MASDAR

CAPABILITY IN AGRICULTURE

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MASDAR’S CAPABILITY IN AGRICULTURE

1. INTRODUCTION

Agriculture is in the world spotlight as never before. Food prices are increasing dramatically, rich and poor countries are seeking greater food self-sufficiency whilst increasing areas of agricultural land are being used for producing bio fuels. Prophets of doom are predicting the calamitous impacts of more frequent and severe famines and the benefits of ‘improved’ agriculture are still to be realised in most parts of Africa. Not before time, donors are putting renewed emphasis on agricultural development and serious attempts are being made to facilitate a new “Green Revolution”.

MASDAR has been directly involved in agricultural development for over 30 years and has a wealth of practical knowledge from Africa, Asia and Eastern Europe. This experience ranges from assisting subsistence farmers through to managing large-scale, irrigated commercial farms and includes staple food-production, high-value export crops, livestock and post-harvest processing. Examples of this experience are highlighted below.

2. AGRICULTURAL EXTENSION

Approaches to agricultural extension have changed substantially over the last 30 years. Initially the emphasis was on telling farmers what to do, based on advice emanating from research stations. Rigid management structures were often imposed (as in the case of the Training & Visit System) and the flow of information was predominantly top down.

This emphasis has changed over time and other approaches based on greater farmer participation, farming systems, on-farm research and livelihoods have all been in vogue. Currently there is increasing emphasis on value-chain methodology and treating farming as a business.

It is almost certainly futile to search for a single, universally applicable model for extension and different approaches will be appropriate in different circumstances. MASDAR has had extensive practical experience of numerous extension methodologies and can adapt these to suit any agricultural situation.
In **Nigeria** throughout the 1980’s MASDAR managed both the Kano State Agricultural Development Programme and the extension and training components of the Bauchi State ADP. These had a total extension staff of over 5,000 (see case study 1).

**CASE STUDY 1: Transforming T&V to T&D**

The large Agricultural Development Programmes (ADPs) funded by the World Bank in Nigeria in the 1980’s introduced the Training & Visit system of extension pioneered by Daniel Benor. The basic T&V model is simple, based on a top-down transfer of information from research stations to subject matter specialists (SMS) who in turn train field extension staff on a regular basis (fortnightly) throughout the year on specific subjects of relevance to local farmers, crops and seasons. Field staff pass on their training to individual farmers or groups of farmers known as ‘contact farmers’. The contact farmers in turn transfer what they have learnt to neighbouring farmers. The schedule of regular visits and training sessions also allows farmers’ queries and field staff observations to be referred back up the chain to SMS and research staff for a response.

In Bauchi, MASDAR modified the basic T&V system to one of Training and Demonstration. Each extension agent maintained 5 demonstration plots and used these both for on-the-job training and for practical demonstrations. This emphasis on learning and imparting practical skills greatly enhanced the impact of field staff.

Although T&V / T&D extension systems have subsequently been criticised, there is no doubt that in the Nigerian context of the 1980’s they installed management systems which maximised the effectiveness of existing extension staff.
MASDAR further refined its management of extension services on the Gongola State ADP and Katsina State ADP until in the late 1990’s we were appointed Agricultural Advisors to the Nigerian Government. Building on almost 20 years experience in that country we developed a participatory approach to extension (see case study 2).

CASE STUDY 2: Facilitating Farmer Participation

As agricultural advisors to the Nigerian Government, MASDAR were requested to review the existing structures for agricultural extension throughout Nigeria, to highlight the successes and failures of previous approaches and to make recommendations for future initiatives. In common with the situation in many countries, MASDAR reported that the most significant short comings of public agricultural extension services had been:

- Non-responsiveness to the variation in farmer needs
- Lack of ownership by the intended beneficiaries
- Failure to reach poor and female farmers
- Limitations in the quality of field and technical staff
- High and unsustainable cost

They concluded that a fundamental change of approach was needed which would enable farmers to define and solve their own problems and to determine and take responsibility for the extension services they required.

MASDAR then prepared a detailed project appraisal for a “Participatory Rural Development” project, of which the key elements were:-

- Empowering agricultural producers by encouraging and enabling participation in community decision-making
- Empowering extension and support services to respond to the demands of their clients
- Developing accurate, relevant and timely information systems for all stakeholders.
- Encouraging the development of transparent markets for farm outputs and inputs within a well-defined regulatory framework

‘Top down’ extension can still play a role, especially in single high-value cash crop environments. This was the case in Ghana when MASDAR were contracted by the Ghana Cocoa Board to review the current cocoa extension packages, their method of dissemination and the procedures used for training field extension staff. Twelve key recommendations for improved training and extension were made and implemented. Likewise in Bangladesh on the Tea Rehabilitation Project a MASDAR team conducted extensive training for project extension staff and helped them refine their extension messages.
In contrast, in Nepal on the Agricultural Research & Extension project MASDAR helped reorient the extension service to make it more demand-led (see case study 3).

**CASE STUDY 3: Creating a decentralised, client-based extension system**

MASDAR provided technical assistance to the Agricultural Research & Extension Project in Nepal for four years. Although the project was originally formulated with the objective “to improve the management and capacity of agricultural research & extension services” it quickly became apparent that more radical change was needed. The extension service had been geared towards “delivering” the technology packages associated with the green revolution of the 1960’s and 1970’s and farmers now required a far more flexible and responsive service. In addition, it was abundantly clear that a large, permanent public extension service was costly, inefficient and difficult to maintain. Common to many extension systems around the world, Nepal responded with three major strategies:-

- Decentralisation
- Privatisation and
- System reform (downsizing and increasing efficiency)

Moreover, the public extension service needed to be transformed to become:-

- More client-oriented and responsive to demand for services and less technology-driven
- More results-oriented in producing benefits for clients and less target-oriented towards inputs and activities
- More strategic in focussing on areas in which impact was likely (impact including factors such as livelihoods and the environment and not simply production)
- More facilitating of other agency programmes (e.g. NGOs and the private sector) and less the sole source of authority or technological innovation

The MASDAR TA was at the forefront of facilitating these changes and transforming the Nepalese extension service.

On several projects in Zambia, MASDAR has provided support to the extension services. In particular, on the Zambia Agricultural Research & Extension Project (ZAREP) considerable success was achieved in coordinating the research and extension services and improving efficiency; whilst in the District Development Support Programme and in the Southern Province Household Food Security Programmes extension was promoted in the context of government decentralisation. Most recently, on the Smallholder Enterprise and Marketing Programme, MASDAR advanced the concept of farming as a business and training farmers in the importance of business skills and entrepreneurship.

Other MASDAR projects involving agricultural extension have been implemented in Uganda, Sudan, Cameroon, Ethiopia, Malawi, Mozambique, Tanzania, The Gambia and Moldova.
3. AGRICULTURAL RESEARCH

Traditionally, agricultural research has investigated improved technological packages e.g. high yielding varieties, fertiliser regimes and pest control techniques. More recently, especially in Africa, there has been an interest in farming systems research and the interrelationships between different livelihood strategies undertaken by the farmer and his family. Further more, the concept of Conservation Farming is proving highly beneficial for both large and small scale farmers and has the potential of greatly increasing productivity in many parts of the world. MASDAR has over 30 years of relevant experience in practical agricultural research in Africa and Asia.

On the Kano State ADP in Nigeria, MASDAR research workers undertook extensive trials to determine the crops, varieties and farming systems suitable for the short rainy seasons in Kano. The introduction of animal traction, new fruit trees, simple irrigation in the fadama areas, improved cultivation and water conservation led to significant productivity increases and substantial improvements in the rural economy. In neighbouring Bauchi State, the agricultural research concentrated on the impact of improved practices on traditional cropping systems (see case study 4).

CASE STUDY 4: Building on Farmers' Indigenous Knowledge

The growing of crops in mixtures is a widely used traditional practice in northern Nigeria. Over 24 different crops on rainfed land in a total of 174 different crop mixtures have been identified. Colonial agriculturalists tended to denigrate these practices and promoted sole cropping, similar to the farming they were used to in Europe. However, research has confirmed that many traditional Nigerian farming practices are far more efficient in maximising yield per unit area and are also better suited to the unreliable and unpredictable rainfall patterns common in the region. On the Bauchi State ADP, researchers started from the premise that traditional cropping practices were 'sound' and sought ways in which new technology could be incorporated into them. New crops (soya), new crop varieties (short stemmed sorghum) and new pest control measures (electrodyne sprayer) were introduced and local farmers adopted and adapted these into their own cropping systems. This partnership between the research worker and the farmer built on local indigenous knowledge and produced far greater impact than the more conventional approach of giving farmers a 'recipe' to follow.

In Zambia, on the Zambia Agricultural Research and Extension Project (ZAREP) MASDAR provided a Research Management Specialist to assist in reorganisation of the research network and to help in research prioritisation, and a biometrician to assist with a backlog of data analysis. MASDAR also provided
the farm management services for the Golden Valley Research Station, Zambia’s leading practical agricultural research site.

Many research organisations in Africa are struggling to survive as their budgets are cut, and drastic reorganisation is needed if they are to survive. This happened in Ghana where MASDAR provided Technical Assistance for the reorganisation and commercialisation of the Cocoa Research Institute (CRIG). The overall objective was to significantly reduce the expenditure budget and to diversify CRIG’s sources of funding by commercialising its research results and providing consultancy services to other institutions.

A MASDAR research management specialist provided technical advice on improving efficiency and effectiveness on the Agricultural Research and Extension Project in Nepal (see case study 5) whilst in the same country two MASDAR consultants carried out a major review of the economic and social impact of research undertaken at Nepal’s premier agricultural research stations at Lumle and Pakhribas.

**CASE STUDY 5: Improving Research Management**

Numerous constraints and weaknesses may limit the efficient and effective implementation of agricultural research. In the case of the Nepal Agricultural Research Council (NARC) many of these were related to the management of available resources including:-

- Fragmentation of research with a large number of projects and dispersion of staff across many stations
- Inadequate human resources and many staff vacancies
- Lack of incentives and, in the case of externally-funded projects, distorted incentives
- A weak M&E system
- Slow uptake of information technology and MIS

A MASDAR Research Management Specialist assisted the project to bring about necessary institutional restructuring, developed a new strategy for determining research priorities and strengthened the linkages between NARC and other relevant actors. This included experimenting with contracting out research under a competitive system.
In Russia, MASDAR in association with the National Institute of Agricultural Botany in Cambridge, provided TA to support seed certification. The main objective was to strengthen Gosseminspektsia, the central seed inspection organisation of the Russian Federation (see case study 6).

CASE STUDY 6: Developing a seed certification system for Russia

MASDAR in association with the National Institute of Agricultural Botany in Cambridge provided over 50 months of technical assistance to the central seed inspection organisation of the Russian Federation. The overall objectives were to raise the standard of the Russian seed inspection, certification and testing services to internationally recognised standards and to ensure ready access of guaranteed high quality seed of new and improved varieties to farmers at competitive prices. The following were achieved:-

- Production of a new Russian Seed Law and Standards Acts
- Considerable training on seed production technology, including seed hygiene, storage and harvesting
- Development of a pilot project by the Seed Inspection specialist and a complete set of protocols covering all the technical and administrative procedures required by the new Certification System. Implementation of one full year of seed production activities, using the new procedures
- Upgrading of the seed testing laboratory and implementation of seed testing training
- Development of Plant Breeders Rights protocols and formulation of a system of variety licensing and royalty collection
- Joining of Russia to the recognised international agencies OECD, ISTA and UPOV
- Production of 17 detailed instruction/training manuals regarding all aspects of seed certification, laboratory analysis, seed production, seed inspection and ISTA accreditation.

Other MASDAR agricultural research inputs have taken place in Tanzania, Uganda, The Gambia, Botswana, Bangladesh and Pakistan.
4. IRRIGATION

MASDAR has experience with irrigated crop production ranging from large-scale centre pivot systems (MASDAR ran its own commercial farm in Zambia during the 1990’s) to improved smallscale fadama production.

In Bakolori, Nigeria, for the Sokoto Rima Basin Development Authority, a team of MASDAR specialists prepared and implemented an extensive agricultural programme to introduce overhead and surface irrigated farming on a formal scheme covering 25,000 hectares. In contrast, in the next door state of Kano, MASDAR worked with existing small scale fadama farmers and introduced improved irrigation practices based on washbore technology and simple engine-driven pumps (see case study 7).

CASE STUDY 7: A huge boost to small-scale irrigation

The most successful component of the Kano State Agricultural Development Programme, managed by MASDAR for 9 years was the fadama programme. Traditionally Nigerian farmers lift water from shallow dug-outs and dug wells, often using a shadouf, for individually managed micro scale irrigation in the dry season. The system is very labour intensive and the discharge is low and can only irrigate small areas. The Programme promoted shallow tubewells with small engine driven pumps and later washbores (introduced from India) a low-cost technique suitable for shallow aquifers overlain by coarse materials. It was remarkably successful and the main outcomes were:-

- The project drilled over 5,000 tubewells and sold about 35,000 gasoline-powered pumps and later washbores. About 50,000 ha are being irrigated now
- In a 1994 survey conducted for the impact evaluation, 70% of farmers said that they used pumps for irrigation, but less than 5% of them had used pumps 10 years ago
- One third of the farmers reported that dry-season cropping (tomatoes, onions, garlic) is now their most important source of income and half said it was their second most important source of income
- 60% of the farmers indicated that ten years ago their most important crop was a staple, whereas now only 35% consider that to be the case – an indicator of increasing diversification
- A thriving service industry has developed to maintain the pumps and the washbores
- The economic rate of return for the Kano State project at audit was estimated at 38% including fadama cropping but just 16% for dryland cropping only. The return to fadama development was very high indeed, certainly over 40%.

The programme was so successful it has been expanded through a National Fadama Development Project.

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Fadamas are river valley areas which are seasonally flooded or have high water tables for all, or a large part, of the year.
On the Peri Urban Smallholder Development Project in The Gambia a MASDAR Irrigation Engineer designed 25 appropriate irrigation systems suitable for horticultural production. He analysed the cost benefit of each scheme and introduced and evaluated different irrigation practices including wells, boreholes, various water lifting devices, reservoirs, distribution pipes and application systems such as drip irrigation. Of the pumps evaluated, solar-powered submersible pumps were by far the most popular, especially when combined with a drip system, and these will be promoted in a successor project funded by the AfDB. Also in The Gambia on the Rice Development Project a 4-person MASDAR team developed 200 ha of irrigated smallholder farms complete with pumps and water distribution system.

In Azerbaijan MASDAR supplied an irrigation agronomist to a feasibility study for the Samur-Apsheron Canal System. He reviewed the potential production capacity of the irrigated agricultural land in the study area and determined the future demand for irrigation water.

The largest irrigation assignment undertaken by MASDAR was to set up the Mayo-Ine Irrigation project in Nigeria. This was a turnkey project to establish a 3000 ha irrigated mixed farm with a further 3000 ha of outgrowers. The MASDAR team were responsible for all major activities including farm layout, construction of roads and buildings, importation of equipment, land clearing and preparation together with all cropping activities including extension services for outgrowers. The farm was subsequently purchased by the Chanrai Group and MASDAR were contracted as farm managers. The farm (Afcott) subsequently became one of the most successful agroindustries in Nigeria.
In **Nepal**, on the Gulmi and Arghakhanchi Rural Development Project, MASDAR staff facilitated the building or rehabilitation of 45 irrigation schemes, helping local communities to build and maintain many kilometres of precipitously situated canals. GARDP worked with local Water User Groups providing technical advice so that they could access the generous loans for irrigation available from the Agricultural Development Bank of Nepal. Moreover, they were able to access funds for maintenance which is essential to cope with the future inevitable landslide damage to their canals.

Other irrigation projects have been undertaken in **Eritrea, Somalia, Ghana** and **Bangladesh**.

More recently in Malawi, on the Smallholder Crop Production and Marketing Project, MASDAR staff are working with 39 different small scale irrigation schemes distributed throughout the country and involving gravity-fed, treadle-pump and watering can systems of irrigation. Detailed profiles of each scheme have been prepared and assessments made of the problems and prospects confronting each scheme. These assessments have been used to develop scheme specific strategic intervention plans and to develop and implement appropriate training programmes.

5. **HORTICULTURE**

Horticultural crops have a particularly important role to play in agricultural production in the developing world. On the one hand, smallscale fruit and vegetable gardening is a key livelihood strategy improving the nutrition of farmers and their families. On the other hand, high value horticultural crops can lead to much higher returns on local markets and may be the best way for accessing lucrative export markets as has happened in Zambia, Kenya and Ghana.

MASDAR has considerable experience in the production and marketing of horticultural crops and several recent projects have targeted these issues. In **The Gambia** on the Peri Urban Smallholder Development Project both a Horticultural Production Specialist and a Horticultural Marketing Specialist encouraged intensive vegetable production on irrigated gardens farmed mainly by women.
The vegetables so produced played an important part in improving the local diet as well as being sold to satisfy local demand both from local Gambians and the rapidly growing tourist trade. Likewise in projects in Zambia, Uganda, Mozambique, Nigeria and Sudan MASDAR has encouraged smallscale fruit and vegetable gardening.

In contrast, in Malawi, the aim of the Smallholder Macadamia Nut Project was to enable smallholder farmers to access the lucrative export markets afforded by a long term, perennial nut crop (see case study 8).

**CASE STUDY 8: Enabling smallscale farmers to access lucrative export markets**

Macadamia nut is a high value confectionary nut which is already an important export crop in Malawi although it is predominantly grown on large scale estates. The objective of the Macadamia Smallholder Development Project, managed by MASDAR for 3 years, was to enable smallholder farmers to participate in this export enterprise. The MASDAR input was highly effective and project targets were significantly exceeded. In particular, the following outputs were achieved:

- 6 mother and 100 community nurseries were established. Each nursery had its own borehole and 4,325 trees were propagated
- Over 500 ha of macadamia trees were planted in farmers fields (61,000 trees) intercropped with 2,500 ha of other crops
- 207 macadamia production groups were set up involving 3,111 members.
- 330 on-farm demonstration plots were established and numerous field days organised

As a result smallholder farmers in Malawi now contribute to the production of this important export crop.

Similarly on the Smallholder Enterprise and Marketing Project in Zambia a MASDAR Horticultural Export Marketing Specialist worked with major European food supermarkets to establish fresh vegetable and fruit outgrower schemes for daily export to the UK by air from Lusaka.
6. LIVESTOCK PRODUCTION

Although development projects targeted at livestock production have been in decline in the last decade, there is no doubt that livestock form an important part of many farming systems in the developing world. MASDAR has wide ranging experience in this sector including large scale beef and dairy farming, village level poultry production, veterinary services, hides and skin processing and livestock marketing.

In Uganda on the Dairy Rehabilitation Project a MASDAR livestock advisor set up a database for recording the status and health of the national herd whilst on the Beef Ranch Rehabilitation Project MASDAR staff restored damaged infrastructure at the Kiryana Ranch. In Botswana a computer specialist designed and set up an Animal Production and Range Assessment model for the country comprising two modules namely calculation of net biomass production by district and assessment of the animal production potential for selected livestock and game species.

Small animal production at village level has been undertaken in Mozambique (poultry), The Gambia (rabbits), Zambia (small ruminants), Nepal (rabbits, poultry, goats) and Sudan. In contrast, in Russia (Ekaterinburg) demonstration units were set up for large scale, commercial pig and poultry farms and a 2 million euro business plan was developed for the Sredneuralski Poultry Farm. In addition a feasibility study was facilitated with Roche/Colburn-Dawes for investing in a substantial animal feeds plant and in reorganising the pig sector in the region.

MASDAR abattoir specialists have provided advice to livestock projects in Mozambique and The Gambia on the setting up and running of efficient and hygienic abattoirs. Also in The Gambia Hides and Skins specialists advised on the best way to tan and process animal skins for the local and international market.
In **Sudan** MASDAR was retained by the Livestock & Meat Marketing Corporations Livestock Route company as technical advisor throughout the construction and commissioning of 59 wateryards and veterinary posts on the main stock trekking routes. In **Swaziland**, MASDAR provided technical support to the Swaziland Dairy Board, whilst on the Pan African Rinderpest Campaign Project in **The Gambia** veterinary advice was provided (see case study 9).

### CASE STUDY 9: Pan African Rinderpest Campaign

MASDAR provided Veterinary Technical Assistance to **The Gambia** to assist in the control of Rinderpest, to bring about a dramatic change in the way the disease is reported, and to assist the Government in the privatisation of its veterinary services.

Until the introduction of the Pan African Rinderpest Campaign the Gambia, like most of its neighbours undertook regular vaccination of its cattle population against rinderpest. The campaign was designed to reduce outbreak of the disease through improved co-ordination with neighbouring countries of disease monitoring, diagnosis and vaccination using (initially) rinderpest and CBPP vaccines. The Veterinary Expert also established a revolving fund for drug importation and advised on privatisation.

Of major importance on this assignment was the training of Gambian technical staff in appropriate diagnostic skills to ensure the long term sustainability of the campaign.

### 7. LARGE SCALE FARMING

Although most of MASDAR’s portfolio of agricultural projects has been targeted at the smallscale farmer, our experience includes managing large-scale farms and providing technical advice to this sector. This was particularly the case in Eastern Europe where we helped privatise large State farms in **Poland** and the **Czech Republic** (see case study 10). In Ekaterinburg, **Russia**, we set up demonstration units on potato, glasshouse, pig and poultry farms and established linkages with major Western European Agribusinesses. In **Romania** we prepared 45 detailed business plans for the agricultural sector and facilitated inward investment from UK farmers who wanted to develop farming opportunities in the rich soils of the Danube Basin.
CASE STUDY 10: Restructuring large State farms in Eastern Europe

After the collapse of communism throughout Eastern Europe there was a concerted effort to restructure and privatise many of the very large and very inefficient State Farms. MASDAR was in the vanguard of this process and during the early 1990’s prepared restructuring proposals for 5 farms in Poland (Fronowo Gorne, Kietrz, Ksiezy Dwor, Lagajny and Niechoice) and 12 in the Czech Republic (including Borohradek, Melnik, Most, Nova Bystrice, Pavlovice, Bohemia and Northern Bohemia).

Using Vlasim State Farm as an example this was a huge state enterprise, not only growing cereals, potatoes, oil seeds, pulse crops, maize, fodder crops, dairy, beef, pigs, poultry, fruit and vegetables but also containing workshops, processing plants and social infrastructure. MASDAR were employed to analyse the overall business of the farm and its component enterprises and to determine profitability. A complete restructuring was undertaken and new business plans were developed for the component enterprises. New technological packages were introduced, staffing structures were revised and improved financing schemes established with local banks. As a result four new farming businesses were established which continued to benefit from MASDAR technical assistance after the restructuring process.

In Nigeria, at Mayo-Ine, MASDAR developed and managed a 3000 ha farm which subsequently became one of the most successful agroindustries in that country. In Zambia we managed our own mixed farm throughout the 1990s. Also in Zambia we provided farm management services to the Golden Valley Research farm and turned it into a showpiece for the region.

In South Africa we assisted the Northern Province Department of Land and Environment privatise numerous agricultural assets including the largest citrus estate in the southern hemisphere at Zebediela. This 2000 ha estate which had been badly mismanaged by the Agricultural and Rural Development Corporation was eventually handed back to the Bjatladi community in 2003. It is now co-owned and managed by the local community and exports under the ‘Fairtrade’ label.
8. SOIL AND WATER CONSERVATION

The need to control soil erosion and to conserve water are of paramount importance in many agricultural situations. Moreover, changing farming practices have often made the situation worse by exposing the soil either through deforestation or by substituting traditional mixed cropping regimes with monoculture row cropping.

MASDAR soil and water conservation specialists have undertaken work throughout many parts of the developing world including Nepal, Ethiopia, The Gambia, Kenya, Malawi, Namibia, Nigeria, Somalia, Sudan and Zambia.

In addition, for many years MASDAR promoted a vegetative method of soil and moisture conservation (see case study 1) which was strongly endorsed by the World Bank and others in the donor community.

CASE STUDY 11: Vetiver – A Hedge Against Erosion

Many techniques for soil and water conservation rely on mechanical construction e.g. contour bunds, tied-ridging and diversion banks. Although such structural systems of soil conservation have worked fairly well in developed countries, they have failed spectacularly in most developing countries. Not only are they expensive to construct and maintain but farmers lack motivation to construct them.

A very promising alternative is vegetative soil and moisture conservation which is not only extremely cheap (less than $\frac{1}{10} - \frac{1}{30}$ the cost of constructed banks and waterways) but the farmers can do the work themselves. Of particular interest is the use of Vetiver Grass (Vetiveria zizanioides). This can be used for the construction of hedges by subsistence farmers who have little or no resources and limited access to extension services. The hedges are able to slow down water runoff and trap nutrient-rich topsoil. Vetiver has the following advantages:

- When planted correctly, vetiver will quickly form a dense and permanent hedge
- It has a strong fibrous root system that penetrates and binds the soil to a depth of up to 3 metres and can withstand the effect of tunnelling and cracking
- It is perennial and requires minimal maintenance
- It is practically sterile and because it produces no stolons or rhizomes, it will not become a weed.
- Its crown is below the surface, which protects the plant against fire and overgrazing
- Its sharp leaves and aromatic roots have demonstrated a resistance to most diseases
- Its sharp leaves and roots repel rodents, snakes and similar pests
- Once established it is generally unpalatable to livestock. The young leaves, however, are palatable and can be used as fodder.
- It can withstand drought, flood and long periods of water-logging. It is cheap and easy to establish as a hedge and to maintain – as well as to remove when it is no longer required
- It will grow in all types of soil regardless of fertility or salinity

MASDAR promoted the use of Vetiver extensively in Africa and set up demonstration plots in Zambia and Nigeria. MASDAR also undertook micro-propagation of vetiver plants to enable rapid uptake in new environments.
9. FEASIBILITY / LAND USE STUDIES

MASDAR carries out comprehensive investigations into the feasibility of agricultural development projects ranging from whole regions (see case study 12) to individual farms.

**CASE STUDY 12: Agricultural Feasibility Study of Sardauna Province, Nigeria**

An agricultural feasibility study of Sardauna Province was carried out on behalf of the Federal Government of Nigeria and IBRD.

The study covered the land utilisation of the whole area, together with the integration of livestock with cash and food crops. Special emphasis was placed on providing viable livestock projects which were feasible within the social environment. The expansion of coffee and tea cash crops was examined and an economic and financial analysis made of the solutions proposed. The organisational structure for credit, marketing, input supply, extension and training was prepared in detail.

In Ghana a major AfDB-financed study of the agricultural potential of the Afram Basin conducted by MASDAR resulted in the financing and implementation of a major new project ‘The Afram Basin Development Project’. In Ethiopia we undertook a Master Plan Study for the Omo-Ghibe River Basin, a 77,200 square km area with considerable agricultural potential. The master plan study included detailed analysis of soils, climate, drainage, rainfall, vegetation and human activity and reviewed the potential for development. Similarly, in Namibia MASDAR undertook a study of the Resources of the Northern Communal Lands. This involved a study of land, water, crop and livestock resources, agricultural support services, infrastructure and potential environmental impact of possible development initiatives.

In contrast, at farm level MASDAR undertook a study in Ghana for a private client to review the suitability of 3 sites for large-scale mechanised production of food crops. Similar farm studies and farm business plans have been prepared by MASDAR in many other parts of the world.
10. POST HARVEST

Increasing agricultural production is only part of the solution to improving food supplies. What happens ‘post harvest’ either in terms of reducing losses or in adding-value through processing is equally important.

In many parts of Africa, MASDAR specialists have investigated appropriate storage solutions both for small-scale and large-scale producers. For example in Cameroon a post-harvest loss specialist reviewed different small-scale crop drying devices and promoted the most beneficial whilst in The Gambia several MASDAR specialists advised both on crop processing and livestock hides and skins processing. In Nigeria on the Rural Agro Industrial Development Scheme a large TA team based in 4 offices around the country advised on various post-harvest practices. Particular emphasis was placed on:

- Rice milling and polishing
- Maize flour production
- Potato seed and chip production
- Cassava processing at village level
- Cocoa drying
- Certified seed production and packaging
- Livestock feed compounding
- Fruit juice and vegetable processing
- Small-scale palm oil production

Manuals have been prepared on many of these topics and have been used extensively throughout Nigeria.
SUMMARY

- MASDAR has over 30 years practical agricultural experience in Africa, Asia and Eastern Europe

- Our experience ranges from assisting subsistence farmers through to managing large-scale, irrigated commercial farms

- We have extensive experience in agricultural extension and research, irrigation, horticulture, livestock production, soil and water conservation and post-harvest storage and processing

- Our multidisciplinary teams of agricultural specialists can undertake land use studies ranging from individual farms to whole river catchments covering tens of thousands of square kilometres

- Over 3500 technical specialists are registered on our CV database
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