increases in the use of fertiliser and/or reduce application of crop protection chemicals. This outcome would integrate well with ecological approaches

- Benefits to human health through reduced under-nutrition, and improved food safety through the reduction that may be possible in the production of toxins in storage

From the point of view of developing countries, there are some important downside risks of GM. These include:

- The uneven adoption of GM technology into the exportables sector of a developing country’s agricultural output. Early adopters should be able to increase sharply both productivity and quality, and thereby cope with the decline in real prices on world markets that this generates. Non-adopters or late adopters may find it difficult to catch up, and may eventually have to exit the industry, after an extended period of very low returns. As many livelihoods in developing countries are dependent – directly or indirectly – on production of exportables, this is an particularly important concern

- Private GM R&D is likely to neglect crops important for smallholders

- Failure of regulation within developing countries to provide adequate protection against inappropriate introductions which could damage the environment and/or health

- A highly concentrated industrial structure developing within global food systems, with a small number of corporations supplying seeds and inputs while also purchasing and processing output. The major players could have enormous pricing power, which might be used to ensure that they captured an undue proportion of the benefits of technical progress, to the disadvantage of farmers or consumers. There is a difficult balance to be struck between, on the one hand, concerns about excessive market power of transnational corporations and, on the other hand, the role that intellectual property rights play in providing incentives for technology R&D.15

Certainly there has been a strong backlash against GM, most recently evidenced by a letter from the directors of several of the UK’s largest development agencies urging the government to stop promoting the technology and challenging the industry claims that it offered the potential to feed the world. An alternative to investing in GM technology is to invest in a range of initiatives that help resource poor farmers to get the most from their land. A range of such projects has been established by development NGOs based both in the UK and in less developed countries. They have incorporated such strategies as integrated pest management, soil and water conservation and intercropping. This is evidenced in the case study from Lesotho (page 12).

Financial capital

One of the main arguments in support of trade liberalisation is that it should help vulnerable, less developed countries to find new markets for their produce and new income generation opportunities. Certainly many less developed countries and Commonwealth producers have suffered in the past from the protectionist policies of trading blocs such as the EU, which have put tariffs on imports and subsidised their exports leaving the Commonwealth producers substantially disadvantaged. However, the reality of trade liberalisation has tended to benefit the biggest producers (European and Cairns Group and intermediaries/consumers, the major multiple retailers of the north) with considerably fewer benefits being unevenly distributed in the less developed countries.

The case of India

Analysis from India shows how badly some have fared under liberalisation. According to Indian researcher Devinder Sharma the Indian agricultural sector has suffered greatly from the implementation of the WTOs Agreement on Agriculture (AoA).17

Increased market access was the mantra of the free trade agenda, aimed at opening up new markets for agricultural exporters. The AoA required all countries to allow a certain minimum market access for every agricultural product at five per cent for developed countries and four per cent for developing countries. Less developed countries, with low costs of production, were always told that the developed countries would
SUSTAINABLE AGRICULTURE, SUSTAINABLE LIFE

Case studies

Kenya: Seed fairs
Many local seed fairs are organised by communities each harvest-time. Recently in Tharaka, Kenya, 46 farmers came together and displayed 206 different varieties of local crops including cowpeas, millet, sorghum and squash. These events foster the exchange of seeds and related information among farmers and this maintains local agricultural biodiversity. They show the richness and availability of local crop varieties. Even after a recent drought period, 85 per cent of the seeds were obtained from family seed stocks and from neighbours. (Source ITDG, (East Africa))

Lesotho: The Machobane Farming System
The Machobane Farming System (MFS) is an example of a fundamentally redesigned system yielding multi-functional benefits. Lesotho is severely affected by erosion and land degradation. During the last twenty years, the proportion of arable land fell from 14 per cent to nine per cent of the country’s total area, and crop yields are now about half the 1970s level. Dr J J Machobane, a Mosotho agronomist, first conceived of his system over 40 years ago, experimenting on his own land for 13 years before attempting to launch it amongst fellow farmers. Unlike most extension methods, the Machobane approach starts with the basic behavioural requirements for adopting its technical message:

- Self-reliance – farmers must be convinced that they can achieve food security without external assistance
- Appreciation of the resource base – farmers must be ready to work hard, and be convinced that they can improve crop production by fully exploiting their resource base
- Learning and teaching by doing – farmers must be trained on their own fields and farmer trainers must be ready to do work along with them
- Spontaneous technology spreading – farmers learn from other farmers, and Machobane farmers have the duty to help their neighbours

In Lesotho mountain areas, most crops are grown on terraced land, but poor soil structure, inadequate soil fertility management and erratic rainfall mean that land productivity is low and variable. According to Machobane, these constraints can be overcome by rational exploitation of the resource base and minimising the need for purchased inputs. The technical elements include intercropping, localised placement of ash (from household waste) and manure, weeding introduction of potato as a cash crop, preservation of natural predators of crop pests, row-rotations, and legumes with cereals.

Farmers adopting the MFS have observed three advantages of the system:

(i) higher land productivity (0.4 ha per family needed for food security compared with the more normal 1.2 ha);
(ii) increased cash income obtained by planting potato;
(iii) improved resistance to drought: their fields are green compared to non-Machobane fields during drought. In addition, MFS will substantially reduce farm income fluctuations through the combination of lowering yield fluctuations of individual crops, spreading risk of fluctuations in yields and prices by planting a larger range of crops and decreased reliance on imported inputs (fertilisers and pesticides). Some 2,000 farmers are now practising this system.

(Source: Alberta Mascaretti Quoted in Pretty 2000)
have to open up their markets for cheaper food imports, as a result of which the developing countries would gain enormously.

A recent study by the FAO, however, concluded that there has been hardly any change in the volume of exports. Tariff peaks or in other words high import duties continue to block exports from the developing countries. Tariffs still remain very high, especially in the case of cereals, sugar and dairy products. Sanitary and phytosanitary measures, which were enforced to ensure the quality of imported products, actually continue to be a major barrier to diversifying exports in horticulture and meat products.

India recorded a spectacular increase both in area under oilseeds as well as in its output, with production doubling from 11 million tonnes in 1986–87 to around 22 million tonnes in 1994–95. India’s near self-sufficiency in edible oils was, however, not palatable to the economic pundits as well as market forces. While acknowledging that oilseeds had demonstrated a rate of growth that exceeds the national trend, the World Bank actually called for discarding the policies that had brought about the positive change. The World Bank’s argument was that India lacked a “comparative advantage” in oilseeds when compared with the production trend in the US and the EU, and should, therefore, be importing edible oil. It was, however, known that the support prices paid to Indian groundnut and mustard farmers were less than those paid to the groundnut and mustard farmers in the US and Europe.

What the World Bank did not say was that the selling price of India’s oilseeds per tonne was equivalent to the production cost of one tonne of oilseeds in the US. Moreover, the production cost in the US would have been still higher if the massive amounts of subsidies that it pays to its farmers were to be withdrawn. In fact, it is the US which actually suffers from a “comparative disadvantage” given that the fact that its subsidies distort the price. The US and more importantly the EU should, therefore, be importing edible oil from India every year given its cheap cost of production. The Indian ministry of agriculture acknowledges that the expected gains from trade liberalisation have eluded the developing countries. It was expected that, with the reduction in trade distorting measures, agricultural exports from the developing countries would increase. Yet this did not happen. In fact, India has on the contrary seen a massive increase in the imports of agricultural commodities and products – from about INR50,000 million in 1995 to over INR150,000 million in 1999 to 2000 – a three-fold increase. In edible oils alone, the import bill has soared to INR90,000 million. The current trading system has also not helped efficient producers in realising a higher price for their products. On the contrary, prices of most agricultural commodities are declining in the world markets, following a long-term trend.

It is not just the farming sources of income that are not materialising for developing country farmers. Farming and rural tourism are activities being encouraged the world over. However, there is mounting evidence that many of the benefits of such diversification strategies are not staying in less developed countries, but are being appropriated by international operators who are controlling flights, hotels, resorts and tours. Two case studies reflect the varying financial plight of growers at the moment (page 14). The first confirms the problems facing African horticultural exporters who find that trade liberalisation presents new hurdles rather than new opportunities. The second case study from Bangladesh reflects the benefits that sustainable agricultural diversification can bring to some communities.

Conclusions
The 54 countries of the Commonwealth (comprising 30 per cent of global population) with their multiplicity of races, cultures, natural resource endowments and ecologies offer a truly unique multi-faceted prism through which to view the richness of the human condition. Their diversity clearly demonstrates that no single policy prescription will be appropriate for all situations. Large-scale, large impact approaches might fit certain circumstances, small-scale, low impact approaches might be more appropriate elsewhere. The two options should not be not mutually exclusive, but deserve equal recognition and resource allocation.

What does seem to be the same throughout the Commonwealth is the persistent poverty (as recognised nearly 50 years ago by the UN Conference on Food and Agriculture) and growing social exclusion (including rich and poor countries alike). What is also common is our interdependence. We share the same planet, are all affected by the changes to climate and the biosphere, depend on the same diversity of resources and are bound by international economic arrangements.

There are manifest problems in terms of enabling adequate access to the five DFID capitals identified above in this report and these problems will require a concerted effort if they are to be redressed. There will need to be firm resolution and positive action to empower vulnerable rural communities and to enable them to help themselves. Initial steps to enhance their capacity could include:

- Enabling less-developed countries to negotiate meaningfully at WTO/AoA
- A definitive and equitable solution to the debt burden, together with progress toward good governance and reallocation of public resources towards more sustainable development goals (such as agriculture, health and training)
- Greater investment in small-scale farming systems and research, rural infrastructure and environmental conservation
Case Studies

Africa: The impact of the Common Agricultural Policy on market access on African horticulture

As financial impacts are being reviewed nominally in the name of trade liberalisation, so too are food safety standards. The EU has been working to harmonise maximum residue levels (MRLs) for pesticide residues of approximately 100 pesticide active ingredients. The onus has been on producers and users of the pesticides to prove the level of safe MRLs; otherwise the level has been set at zero. As sales of African horticultural products are comparatively low, the pesticide producers have not entered into the costly process to get their products tested. Growers of fruit (including avocados, pineapples, passion fruit and mangoes), yams, root and tuber crops, peas and beans are most likely to be affected. In terms of its impact on industry, the legislation is likely to lead to:

- A fall in overall production of fruit and vegetables for export to the EU
- Increased costs of production (although in certain cases, adoption of integrated pest management approaches may lead to a fall in costs in the long run)
- A higher risk of crop wastage and crop failure
- Smaller growers no longer being able to export
- Smaller exporting countries being excluded from the supply chain

The EU MRL regulations are likely to have the following impacts on smallholders:

- Importers will cut back on sourcing from exporters who rely largely on smallholder production for their supply of produce
- Exporters will cut back on their sourcing from smallholders if alternative sources of supply are available
- Exporters are likely to discontinue sourcing from independent smallholders (ie those that are not attached to particular exporters)
- Smallholders will face increased production costs (exporters may pass down, for example, more expensive pesticides, increased costs of control, monitoring and training)
- Exporters are likely to tighten control over their smallholder suppliers, and in general smallholders will become more dependent on exporters and/or on other outsiders
- Those smallholders with an option to produce cash crops for the local market may choose to switch back to local market production instead

The MRL regulations are likely to lead to the following impacts on horticultural workers:

- Substantial job losses, especially for those working for smallholders or for medium-scale growers
- Increased seasonality of remaining jobs, which may have the effect of further reducing job security

There is a possible expansion of job opportunities on the largest farms and exporting operations, and in monitoring, control and training of outgrowers. However, any resultant increase in jobs is unlikely to compensate for the general downward pressure on employment, especially in the smaller exporting countries where there are no large-scale commercial operations.

Bangladesh: Integrated pest management for rice

Integrated pest management for rice in Bangladesh is being implemented through three projects (INTERFISH, NOPEST and GOLDA) that are supported by DFID and the EU and implemented by Care. They involve farmers attending farmer field schools (“schools without walls”) during a whole rice season. They meet each week to learn new agro-ecological principles and concepts relating to rice, pest and predator management. Some 6,000 farmer field schools have been completed, with about 150,000 farmers adopting more sustainable rice production on 54,000 ha.

The programmes also emphasise fish cultivation in paddy, and vegetable cultivation on rice field dykes. Rice yields have improved by 5 to 7 per cent, and costs of production have fallen owing to reduced pesticide use – some 80 per cent of farmer field school participants no longer use pesticides. The fish rice-vegetable systems have been shown to produce synergistic benefits: additional income from fish is $156/ha, from vegetables on dykes $23/ha, but fish and vegetables together bring an additional $250/ha. As a result, the 150,000 participating households are now food secure throughout the year.

Source: Desilles, 1999)
There should also be greater corporate responsibility and accountability through the UNCTC/UNCTAD with any corporation found responsible for damaging the global commons being held to account.

Written by Chris Emerson and Martin Wallis, Farmers’ World network. Farmers’ World network (FWn) was set up in the aftermath of the Ethiopian famine in 1984 to promote development education amongst UK farmers. Over 15 years later, FWn continues to promote the economic and social wellbeing of vulnerable rural communities around the world by:

- Promoting awareness, in UK rural communities, of the problems of developing countries, and of the relationships between agriculture in Europe and less developed countries
- Establishing a group of farmers, and other members of the land-based industries, with a good understanding of the issues behind world food production, distribution and trade
- Providing information and resources to enable rural community members to engage in policy debate at national and international levels, and contribute to the design and implementation of policies geared towards more sustainable methods of food production, distribution and trade

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Growing for the future

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Agriculture provides more than two-thirds of the raw materials for Unilever’s branded goods. We are among the world’s largest users of agricultural raw materials, and a major buyer of agricultural goods for processing on world markets. We process vegetable oils, such as sunflower, soy and rape seed, which are used in our spreads and dressings. We produce palm oil as well as buying it on the open market. We are one of the world’s largest producers of tomato-based sauces and pastes with many growers working under contract. We use vegetables such as peas and spinach in our frozen brands.

For many years we have worked with farmers in developing agricultural best practice guidelines. The guidelines are incorporated into our contracts with growers, and define soil preparation, fertilisation regimes, harvesting and other crop specific activities. Current best practice is mainly based on integrated farming principles, and involves judicious use of fertilisers and pesticides to maximise yield while minimising environmental impacts. From this basis, the sustainable agriculture initiative is a logical progression.

Why is sustainability important to Unilever?
The aims at the heart of our corporate purpose are “to meet the everyday needs of people everywhere” and to use “the highest standards of corporate behaviour towards our employees, consumers and the societies and world in which we live”. We feel this is only achievable in the long-term if our actions are determined by the broader principles of sustainable development; ensuring we meet the needs of today without jeopardising the ability of future generations to meet their needs. This means we must align our economic goals with the social and environmental consequences of our work.

Because we rely heavily on natural raw materials, in purely business terms it makes sense for us to ensure their sustainable supply so that we can continue to run a prosperous and healthy company in the long-term. We also have a clear obligation to our stakeholders, especially shareholders, employees and business partners, to ensure continued access to agricultural materials. Our consumers expect high-quality goods produced in an environmentally and socially responsible way, and we need to ensure on their behalf these requirements are understood along the supply chain. Our market position gives us some influence on how the materials are produced, and considerable social responsibility to use this influence wisely. We also believe it is the market, rather than regulation, that holds the key to progress.

Unilever’s sustainable agriculture initiative

Aims and approach
The sustainable agricultural initiative began in the mid-1990s. Recognising that pressures on agriculture had implications for Unilever in the long-term (see: Mission Statement page 18) we began working with others to develop the programme. We also started similar initiatives for water and fisheries in response to pressures on water resources and fish stocks.

The aim of the sustainable agriculture initiative is to ensure continued access for Unilever to key agricultural raw materials, and ultimately to develop market mechanisms that allow consumers and customers to influence the sourcing of raw materials.
Mission Statement

The sustainable agriculture initiative seeks to ensure that the agricultural systems on which Unilever relies have the capacity to deliver sustainable supplies of raw materials and that all of Unilever’s own business operations understand and anticipate the changes needed to secure sustainable supplies into the future.

BACKGROUND

Our purpose in Unilever is to meet the everyday needs of people everywhere - to anticipate the aspirations of our consumers and customers and to respond creatively and competitively with branded products and services which raise the quality of life.

Agriculture provides more than two-thirds of the raw materials for these branded products. Sustainable supply of these materials is an essential element in the long term success of our business.

The capacity of agricultural systems to meet the world’s food and fibre needs is under increasing pressure. Growing competition from urban development and nature conservation is limiting land available for agricultural production while valuable arable land is also being lost due to soil erosion. Agriculture is using more and more water for irrigation yet critical reserves of fresh water are being rapidly depleted. Water resources are also at increasing risk of pollution from nutrients (fertilisers and animal waste) and pesticides used in agricultural production. These factors led Unilever to develop an initiative on Sustainable Agriculture.

APPROACH

Unilever supports the view that sustainable development requires alignment of economic growth, environmental protection and social progress and has adopted the following definition of Sustainable Agriculture:

Sustainable Agriculture is productive, competitive and efficient while at the same time protecting and improving the natural environment and livelihoods of local communities.

Starting from a number of principles which embrace the concepts of economic growth, environmental protection and social progress, we have set up a number of Lead Agriculture Programmes around a number of key crops. Together with stakeholders, these LAPs have worked towards defining new sets of Sustainable Agricultural Practices which lead to improvements on a number of chosen sustainability indicators. We will continue to seek improvements in agricultural practices, leading to ever better sustainability levels in our supply chains.

At the same time, we will support and stimulate general agreement on application of superior practices through partnerships in our supply chains. This will be best realised in a well-functioning market environment for all inputs and outputs. We will participate in, or start anew, food industry and other initiatives to promote and advance sustainable agriculture for all crops. In this way we will ensure that we deliver against our purpose: to add continuously to the quality of life of our consumers.

Rotterdam, October 2003
through their buying habits. The question we face is how can farming become more productive, protect the environment, preserve natural resources and contribute to rural communities, while using fewer agrichemicals and other inputs?

It poses a huge challenge for those involved in agriculture: farmers, scientists, experts, governments and businesses. We have chosen to focus on how to improve the sustainability of current farming methods in particular locations, and how to make the production of the crops we need sustainable. We have started to do this where we directly influence agricultural practices used, ie on our own plantations and where we deploy contract farming. We realise what can be achieved at farm level is limited. Aspects of water management, biodiversity and rural development need to be addressed on a wider scale, but lie outside the scope of our current Lead Agricultural programmes.

Continuing the learning processes

A commitment to continuous learning and a willingness to remain open to new ideas are embedded in our corporate purpose. These are critical to the success of our initiative: the challenge of sustainable agriculture is to combine current scientific views with empirical and sometimes traditional knowledge on issues such as pest management and crop rotation.

A tradition of learning is well established within Unilever. In some cases we have been working for over 30 years with farmers to develop agricultural best practice guidelines. These are based on an integrated farming approach and aim to reduce environmental impact, ensure product quality and maximise crop yield. From this basis we can move towards sustainable agriculture practices. The main innovations the sustainability perspective has added come from outside agriculture – such as biodiversity and the social aspects.

Engaging people to take this process forward is essential. Those who have been involved in drawing up the best practice guidelines will contribute their experience to the sustainability project. We also want to stimulate continuous improvement in practices and working with the farming community through participative learning. Our objective is to support suppliers in setting up self-sustaining consulting mechanisms, which will enable farmers to find solutions themselves.

We believe sharing knowledge will prompt our industry peers to take similar initiatives, which is part of our overall strategy. To kick-start our own learning process, we have consulted with experts around the world and engaged with people who have influence over our business and with our stakeholders.

The project

Establishing the basics

In 1995 we commissioned a study which provided the foundations for our current approach. It captured the opinions of leading players and opinion formers among consumers, farmers, agribusineses, the food industry, retailers and nongovernment organisations (NGOs) with an interest in the environment and sustainable development.

A 1998 workshop drew participants worldwide from within the company and among agricultural experts from academia. The workshop was a milestone in the sustainable agricultural initiative, and its outputs have shaped the project. These were:

- Development of a mission statement, including a definition of sustainable agriculture
- Defining four principles of sustainable agriculture (see Principles)
- Identifying ten broad indicators of agricultural sustainability
- The choice of five crops – oil palm, tea, tomatoes, spinach and peas – which are significant to Unilever in the long-term and where we have a direct influence on agriculture, either on own plantations or to contract farming.

With these foundations in place we have made progress. Each of the five key crops is being tested in Lead Agricultural Programmes. We are now broadening the scope to include other crops.

Internal and external partners and participants

The main participants of the initiative are hundreds of local farmers around the world, on which the success of the Lead Agricultural Programmes is ultimately dependant. They are the people in the field who actually have to implement the changes to move towards sustainable farming. To provide a framework for this learning process, we have established three groups:

- The Sustainable Agriculture Advisory Board – to provide independent expertise, direction and judgement
- The Sustainable Agriculture Steering Group – responsible for the coordination and implementation of the process
- Four Consultative Groups – to look at markets and supply chains for specific food groups.

The following sections show how each group will help Unilever move towards its objectives.

Principles of Sustainable Agriculture

Our approach to the sustainable development of agriculture is to support the following principles:

- Producing crops with high yield and nutritional quality to meet existing and future needs, while keeping resource inputs as low as possible
- Ensuring that any adverse effects on soil fertility, water and air quality and biodiversity from agricultural activities are minimised and positive contributions are made where possible
- Optimising the use of renewable resources while minimising the use of non-renewable resources
- Sustainable agriculture should enable local communities to protect and improve their wellbeing and environments.
The framework

Advisory board
The Sustainable Agriculture Advisory Board (SAAB) provides independent advice and judgement and strengthens policymaking within Unilever. Its principal objectives are the improvement of environmental impact of primary production, safeguarding social infrastructure and wellbeing for stakeholders. Profit and continuity are also important aims. SAAB membership comprises individuals from research institutes in the voluntary sector and academia. Members are selected for their individual quality, rather than to represent their organisations. SAAB’s role encompasses a number of key functions. Members advise on the overall approach of the sustainable agriculture initiative, including aspects of primary production processes, land use, chain management and consumer interests. They advise on sustainable standards for Unilever’s selected key crops, as well as how to make these standards acceptable to stakeholders. SAAB’s other main function is to establish links with other bodies working in the field, e.g. in agricultural research, water management and biodiversity.

Steering group
The Sustainable Agricultural Steering Group (SASG) comprising Unilever staff is responsible for managing the initiative. Its objective is to promote sustainable supply chains worldwide, focusing on Unilever’s long-term, sustainable access to the key crops. Jules Pretty acts as advisor (see SAAB page 5).

Progress is mapped out in three phases:
- Sustainable agriculture best practice in growing key crops
- Sustainable agriculture standards for sourcing key crops and developing a sustainable supply chain
- Establishing market mechanisms that enable Unilever to source products from sustainable agriculture.

Progress must be measured. Clear objectives, milestones and performance indicators are built into each phase.

Implementation groups
The implementation groups consider the four strategic food groups: oils (including rape seed and palm oil), tea, tomatoes, and vegetables (spinach and peas). Their roles are to assess the world markets and supply chains, and establish market mechanisms that enable Unilever to source materials from sustainable suppliers.

The fieldwork

Sustainable agriculture indicators
Establishing the ten indicators in the 1998 workshop was a major first step in defining criteria for sustainable agriculture. The choice of indicators focuses on physical aspects first: agriculture must be sustainable from an ecological point of view. Social and economic elements can only follow if this requirement has been met. Within each broad indicator, specific, measurable parameters are defined. Local situations and crop types will mean giving local definitions to some parameters; others are common to all Lead Agricultural Programmes. Monitoring makes the impact of farm practices on the environment, economy and society more transparent.

Lead Agricultural Programmes
Each programme has defined its parameters, following the ten indicators. All have involved local growers and planters, local NGOs, research institutes and sometimes community groups. During the first two years, the baseline was established; the impact of current agricultural best practices on environment, economy and social conditions, as measured through the parameters. The next step is to improve practices and push parameter values to a more sustainable level. Discussions with stakeholders are important to reach agreement on what constitutes a “more sustainable” level. Once changes are made, the effect on the parameter values is monitored. If the parameter values move in the right direction, then the new practices become part of the sustainable agriculture standard. If the values do not change, or move in the wrong direction, then either the wrong practice was changed, or the right practice was changed in the wrong way, or the parameter value chosen was not correct after all. It is a process of trial and error.
Unilever’s Sustainable Agriculture Initiative

SAAB MEMBERS

Janet Barber, independent international sustainability expert, UK
Janet Barber has national and international experience in planning and implementing public policy and field programmes designed to achieve the socially and environmentally sustainable use of natural resources and analysing the effectiveness of investments. She has worked with Forum for the Future (UK), WWF, and other NGOs and international companies.

Hartmut Bossel, University of Kassel (retired), Germany
Dr. Bossel has led research projects and studies on energy supply policy, global dynamics, agricultural policy, forest dynamics and management, sustainable development and indicator systems. Before his retirement in 1997 he was professor of environmental systems analysis and director of the Scientific Center for Environmental Systems Research at the University of Kassel.

Amadou Diop, technical director, Rodale Institute, USA
Dr. Diop works on Rodale Institute programmes, which focus on education and extension of regenerative farming practices to young farmers. The Institute works with people worldwide to achieve a regenerative food system that renews environmental and human health, and aims to develop awareness of the importance of healthy soil.

Bernward Geier, executive director for external affairs International Federation of Organic Agriculture Movements (IFOAM), Germany
Bernward Geier is responsible for IFOAM’s lobbying, outreach, editing and press-related activities. IFOAM represents the worldwide movement of organic agriculture, providing a platform for global co-operation. It is committed to a holistic approach in the development of organic farming systems including maintenance of a sustainable environment and respect for the needs of humanity.

Anne-Marie Izac, director innovation and communication, French Agricultural Research Centre for International Development (CIRAD) France
Dr. Izac’s research interests combine ecology, economics and natural resources management. She has worked within CGIAR and the International Centre for Research on Agroforestry (ICRAF). CIRAD has a mandate to contribute to rural development in tropical and subtropical countries through research, experimentation, training operations in France and overseas, and scientific and technical information, primarily in the fields of agriculture, forestry and agrofoods.

Barbara Dinham, Pesticide Action Network UK (PAN UK), UK
Barbara Dinham is programme director of PAN UK, an independent charity addressing the health and environmental problems of pesticides. PAN UK works to eliminate the hazards of pesticides through a range of programmes, and is part of the worldwide Pesticide Action Network. Richard Perkins, World Wildlife Fund United Kingdom (WWF-UK), UK Richard Perkins is involved with UK and international research and advocacy projects on the environmental impact of food, farming, rural development, and agricultural trade at WWF. He is also a member of international NGO networks addressing food, sustainable agriculture and rural development.

Jules Pretty, University of Essex, UK
Prof. Pretty is director of the Centre for Environment and Society, University of Essex, and was formerly director of the Sustainable Agriculture Programme of the International Institute for Environment and Development in London. He has authored several books on sustainable agriculture. Mr. Pretty is associated with the Forum for the Future in the UK. He is advisor to the SASG.

Rudy Rabbinge, University of Wageningen, Netherlands
Professor Rabbinge’s main teaching subject is principles of production ecology. His research projects cover: yield potentials of energy crops under various land use options; integrated cropping systems; sustainable land use and food security in developing countries; and work on land use, yield, ecologically sound pest control and knowledge transfer.

Bernard Tinker, Oxford University (retired), United Kingdom
Dr. Tinker is a soil scientist with expertise in oil palm production. He is consultant to a Malaysian plantation group. Other roles include adviser to Palm Oil Research Institute of Malaysia, head of the soils department at the Institute of Arable Crops Research, UK, and a director with the Natural Environment Research Council.
Sustainable agriculture indicators

1. **Soil fertility and health**
   Soil is fundamental to agricultural systems, and a rich soil ecosystem contributes to crop and livestock performance. Sustainable practices can improve beneficial components of the soil's ecosystem. Parameters: 1. Number of beneficial organisms (eg earthworms per square metre) 2. Number of predatory mites 3. Number of beneficial microorganisms 4. Soil organic carbon (a measure of healthy soil structure)

2. **Soil loss**
   Soil eroded by water and by the wind can lose both its structure and organic matter, diminishing the assets of an agricultural system. Sustainable practices can reduce the extent of soil erosion. Parameters: 1. Soil cover index (the proportion of time soil is covered with crop, which protects against leaching and erosion, and promotes water binding) 2. Soil erosion (loss of topsoil in percentage per annum or in t/ha/annum)

3. **Nutrients**
   Crops and livestock need a balance of nutrients. Some of these can be created locally (eg nitrogen), and some must be imported. Nutrients are lost through cropping, erosion and emissions to the air. Sustainable practices can enhance locally produced nutrients and reduce losses. Parameters: 1. Quantity of inorganic Nitrogen (N) or Phosphates (P) or Potassium (K) applied (per ha or per tonne of product) 2. Proportion of N fixed on site/imported 3. Balance of N/P/K over crop rotations 4. Emissions of N-co pounds to air

4. **Pest management**
   When pesticides are applied to crops or livestock, a small but significant proportion can escape to water or air or accumulate in foods affecting ecosystems and human health. Sustainable practices can substitute natural controls for some pesticides, reducing dependence on synthetic substances. Parameters: 1. Amount of pesticides (active ingredient) applied (per ha or per tonne of product) 2. Type applied (profiling, positive list, weighting factor) 3. Percentage of crop under Integrated Pest Management (IPM)

5. **Biodiversity**
   Agriculture has shaped most ecosystems in the world, and biodiversity can be improved or reduced by agricultural practices. Some biodiversity is highly beneficial for agriculture. Sustainable practices can improve biodiversity – by “greening the middle” of fields as well as “greening the edge”. Parameters: 1. Level of biodiversity on site: number of species (eg birds, butterflies), farm landscape, habitat for natural predator systems (eg hedgerows, ponds, non-cropped areas) 2. Level of biodiversity off-site: cross-boundary effects

6. **Product value**
   Product value is a measure of the desired outputs of an agricultural system. Sustainable practices should be able to maintain or improve product value. Parameters: 1. Total value of produce per ha 2. Yield of target product in tonnes per ha 3. Conformance to quality specifications: nutritional value, including minerals, pesticide residues, foreign bodies etc 4. Ratio of reused or recycled solid waste to solid waste disposed in landfill

7. **Energy**
   Although the energy of sunlight is a fundamental input to agriculture, the energy balance of agricultural systems depends on the additional energy supplied from non-renewable sources to power machinery. Sustainable practices can improve the energy balance and ensure that it remains positive – there is more energy coming out than going in. Parameters: 1. Balance: total energy input/total energy output, including transport where relevant 2. Ratio renewable over non-renewable energy inputs 3. Emissions to air (greenhouse and pollutant gases)

8. **Water**
   Some agricultural systems make use of water for irrigation, some pollute or contaminate ground or surface water with pesticides, nutrients or soil. Sustainable practices can make targeted use of inputs, and reduce losses. Parameters: 1. Amount of water used per ha or tonne of product for irrigation 2. Leaching and run-off of pesticides to surface and ground water 3. Leaching and run-off of N/P/K (nutrients) to surface and ground water

9. **Social and human capital**
   The challenge of using natural resources sustainably is fundamentally a social one. It requires collective action, the sharing of new knowledge and continuous innovation. Sustainable agriculture practices can improve both social and human capital in order to ensure normal outputs. The prime responsibility for this should remain with the local community, leading to realistic and actionable targets. Parameters: 1. Group dynamics/organisational density (farmer groups) 2. (Rural) community awareness of relevance and benefits of sustainable practices/connectivity to society at large 3. Rate of innovation

10. **Local economy**
    Agricultural inputs (goods, labour, services) can be sourced from many places, but when they come from the local economy, the expenditure helps to sustain local businesses and livelihoods. Sustainable agriculture practices can help to make the best use of local and available resources in order to increase efficiency. Parameters: 1. Amount of money/profit reinvested locally 2. Percentage of goods/labour/services sourced locally 3. Employment level in local community
Currently, 11 Lead Agricultural Programmes (LAP’s), covering five crops – peas, spinach, tea, oil palm and tomatoes – are established. For all five crops good practice documents have been produced. Policies, protocols, technical guidance and parameter documents on sustainable agriculture are published on the website: www.growingforthefuture.com

The following pages give examples of concrete results in the various LAP’s.

### Putting the buzz back into farming: Turning field margins into a biodiversity goldmine

**Colworth R&D farm in the UK**

“Creating species-rich habitats on farmland can bring back the wildlife which should naturally be there, maintain farm profits and send biodiversity through the roof.”

(David Bellamy)

**The issue**

Over the past 30 years, biodiversity on UK arable farms has fallen dramatically. Most farms are now desperately short of pollen and nectar – there is an urgent need to replace these nine essential building blocks of biodiversity. Habitat creation is the “crop of the future”. Hitherto, green payments have been largely based on “income foregone”, when land is taken out of production and average yield is lost. At a time when arable incomes are on the floor, the rewards are meagre and the incentive to make wholesale change is at best muted.

**Addressing the issue**

In response to this situation, Unilever R&D Colworth is putting effort into exploring the potential of the least productive areas (e.g. field margins) on the Colworth farm targeted for habitat creation to boost biodiversity. The farm provides a unique facility for the assessment of new, potentially more sustainable farming methods and practices in a commercial environment. One of the key objectives of the farm is to assess and improve biodiversity in a modern agricultural farm context which explains why it is an active partner in the “Buzz project” together with Birds Eye Walls. This project has a network of six UK sites (including the Colworth farm). It aims to demonstrate to farmers practical and effective techniques to manage farmland which enhance biodiversity and maintain farm profitability.

**Progress**

Field margins have been established on all sites, with satisfactory but varying degrees of success, reflecting the site location, soil type, environmental conditions, and experience of the site managers. A range of habitats has been created to study current options available to farmers in the agri-environment schemes to enhance biodiversity, including: flower-rich grassland; natural regeneration; cropped conservation headland; tussocky grass, legume mix and conventional cropping (as a control). The key biodiversity indicator species monitored are beetles, butterflies, bumblebees, small mammals and winter birds as well as plant species. The first year has provided good results with the wildflower-rich and legume mixes generating by far the biggest responses in biodiversity.

**Challenges**

Rewards for boosting biodiversity should reflect “value for money” and incentivise the habitat creation that delivers best results. By visiting one of the six demonstration farms, farmers across the country will see the work in action, and be provided with the knowledge, skills and confidence to manage them effectively. Open days are planned, where all stakeholders, from farmers to consumers, are invited to share learnings and discuss the value of improving the biodiversity on the farm.
Balancing healthy peas with a healthy environment

Integrated pest management and better fertiliser management lead to a healthier pea and a healthier environment

The issue
Sustainability involves minimising the use of non-renewable resources or inputs. Agricultural production has traditionally relied on relatively high input levels including synthetic fertilisers, pesticides and energy to achieve consistently good yields and high quality. A programme at Birds Eye peas has aimed, over several years, to reduce inputs to optimum levels through better understanding of factors that impact on yield and quality. It has also introduced alternative management practices, which keep pests below economically important levels without chemical interventions or with reduced pesticide inputs. Energy use in agricultural operations is also a significant input. Direct energy, eg use of diesel in cultivation, application and harvesting operations, and indirect energy, associated with other inputs are significant. These need to be considered in relation to energy outputs and waste.

Addressing the issue
Developing integrated pest management (IPM) approaches in peas involves understanding the ecology of important invertebrate pests, diseases and weeds in the crop. It also entails finding alternatives to chemical control, or ways of monitoring these pests to enable sprays to be applied only when economically justified. Birds Eye has always been challenging the use of pesticides on peas because they are solely accountable and responsible for the consumer, and for environmental safety and quality of their products. This is why Birds Eye only produces and sells under its own brands. An objective profiling system for the use of pesticides is in place. This looks at efficacy in peas, environmental risks and human health risks, and enables a preferred list of pesticides to be issued annually – these are the only pesticides permitted for use on peas.

Better fertiliser management involves investigating how we can best assess the nutrients in the soil or crop to determine the optimum levels to benefit the crop. This must be done without increasing the risks of nitrates and phosphates leaching to groundwater. Energy studies in peas can indicate target areas for energy input reduction. These aspects impact on several aspects of sustainability, as measured through Unilever’s sustainable agriculture indicators. Examples are attaining positive impacts on biodiversity, reducing water pollution though less leaching and run-off, lessening the likelihood of pesticide residues in produce, and reduction of energy inputs from non-renewable sources. Clearly there are environmental benefits as well as possible benefits to human health. Reducing inputs can also significantly benefit the farmer through cost savings.

Progress
Detailed control recommendations are available for all the key invertebrate pests, diseases and weeds. In many cases the recommendations are not to treat the pest problem. For those requiring treatment, action thresholds are available for the insect pests, and the introduction of pheromone traps for some species has enabled more precise monitoring of populations. Seed treatments have largely replaced applications of foliar fungicide applications, reducing the quantities applied and their potential environmental impact. Pre-emergence herbicides are recommended over post-emergence ones, which reduces the herbicide inputs required. Nitrogen is not normally applied to peas because the crop fixes atmospheric nitrogen – however studies on the first cereal crop after peas are assessing whether further fertiliser reductions can be made in this crop, by measuring the soil and plant nitrogen content present after pea cultivation. The progressive move to precision drilling has enabled reduced inputs per tonne of produce with regard to seed inputs and pesticide applications. Life-cycle analysis of peas has indicated those areas where energy use is most significant. For example, the biggest single use of direct energy for peas is the diesel used for harvesting. It has also enabled analysis of emissions related to global warming at each stage. Waste audits have also been carried out.

Challenges
Further work will look at the potential for better weed management, for example by weed mapping to target herbicide applications more precisely. Work will continue on optimum cultivation and other management practices, to reduce the risk of nitrate and phosphate leaching. Energy use will be studied in relation to better harvest strategies and energy efficiencies of harvesters, as well as work on better waste management strategies. Overall this will be of direct economic benefit to farmers.

Capacity Building

Spinach in Germany

The German experience of spinach farmers working closely together with all involved parties – such as scientists, agronomists, and local agricultural organisations – resulted in a productive learning process boosting sustainable agriculture.

The issue
Environmental and economic parameters are easy to measure and therefore appealing in assessing sustainable agriculture. Though difficult to quantify empirically, the most important capital is knowledge and the commitment of those involved in the agri-
cultural production process. Throughout this project we experienced a substantial buildup of knowledge, understanding, and awareness among all project partners: pilot farmers, fieldsmen, scientists, Langnese-Iglo management and stakeholders. This specific and contextualised knowledge empowered farmers to take responsibility and address sustainability issues proactively and creatively. As a result, knowledge becomes the key for continuing improvement.

**Addressing the issue**
Knowledge, awareness and learning are not easily measured, yet their effects are profound and a qualitative description of some of these effects in the Langnese-Iglo spinach project may highlight their vital role in achieving sustainable agriculture.

**Progress**
From the beginning of the Pilot Project in 2000, five pilot farmers have been involved in experiments and trials, maintaining regular contact with project staff. Intensive exchange between farmers, fieldsmen, and scientists gave rise to the formation of a sustainable agriculture working group in 2002. That meets to discuss specific issues with invited experts. Topics addressed this year include biogas and nutrient cycling, cover crops and soil protection. In addition, seminars on soil structure assessment are conducted in groups of about 15 farmers. The prolonged engagement has greatly increased farmers’ awareness. Initial scepticism has been overcome and replaced by increased understanding and awareness of production and its connection to the ecological and socio-economic environment. Inspired by the pilot, farmers started to experiment with mixtures of cover crops to enhance good soil structure and soil health, developed erosion control strategies in cooperation with the project staff, measured the efficiency of irrigation systems, and tested wild flower species for use in field margins. An elevated awareness of the soil as the most important resource has evolved, and farmers are actively involved and interested in the experiments conducted on their farms.

Regular meetings helped increase exchange between farmers, facilitating “learning from the best”. Learning was not only one-way – scientists benefited greatly from farmers’ and fieldsmen’s expertise, helping to tailor highly specific and workable solutions. Generally the pilot initiated multiple learning processes, which in turn have augmented corporate knowledge within the participants. Learning processes are ongoing and expertise is still growing as more actors become involved. Our capacity to respond to future changes is enhanced and thus ensures the long-term viability of spinach production within the region.

**Challenges**
Capacity building has been one of the most pronounced effects of the Lead Agricultural Programme. The next step will be the roll out of the project to all 115 growers in the region. Similar positive effects are expected as more growers become involved and synergy is created through broader discussion and exchange.

*Unilever’s Sustainable Agriculture Initiative*
impact of spinach fertilisation on water quality, and studies on the effect of overall farm management and rotation on soil fertility will drive further improvements in reducing the environmental impact of fertilisation practices. The commitment of the farming community is essential for the success of such an initiative, and farmers will therefore continue to be involved in this improvement process.

Indigenous forest protection and restoration

Tea in Kenya and Tanzania

Tea estates can contribute to biodiversity and spearhead the lobby to retain the world's remaining indigenous forests.

The issue

In many countries we still see loss of natural forests due to logging and settlement with a consequent impact on rainfall and land degradation. Tea, often criticised for being planted as a monocrop, can result in limited diversity within the tea fields.

Addressing the issue

Indigenous trees play a critical role in our environment, as a component of water catchment areas (assisting water retention and stabilising soil profiles) and as a contributor to biodiversity. Tea estates should be at the forefront of the lobby to retain the remaining indigenous forests of the world. There are also actions that estates can take within their own boundaries to support both water catchment conservation and biodiversity.

In Kenya, a project initiated in 2000 had the specific objective of planting indigenous tree species within the tea company’s estates. With the cooperation of relevant stakeholders the project was extended to include plantings in adjacent rural areas, along forest edges and riverine strips, along roads, and around housing, schools and hospitals. The plantings were intended to promote environmental awareness, increase biodiversity, help replenish depleted reserves of indigenous trees and provide resource and amenities for local people.

Progress

In Kenya, locally indigenous tree species have been identified, seeds collected and nurseries established to raise seedlings. Appropriate methods have been developed for successful germination, seedling care and field planting. Within just two years, the project has planted 50,000 indigenous trees and produced a further 50,000 seedlings. In addition to widespread plantings and the development of new forest blocks, an existing arboretum has been renewed and a new one planted. The team has also involved neighbouring communities to extend awareness.

Challenges

- Ensuring that the trees planted are carefully maintained through the first five years to secure their survival to maturity
- Progressively extending beyond the tea estates into neighbour- ing areas by providing support and methodologies which others can adopt
- Ensuring no protected rainforest is used for development of new tea fields. Using other available land such as grassland, and seeking ways to increase productivity per unit area.

Fuelwood cultivation

Tea in Kenya and India

Productive fuelwood plantations have an important role in building self-sufficiency in renewable energy resource.

The issue

Tea production requires large amounts of energy for running the factories, and especially drying the tea. The heat for drying comes from boilers, normally fired by either a renewable resource, such as wood from industrial plantations, or a nonrenewable resource, such as coal or oil. Increasing economic demand to plant more tea and increase yields is leading to potential shortages. At the same time industrial “fuelwood” plantations have not had the same agricultural emphasis as the tea crop itself and productivity levels have been relatively poor.
Addressing the issue
A full review of fuelwood production and utilisation was undertaken to define a good practice protocol. The study started with the initial planting material and worked through all aspects of production to the harvesting and storage of wood prior to burning. Information was collected from all sources, including visits to known centres of excellence in timber production, such as South Africa. Estates developed clear plans with details of planting time to meet factory requirements, the planting material, the timing of harvest, coppicing, replanting and time spent stored in the field and under cover.

Progress
Eucalyptus is retained as the principle genus for fuelwood production. Seed is selected from “mother” trees against specific criteria. Nursery practices enable field planting within four to five months of seed sowing, minimal soil use and the recycling of polythene sleeves. The fuelwood crop is grown on an eight to ten year cycle. The yield has increased by 50 per cent after five years and it is expected that a 100 per cent yield.

Challenges
• Exploring new planting material including a selection of high yielding clones
• Developing a better understanding of the variations required in field practices for different climatic zones
• Increasing boiler efficiency

HIV/AIDS programmes

Tea and palm oil in Kenya, Tanzania and Ghana
Tea estates have a unique opportunity to access a significant population to help limit HIV/AIDS spread and support those affected.

The issue
AIDS is a serious and growing problem worldwide, especially in Africa. It is caused by the HIV/AIDS virus, which has already infected over 40 million people. Tea estates employ large workforces and often provide housing for their families. Estates can be especially vulnerable to the impact of HIV/AIDS.

Addressing the issue
Estates have a unique opportunity to access many people to help limit HIV/AIDS spread and support those affected. They should recognise the potential impact of the epidemic and put in place programmes to train, educate and care for their workforce.

The principle components of a programme include:
• Establishing the policies, responsibilities and management
• Awareness, education and prevention measures
• Treatment and care
• Impact assessment
• External interactions and contributions.

What can be achieved in a given location will depend upon a range of factors, including the status of national programmes and facilities available for treatment and care. However every estate has a specific responsibility to set up initiatives and to work with government, non-governmental organisations (NGOs) and their business associates to develop an appropriate activity.

Progress
Several businesses, including Unilever, are supporting HIV/AIDS programmes within their own workforce and extending the impact to the community in which they operate. Unilever have provided a resource manual to guide programme managers and this is supported by a road map which can be used to assess progress and plan next steps. Business groups have been formed to support the sharing of ideas and good practice on HIV/AIDS, including the use of specific industry groups, such as the tea growers’ associations. Assessment is currently difficult – it is clear there is increased understanding of how HIV/AIDS infection can be avoided, and some progress is shown by a measurable decline in the occurrence of other sexually transmitted diseases. Similar programmes are in place at Unilever’s palm oil plantations in Ghana.

Challenges
• Changing behaviour, which can effectively limit the further spread of HIV/AIDS, is taking time to achieve
• Continued emphasis on encouraging other businesses to establish programmes and extend those that exist
• Building capacity to deliver counselling, testing, treatment and care, both in the public and the private sector.
Closing the loop

Palm oil in Ghana and Malaysia

The re-use of liquid and solid waste leads to better nutrient management, improved soil fertility and cost saving.

The issue
The palm oil tree produces fruits all year round in clusters or fruit bunches. Fruit bunches are harvested daily and sent to mills where they are cooked in high-pressure steam. This loosens the fruits from their clusters and stops their oil becoming rancid. The fruits are then beaten and churned to rupture the oil cells. Hot water is added to draw out the oil and the mixture passes through a press that squeezes out the oil, the water in the fruit and the added water. In this process two types of waste are generated: liquid and solid. The mill effluent consist of water and organic matter. This semi-slurry effluent soon develops a strong, unpleasant odour due to anaerobic breakdown. The high oxygen demand, during breakdown, is deleterious to river and soil-life if effluent is discharged directly into small areas or watercourses. The solid waste consist of empty fruit bunches, fibre and shells.

Addressing the issue
The effluent is a source of irrigation water, dissolved plant nutrients and organic matter. The sustainable solution is to return this material to the land and the crops that produced it, taking into account offensive odours that may spread nearby. The empty fruit bunches are high in nutrient content and are applied in the field to improve the organic matter content of poor lateritic soils and at the same time suppress the growth of woody vegetation which flourishes in such areas. The other types of solid waste are fibre and shells, which are used as fuel to fire the boilers from which both the plantations in Malaysia and Ghana produce their own electricity for processing.

Progress
At this moment, 95 per cent of the produced effluent is used for land application at Unilever’s palm oil plantations in Malaysia, compared with 50 per cent in 1995. Similar progress has been made in Ghana. To reduce the unpleasant odours and lower the biological oxygen demand (BOD) the effluent is first partially digested in aerated lagoons. It is then periodically pumped up nearby undulating land and gravity-fed into shallow furrows dug between the palms to contain the effluent. The effluent seeps into the soil, eventually ending up as clean ground water while enriching the soil with organic matter and fertilising the palms. The organic matter that accumulates at the bottom of furrows is scraped away annually and applied to the palms. There have been savings on inorganic fertilisers and the land thus irrigated has given high yields.

Challenges
For the future, matters such as retention time in the lagoons, rates of application for different soil types, furrow design and dimensions and fate of organic matter and nutrients need to be further studied to fine tune this sustainable practice into an industry norm. In Ghana, the possibilities of using the shells as material for organic compost for export to Europe, and using fibre as material for making mattresses are being investigated. Slag from the incineration of shells is also being used in a trial to make paving stones, which are cheap and lightweight.

Contour terraces

The construction of contour terraces leads to soil and water conservation.

The issue
Generally, oil palm is not planted on slopes above 30°. Before 1998, at the Unilever plantation in Ghana (BOPP), linear slopes between 10° and 25° were planted. This resulted in erosion problems, reduced yields and difficulty in harvesting.

Addressing the issue
For slopes between 10° and 25°, terracing is a solution to use the steeper land while preventing soil erosion and ensuring common yields. In this way, water and soil will be conserved. In 1998, BOPP has made the decision to construct contour terraces for slopes between 10° and 25°. Terraces have been constructed along the natural contour of the slopes.

Progress
A trial has started to measure the growth rates of the oil palms on the terraced slopes in comparison with the growth rates of oil palms on non-terraced slopes and palms in the lowlands. The trial confirmed that palms on terraced slopes had slow growth rates in the first year but caught up with the rest by the second year of
Oil palms planted on contour terraces leads to reduction of soil erosion and water conservation

planting and by the end of the third year were growing as fast as those in the lowlands. Although too early to measure, it is expected that the yields of oil palms in such terraces will be higher than of oil palms on slopes planted in straight lines.

Challenges
The plan is to construct planting terraces on all slopes above 10° in all future replantings and new plantings. We expect reduced soil and water loss, since terraces take up water which would have run down the slopes.

Drip Irrigation
Tomatoes in Brazil

Significant reduction in pesticide use is the result of advanced irrigation management in processing tomato crops in Brazil

The issue
Tomatoes by their nature require substantial volumes of water not only to achieve yield, but also to ensure good fruit quality. Therefore irrigation management is regarded as one of the most critical aspects of tomato production and overall crop performance. Poor irrigation management will not only lead to lower yields, but will contribute to disease proliferation and moulding. For areas with a shortage of water, such as Australia and Israel, most efficient supply systems are a necessity. However, field trials gave indications that drip irrigation systems might also be beneficial for more humid areas such as Brazil.

Addressing the issue
Conversion from furrow to drip irrigation in Australia not only reduced water use significantly, but also showed considerable yield increase. Notwithstanding the ample availability of water, the operation in Brazil got interested in drip irrigation for these reasons as well as a possible reduction in fungicide application. This could lead to a significant cost reduction for both the grower and the processor while also serving the environment. Field trials at Unilever’s experimental station in Brazil indicated an average yield increase of 30 per cent, a 50 per cent reduction on fungicide application and a 25 per cent reduction on insecticides. These benefits will outweigh the extra irrigation costs, because of the significant gross cost reduction per ton of fruit. Unilever established a plan for the conversion from overhead pivot to drip irrigation. The results of a pilot project showed that there was one major issue of concern – only adequate watering management could deliver the results as indicated above. Growers had to be educated.

Progress
Unilever gave technical and financial support to growers who were ready to convert from pivot overhead to drip irrigation. Some 200ha were put under annual drip irrigation over two years. Many growers successfully increased production, decreased their use of fungicides and reduced their costs. As Unilever could source its fruit closer to the factory, a significant reduction in diesel use and haulage costs was also achieved.

Challenges
Unilever will gradually continue to support growers on the conversion to drip irrigation systems. Growers will be trained and educated permanently on tuning their systems while incorporating updated theoretical background on drip irrigation management and adopting results of practical experience from the experimental station and their fellow growers. A special training programme will be developed in cooperation with experienced consultants and an equipment supplier.

For more information on Unilever’s sustainable agriculture initiative, please visit our website: www.growingforthefuture.com or email us at sustainable.agriculture@unilever.com

Drip irrigation reduces both water and pesticide usage