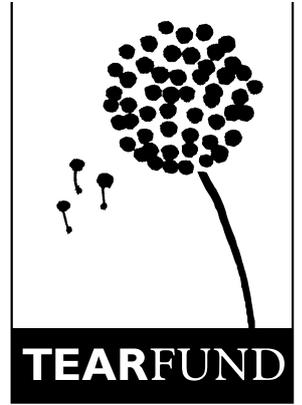


Footsteps

No.47 JUNE 2001

BIODIVERSITY



Caring for life on earth

by Professor Sir Ghilleen Prance

The term *biodiversity* is used to describe the huge variety of life on this planet. An astonishing 1.8 million different species have been identified and named by scientists. Yet we still do not really know how many there are in the world.

We know that there are about 8,600 species of birds, 4,000 species of mammals and 32,000 species of flowering plants because these organisms are relatively well studied. However, there is still uncertainty about other organisms such as insects, (where estimates vary from

eight million to a hundred million), fungi (where 70,000 have been identified but 1.6 million are thought to exist) and little-studied organisms such as bacteria, nematode worms and mites. There are at least eight million species in the world, and probably a lot more, so scientists who identify, name and classify organisms still have a lot of work to do. One of the greatest challenges for the new millennium is to increase our knowledge of the organisms with which we share this planet.

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- Establishment and preservation of biodiversity
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There are three aspects of biodiversity:

- the variety of habitats (environments) in which living organisms live
- the number of species
- the variation within each species.

Why preserve biodiversity?

This diversity holds together life on Earth. The green plants on land and microscopic plants in the oceans produce the oxygen we breathe. Global climate change would be far worse if it were not for the role of forests and oceans in absorbing much of the carbon dioxide we are putting into the atmosphere. Mangrove forests hold tropical coastlines together. Each individual species depends upon others for its existence and the links between different species hold life together. If one species is removed then the others that depend upon it will also either die or be seriously affected.

Some species are particularly important because without them their whole ecosystem will collapse. For example, forest trees and ocean plankton, which control our climate, are often little

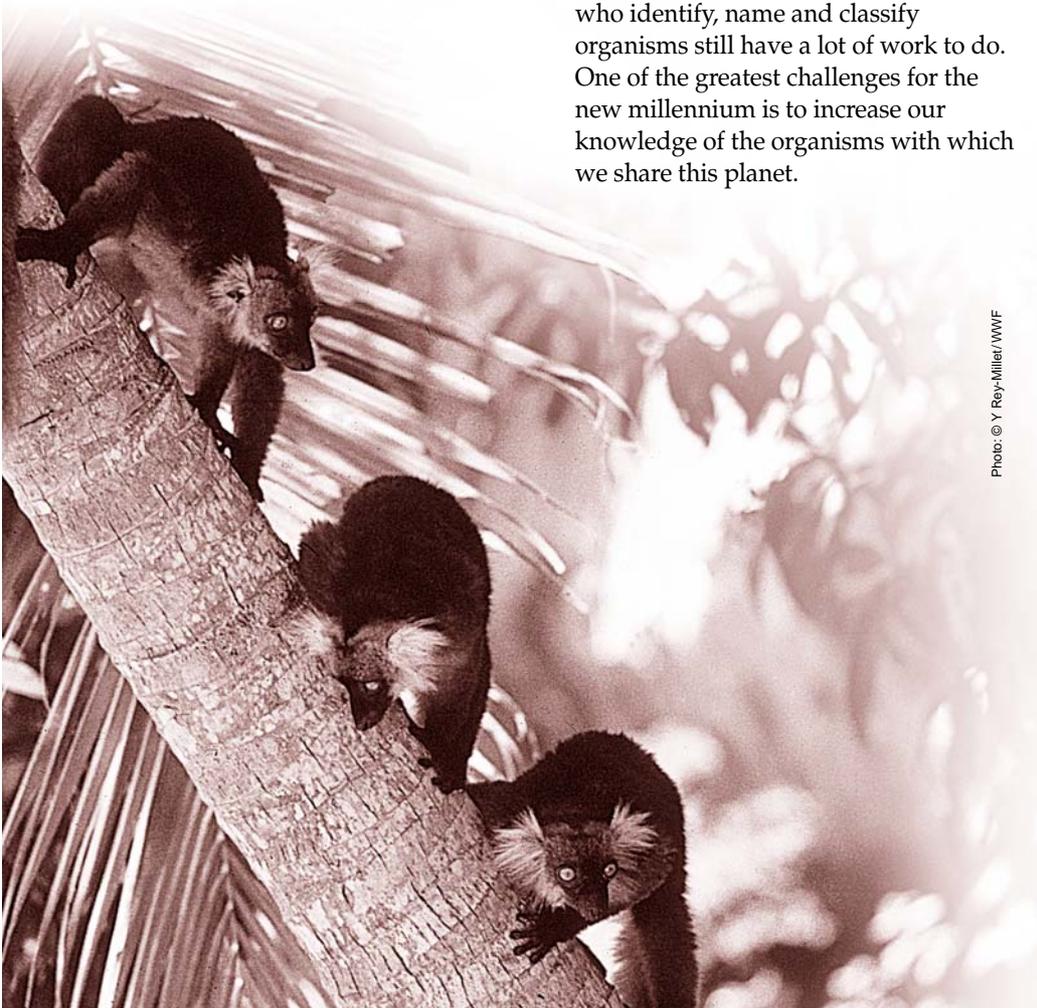


Photo: © Y. Rey-Millet/WWF

Footsteps

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Footsteps is free of charge to individuals working to promote health and development. It is available in English, French, Portuguese and Spanish. Donations are welcomed.

Readers are invited to contribute views, articles, letters and photos.

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Photo: Tearfund

We depend on biodiversity for our food, medicines and many other products.

valued by people, but their role in controlling our environment is the single most important aspect of biodiversity.

A second reason for protecting biodiversity is because humans are dependent upon it. We depend on biodiversity for our food, medicines, shelter, for many industrial products such as wood and rubber, cosmetics and

many other products. As we lose species, we are also losing potential new medicines and foods that may be needed to continue human life on Earth. For example, over half our medicines come originally from plants, and new ones are still being discovered. A recent example is the anti-cancer drug, taxol, from the bark of the Pacific yew tree.

A third reason for preserving biodiversity is ethical. Is it right for people to destroy so much of God's creation? The story of Noah in the Bible shows how God cares for all living creatures.

Fourthly, we should preserve biodiversity purely for beauty and enjoyment. It would be a dull world without the flowers and songbirds around us, or the whales in the sea or the magnificent animals on the plains of Africa.

Using biodiversity

Modern western agriculture is based mainly on growing large areas of a single species such as wheat, rice or maize (monoculture). Traditional agriculture

Glossary of words in this issue

biopiracy	The unacceptable taking (or patenting) of genetic material and traditional knowledge without proper informed consent and agreed terms
diversity	Variety
ecosystem	Communities of plants, animals and other living things, together with the non-living parts of the environment such as rocks and weather, which together form a working system
extinct	A species with no living survivors
gene	Each living organism has thousands of genes that make up the 'code of life'. Each one affects a certain characteristic. For example, we have genes that affect our height, the shape of our feet, our ability to fight off disease, etc
genetic material	The characteristics of each living organism are controlled by strings of genes found in every one of their cells. Scientists are rapidly coming to understand the exact structure of these strings of genes
genetic modification (GM)	The process of removing, modifying or adding genes to a living organism by scientists
intercropping	Growing a variety of crops together
landraces	Cultivated local varieties of crops that have been grown over many generations
monoculture (monocropping)	The growing of one crop species over large areas of land
patent	Legal ownership and protection of a new invention or new process to allow scientists and inventors to benefit from their work and research



Photo: Wren Media www.wrenmedia.co.uk

There is great variation within each species.

depends on diversity and is more protected from pests and disease because of its diversity. Even modern agriculture depends on the genetic diversity of the wild species that are related to crop species. From time to time plant breeders use characteristics from these wild relatives to improve crops. Only 20 years ago an unknown relative of maize (named *Zea diploperennis*) was found in Mexico. This new species was almost extinct but was an important discovery for the future of maize because it is resistant to some of the common diseases and is also perennial. Species like this are vital for the future of our crops. If that species had not been discovered, it would have become extinct and its useful characteristics would have been lost forever.

Traditionally, useful characteristics from wild species have been bred into crops by plant breeders and by farmers who select varieties with characteristics they want. However, it is now possible to transfer genes between unrelated organisms through the process of genetic engineering. This is a technique that has great potential to help tackle the problem of world hunger, but is being abused by some commercial companies. Rather than concentrating on methods to feed the hungry, genetic engineering is being used to provide large profits for these companies. Features such as herbicide resistance are being placed into crops. For a while one company planned to produce crops that would not produce new seed so that farmers would have to buy new seeds each year. Fortunately there was so much protest about this so-called 'terminator technology' that the

company has abandoned the idea at present.

Rather than using genetic engineering to provide excessive profits, it should be used to develop more nutritious and high yielding crops. One such development is the production of rice with a high level of vitamin A. Vitamin A deficiency causes blindness and other problems. The company developing this

rice released their patent rights so that vitamin A rice can be freely developed.

People need to be informed and involved in these issues. People power counts! India challenged a US patent on the insecticidal properties of the neem tree that they had been using for hundreds of years. Peru challenged the patent on their well-known hallucinogenic plant *ayahuasca*. Both patents have now been rejected.

We should not condemn a technique that has much to offer the world, but rather see that genetic engineering is properly used to help feed the world.

Professor Sir Ghilleen Prance FRS is Scientific Director of the Eden Project in Cornwall and Visiting Professor in the School of Plant Sciences of the University of Reading. He was Director of the Royal Botanic Gardens, Kew from 1988 to 1999.

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EDITORIAL

All of us have an impact, whether positive or negative, on biodiversity – the amazing variety of life on earth. This may come through the way we choose to live our lives, the way we farm, the way we care for the environment or the way we dispose of our waste. In just a few pages this issue attempts to bring more understanding both about changes in the diversity of life on earth and of how recent scientific advances may impact on our lives.

From the earliest times when people began cultivating crops and raising livestock, farmers have been selecting particular crop plants and animals. In addition, plant and livestock breeders have enabled significant changes in yield or disease resistance. However, in recent years, advances in genetic science have led to some changes of enormous significance to ordinary people, to you and me. The ability to identify genetic material has led to the patenting of this material, preventing others from using it free of charge, and possibly limiting a farmer's choice when selecting seed. The ability of scientists to breed crops has also changed considerably with recent advances in genetic modification. Now genetic material from one species can be transferred into a completely different species.

These subjects are not easy to understand and we apologise that sometimes we have needed to introduce difficult terms. But all of us need more knowledge of these developments, so that we can discuss their impact on our lives. We hope this issue will help.

Isabel Carter



Genetically modified crops – greed or need?

Will genetically modified (GM) crops bring large harvests and food for all? Or will they bring monster tomatoes and biopiracy (the unacceptable ownership of genetic material and traditional knowledge)? It is still too early to know what impact genetically modified crops will have.

There is much public unease, but many scientists are convinced of the long-term benefits. Supporters argue that the world desperately needs GM crops to ensure food security. These crops may produce higher yields or more nutritious food with less use of chemicals. But many people fear there may be unknown side effects and damage to the environment. Others believe that greed on the part of large seed companies is the driving force – not the need for better crops.

Genes determine the way in which a typical crop plant grows and on average there are about 80,000 genes within each plant. Scientists are now able to insert completely new genes from other species (occasionally even from animals), which alter the characteristics of the crop. So far most work has been done on crops which are grown commercially on a large scale and allow the seed companies to make large profits from their research.



Photo: Wren Media www.wrenmedia.co.uk

Many small farmers in third world countries support a great diversity of crop and plant varieties.

These crops include soya beans, maize, cotton, oilseed rape and tomatoes.

As new genetic material and genes are identified, companies are rushing to patent them, so that they can benefit from their research into processes based on the unique properties of these genes. Traditionally, patents apply to inventions of new products or processes – not to the discovery of things that already exist in nature.

Concerns raised

Dangers to the environment

There is concern that GM crops may interbreed with other similar species – such as the wild relatives of crops. This might introduce genes that would help weeds to resist pests or grow stronger. Another concern is that if the new GM material is from a virus, this could evolve into potentially harmful new viruses.

Loss of biodiversity

At present many small farmers in third world countries support a great diversity of crop and plant varieties. These plants all show different characteristics and can survive under different conditions. Replacing this richness of variety with vast monocultures of a single crop may leave the crop open to attack from pests and diseases or unable to survive changes in climate.

Questions for discussion

This technology raises many new issues that people need to consider.

- Should genetic material which has not been invented but just identified, be patented (and owned)?
- How can companies raise the large amount of money required for this research if they are not allowed to patent their work?
- How can the benefits of GM crops extend to all, not just to a few companies?
- How can money be found to extend the benefits to less profitable crops, such as cassava, sorghum and millet, which are the staple food of millions around the world?

You may find it interesting to hold a debate on these issues and give people a particular role to play so that they represent the views of different people such as a traditional healer, store manager, teacher, bee-keeper, religious leader, small-scale farmer, managing director of seed company, health worker, large-scale farmer, eminent research scientist, minister for economic affairs, local mayor etc.

TVE USA Outreach (see page 14) has developed an excellent activity around this idea. Please write to the *Footsteps* office for a copy if you would like to use it in your community.



THE LOCAL SHOPKEEPER



THE FARMER



THE MINISTER

Health risks

There is a risk that the introduced genetic material may cause allergies in people eating the crop. It may also be possible for some of the genes used to cause resistance to antibiotics.

The profit motive

There is real concern that scientific advances, which could bring enormous benefits to the poor, are being left in the

hands of a few large companies whose motive is excessive profit.

The terminator gene

One company now owns a patent on a gene that prevents saved seed from germinating. So far this has only been found to work with cotton and tobacco, but may be introduced into other crops in the future. Hybrid seed already reproduces poorly, so farmers using this know they will need to buy new seed

each year. However, at present 80% of crops in third world countries are sown using seed saved by farmers. Though farmers will not be forced to buy GM crops with this terminator gene, it is possible there will be increasing pressure to do so in the future.

Information adapted from Panos Briefing No 30A and Outreach Biodiversity Series (see page 14).

Pattavam Village makes history

In April 1997 a special ceremony took place in Pattavam village in Kerala, South India. In a symbolic and moving ceremony, an old farmer handed over to a young child of the village, a register of nearly every species and crop growing within the village boundaries.

This had been prepared by the village youth. The child in turn, handed the register over to the village head for safeguarding and protection in the interests of the community and future generations.

A highlight of the ceremony was an exhibition of living things showing an example of every growing plant. This exhibition gave the villagers an idea of exactly what they owned and what they and their ancestors have kept alive and conserved for centuries. The village

gathering also honoured several farmers who had protected traditional varieties by continuing to cultivate them.

How did the idea for this ceremony develop? In 1995 a group of active young people formed a Village Forum. They wanted the village to develop in a sustainable way. Various outsiders gave support and teaching. They were encouraged to appreciate their traditions and the biodiversity of their village. They decided to organise a register. There were two options. They could bring in an expert who would take a

week to document all the species. But the forum realised that villagers would still be ignorant of their inheritance, and the expert would produce a document that could be easily made use of by corporations seeking plant materials. So they decided on the more difficult option – of doing it themselves. Fortunately they had a local amateur botanist who willingly agreed to help. Training sessions were held for all interested villagers.

The survey revealed that 26 traditional varieties of rice were being grown. However, a village folk song mentions over 100 varieties of rice, many of which now sadly only exist in song. In addition to the rice varieties, 366 species of trees and plants were recorded, 93 species of bird and 14 wild mammals.

The register was only written in the local language. Some rare plants were listed but their location was not given to provide further protection against exploitation.

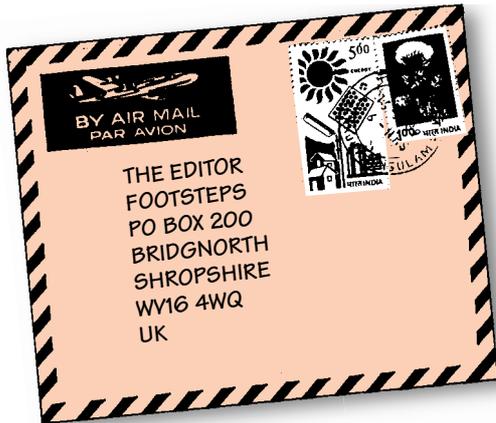
The forum believes they have now established the future rights of their community to continue using all the crops and genetic resources within their village boundary. No patents will be permitted on any of the varieties or species listed. Lawyers are still considering the implications of this work. But the Pattavam villagers set a challenging example to other communities around the world.

Adapted from an article by Claude Alvares in Third World Resurgence Issue 84, TWN, 228 Macalister Road, 10400 Penang, Malaysia.



Twenty-six traditional varieties of rice were being grown.

Photo: Mike Webb, Tearfund



Benefits of tree planting

Since 1978 the Methodist Mission Agricultural Programme in The Gambia has helped construct hand-dug wells in many parts of the country to encourage village orchards and dry-season vegetable gardens. With Ansumana Mendy, the Manager, and Lamin Badji, Supervisor of well digging, I visited the community vegetable garden in Nyofelleh Bah village. When the four wells there were dug, back in 1981, the site was without trees and the wells had dried up so quickly that the villagers quickly abandoned the garden and instead planted a fruit orchard. Twenty years later these fruit trees have become large trees, providing shade and thus reducing evaporation and their roots have improved the ability of the soil to soak up rain. At the time of our visit there had been no rain for seven months but each of the wells had a water level of at least three metres deep.

Bob Mann

From Newsletter 21 of MRDF
25 Marylebone Road, London, NW1 5JR
UK

Ideas for latrine slabs

Last year I visited my home area in the north of Uganda and noticed that several latrine toilets in the village used a slab made of pottery. These were originally made locally for use as large cooking pots, but after they became too old to use for cooking, a hole was made in them and they were being used as weak, ineffective slabs in latrines. They are unsuitable because being already old, they soaked up the urine and quickly became weak and unsafe.

I am hoping to make a latrine slab out of clay, consolidated by local pitch. However, I still need a top layer made from local produce (maybe fruits, bark or leaves?) which can make it waterproof to urine. What products can I use in our region of Central Africa?

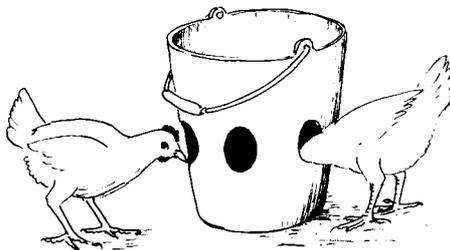
Mitano Feydeau

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PAUL DEAN, on the editorial committee, suggests coating the clay slabs with gloss paint with a little fine sand mixed in to make a rougher surface to avoid slipping. If possible, reinforce the slabs with wire bars or chicken wire. If a local potter is able to fire the clay slabs, then a salt glaze could be used.

Chicken feeder

I found my few chickens were very wasteful with their food, so I solved the problem by using a large plastic jug. I cut two holes in the jug sides just large enough for the chickens to put their heads through. You can easily add food through the holes. The food lasts longer because there's less waste.



I read this idea from Inetia Corbin in *Organic Gardening*, Jan/Feb 2000, and tried it out with my new flock of chickens and ducks. She was right – it does work better than commercial feeders. I used large plastic jugs for the chicks and then switched to larger-capacity feeders made from plastic buckets, with the holes higher up on the sides as my birds grew up.

Ken Hargesheimer
Lubbock, Texas
USA

Taking care of God's creation

The young boy in the photograph has been given responsibility to take care of a young antelope, whose mother was chased away by fierce dogs. He loves the animal and feeds it maize meal (*ugali*) and cold tea. I even share my biscuits

with it' he says. He is a good example of how we need to care for God's creation.

James Kipnyango
PO Box 179, Turbo
Kenya

Community days

We run a skills training centre just outside Bulawayo, Zimbabwe, called the Ekuthuleni Carpentry Project. We try to equip the young people who join us with a wide range of simple and practical skills besides carpentry that they can share with their communities, mostly in the rural areas. We don't want to be a stepping-stone for people to come and live in town, but encourage them to see the needs around them and go back and help. We have recently started monthly 'Community Days' when we raise awareness of needs and possible solutions. We often use the suggestions we find in *Footsteps*. We are now working on drip irrigation for our garden and plan to build a water filter and latrine. The Bible studies are a great encouragement. Thank you for being such an important source of information!

Ekuthuleni Carpentry Project
PO Box 491, Bulawayo
Zimbabwe

Problems with bats

Here is a further response to the question of readers about dealing with bats. In Africa there are often problems in large buildings such as medical centres, schools and even churches. We recommend hanging nylon netting to cover all the surfaces or timbers of the



Photo: James Kipnyango

roof structure so that there are no spaces for the bats to get through. Make sure you do not make a ceiling with the netting as they like to fly between the timbers and rarely underneath. Choose netting with small stitches, made with thin thread so that the bats will not get caught. Our experience has been that they will leave the building a few weeks after the netting is installed.

*M Elysée Tossy
BP 114 Eniab
2ème Année, Parakou
Benin*

Our global village

Adjusting to the contrasts in our 'global village' is a challenge in many ways. An American farmer recently expressed his dismay that, firstly, each product leaving his farm is worth less than it costs him to produce, and secondly, that when it arrives at the other side of the world, it probably ruins the livelihoods of several local farmers. In Nigeria cassava is currently being used as cooking fuel since its market value has been undercut by cheap imports of starch crops. Oranges are really cheap yet imported, expensive soft drinks increase in popularity. In the centre of a productive region of Nigeria, I was served rice imported from Thailand! These issues result in worldwide injustice to farmers and the creation over which we are called to be stewards. Jesus was not only a little baby in a manger but also the One who overturned tables in the temple in his righteous anger over inappropriate trade. Place is important – and local markets are being sacrificed too much.

*John Wibberley
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Partridge rearing

In answer to Mabete Miankenda's query about raising partridges in *Footsteps 45*, I have bred and reared three kinds of partridges. I hope that you have available some broody hens. I would suggest that you begin by searching for nests of wild partridges. When they have 10–15 eggs, take most of them away leaving just two or three eggs in the nest. Place the eggs immediately under your

Cooking with cassava leaves

While reading *Footsteps 43* on encouraging change, a reader from Kenya wondered whether cassava leaves are edible. Two people have responded with recipes. Mr Gilbert comments, 'The majority of people in our country (Democratic Republic of Congo) eat them as basic green vegetables.' He shares the most common method used in the Bunia region where he lives. Mr Ramampandra of Madagascar says that cassava leaves are widely used in his country.

Preparation

- Remove the old leaves and stalks until you have ten handfuls of young leaves, enough for a meal for three to four people.
- Heat a pan of water (five litres) to boiling point.
- Submerge handfuls of cassava leaves in the water for 4–5 minutes so as to remove the poison, then squeeze them hard to remove all the green liquid from the leaves, and then place them on a clean shelf to cool.
- Grind the leaves in a clean mortar.

Recipe one

- Add onions, leeks or garlic, or aubergines if available.
- Place in a pan with just enough water to cover the ground cassava leaves. Heat the mixture for 10–15 minutes, then add a little salt and at least 40ml of unrefined palm nut oil (or any other untreated vegetable oil).
- Tightly seal the pan and leave on low heat for at least an hour.
- Serve with dishes such as rice, plantain bananas, chikwange or fufu paste that is prepared using cassava flour.

Recipe two

Cook the ground cassava leaves with pieces of pork meat and fat, a little salt and enough water to cover. Cook gently for an hour.

Recipe three

Cook the ground cassava leaves with plenty of groundnut paste, a little salt and enough water to cover. Cook gently for 30 minutes.

Remember that some varieties of cassava contain a lot of the poison cyanide. Use 'sweet' cassava varieties. After cooking, the above mixtures should not taste bitter. If they do, they should not be eaten.

*Kabangu-Wa-Katanga Gilbert, c/o Father Mark Denecker, PO Box 134, Païdha, Uganda
Christian Ramampandra, BP 37, 321 – Vohipeno, Madagascar*



broody hen. Hopefully the partridge will then lay some more eggs but you should let her hatch these because you do not want to rob the countryside of wild birds.

When the chicks hatch they will need a high protein diet (termites or other insects) for the first few weeks, but eventually they will feed mainly on grains. To prevent them flying away as they grow, take the end off one of the wings (the last joint) when they are young chicks. You now have flightless partridges and you will have to protect them from predators.

Try to obtain eggs from several nests and keep the offspring separate so you can breed one 'family' with another. You can allow the partridge to brood their own

eggs or you can keep removing the eggs and use a broody hen that can brood 20–25 eggs at a time. My 'Chukar' partridges from Syria would lay up to 100 eggs in one season. Repeat the extra feeding and wing tipping. Remember it has taken many generations for hens to become tame and it will take many generations for partridges to do the same.

Take time to study the local partridges and provide them with the habitat they like, places to nest and lots of food to eat so you will always have plenty of wild partridge to hunt.

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Improving bio-diversity at local level

Case study from Maradi, Niger

by Trudi Dickins and Joel Matthews



The area around Maradi used to resemble a desert until MDP encouraged the regrowth of tree stumps.



The Maradi Integrated Development Project (MIDP) is a Christian development programme which is part of SIM (Society for International Ministries) Niger. They believe the gospel is at the heart of true and lasting development. They encourage stewardship of the earth and living in harmony with both God our Creator, and the earth he created to be enjoyed.

When the MIDP first started work in the Maradi region, there were only a few trees left in fields throughout the whole district. Destruction was almost total. One could go in any direction from Maradi and mistakenly think that the area was a desert. Traditional land preparation methods were very destructive. All trees and vegetation were cleared and burnt, exposing soils to the effect of winds, hot sun and fierce storms. There was no wood for people to harvest for cooking and building. Women walked miles to gather small

sticks and millet stalks. When this was not available, manure was used for cooking. Building material was extremely scarce. People sometimes went out at night to dig up the roots of the few remaining protected trees to use for building. People had to travel up to 30 kilometres to Maradi to buy building poles.

Traditionally farmers cleared all their land to provide fields for crops. MIDP introduced the idea of allowing tree stumps to regrow and become productive. At first farmers found this

saved them the work of clearing the stumps each year. When they found that allowing trees to regrow didn't harm crop growth and brought other benefits, particularly financial, they began to experiment.

With many species, trees cut down years ago still maintain root systems that push up new shoots every year. Farmers are encouraged to leave five of these shoots per tree, cutting one each year and letting another grow in its place. On removing a

Practical adv

- Begin by promoting local trees that farmers see as beneficial for crop growth. Later on, do local research with farmers to find which trees are most suitable. These are usually species with deep roots that do not compete with crops.



- Avoid monoculture. Plant several crops together such as peanuts, several varieties of beans and sesame. This reduces damage from pests and disease.

- Increasing diversity of trees and plants will increase the number of insect predators such as birds, lizards and certain insects (praying mantis) so that pest control improves.



shoot, the cut leaves are left on the surface where they reduce erosion and are then eaten by termites, returning the nutrients to the soil and improving soil fertility. The remaining shoots continue to grow, providing an endless supply of wood. The ideal density, when grown with cereal crops, is between 40 and 80 trees per hectare. However, this can vary, depending on the soil, climate and tree species. Tree layout will need to be carefully considered if ploughs are used for cultivation. In the last 15 years,

farmers' views have changed from seeing trees as a nuisance and competing with crops, to seeing them as an essential part of sustainable agriculture.

From the first year, firewood is collected from trimmings. From the second year on, cut branches are thick enough to sell. Other by-products include fodder, edible seedpods and leaves, timber, and material for roofing, walls, granaries and tool handles. The quality of life has improved tremendously. Wind speeds and dust are

greatly reduced. There is plenty of shade and the area is much more productive and attractive.

Joel Matthews is the Director of the Maradi Integrated Development Project, SIM, BP 121, Maradi, Niger.

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rice

- Encourage high value grasses such as elephant grass. They help prevent soil erosion, encourage soil fertility, provide animal feed and the leaves can also be woven into mats.



- Enable people to solve their own problems and experiment with new ideas. If they work, the farmer will be the first to know and will be the most enthusiastic promoter.

- Encourage farmers to make improvements first on their own land rather than on common land. This is more likely to bring benefits.

- Promote high value trees that provide edible leaves, pods and fruits for humans so that people have something to eat during times of drought. Wood can also be sold in order to buy food.



- Encourage the community to develop clear rules that respect property, so that people are punished for damaging or removing trees on other people's land.

- Promote the natural regrowth of tree species from live tree stumps. If there are no live tree stumps, try scattering seeds from local species during the rainy season.



- At first, encourage environmental protection from the idea of long-term profit and improved fertility. Later, people may be ready to consider environmental issues from a spiritual perspective.

- By encouraging the use of the trees for cooking fuel from the first year, soil fertility improves as crop stalks and animal manure can instead be returned to the soil.



Farmers' questions

ABOUT BIODIVERSITY AND GM CROPS

by Avice Hall

The Women Workers' Training Centre in the flat arid plain of Tamil Nadu works with about 100 villages in the surrounding area. Many years there is hardly any rainfall and there is widespread poverty. Most farmers are subsistence farmers and lack money to own the oxen needed for ploughing the land.

Under the motto 'God loves villages', the centre runs many different development programmes in the villages, including day-care centres for the under fives, medical programmes and after-school tuition. With the encouragement of the centre, many villages now have Women's Clubs and Farmers' Clubs. Each month, the leaders of the Farmers' Clubs meet at the centre, when outside speakers are often invited. These meetings cover a wide range of topics.

Information from these leaders' meetings is then passed on to farmers in the villages.

The day I visited, there were three speakers at the meeting; two government advisors on seeds and cultivation, one of whom had been involved in the development of a variety of GM rice for the government, and myself, a plant pathologist. After the talks there was an open question and

Who has developed GM varieties and why?

The majority of GM crops have been developed by large global companies for use as cash crops. Their aim is to increase the profit margin for their shareholders and large landowners. At present very few GM varieties have been developed by organisations concerned to share the benefits with low-income farmers.

Does farming affect biodiversity?

Growing just one crop over large areas (monoculture) will reduce biodiversity at several levels – at regional level, at field level and also within the crop. The use of fertilisers and pesticides also reduces the numbers of beneficial or useful organisms. However, intercropping or small, traditional growing systems will help to preserve biodiversity.



The Farmers' Clubs leaders' meeting in Nagalapuram.

answer session. Some typical questions and answers are shown on these pages.

Much later that evening after everyone had returned to their villages, we arrived in one village and joined an open-air classroom. Here a small group of men and women was gathered round a blackboard and one of the farmers' leaders was faithfully reporting all that he had learnt earlier in the day. Chalk was used to reproduce the diagrams from the morning, children were hanging round the area and there was much lively discussion about the information passed on.

Then an elderly gentleman stood up and explained that he was the 'tree officer' for the area, and was there to see that they all planted trees, and did not cut them down. He *was* rather elderly and the school children giggled at his talk,

What has biodiversity got to do with agriculture?

There are three levels in which biodiversity operates within agriculture. Firstly there is the general biodiversity of different species of plants, animals and micro-organisms in the environment of the farmed land. Some of these species are helpful to agriculture, such as the micro-organisms that break down organic material so recycling nutrients and improving soil structure, or the beneficial insects that eat crop pests. Other species, such as weeds, pests and those that cause disease, are not beneficial to the farmer.

Secondly there is the diversity of habitat when a mixture of crops is grown together (intercropping). This is useful as the varying sizes of the different crop plants as well as their differing susceptibility to pests and diseases, gives some control of pests and so tends to reduce the likelihood of epidemics on any one species.

Finally there is the diversity within the crop grown which has a mixed genetic makeup. Just one variety of rice may be grown, but the seed may be local, self-saved seed often selected and saved over many generations. These 'local varieties' are known as landraces, and are often well adapted to the local environment. Landraces contain vital genetic variation, and we need to preserve them. This is why landraces are saved in seed banks to provide sources of variation for plant breeders.



Photo: Avice Hall

Drying four varieties of pulse – an example of farmers preserving biodiversity in crops.

but their parents told them off, order was restored and the lesson continued. As we walked away, I thought that the old man was making a very important contribution to the biodiversity of the area, and that we should all wait to see how GM crops develop and not rush to plant them now.

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How might GM crops affect biodiversity?

It is possible for GM varieties to have a more positive impact on biodiversity than some conventionally bred crops. For example, a variety resistant to insect attack would reduce the need for insecticide use, which kills beneficial as well as harmful insects.

However, that is not the whole story. Most of the GM seed available is for cash crops (rape, soya, cotton), not of subsistence food crops (cassava, sorghum, millets). Most of the GM seed available is expensive, and farmers are not allowed to save the seed, because of the patents on it, so expensive seed has to be bought every year. In some cases (such as *Bt* cotton) the management system for the crop is very different from that for conventional cotton. There may also be further effects if a gene from the GM variety 'escaped' into a wild relative, or if the gene in the GM variety made the crop toxic to a rare butterfly.

Are there any advantages to growing GM crops?

Potentially some GM crops offer very real benefits, which may well outweigh any impact on biodiversity that they might have. The growing of 'golden rice', high in vitamin A, which will help to reduce blindness due to vitamin A deficiency, is a good example of this.

All farming has an impact on biodiversity, and some of this is negative. When you try to evaluate the impact of GM crops on biodiversity, you not only have to look at the direct impact (will one particular rare insect species be killed?), you also have to look at the farming system that will be used to grow that GM crop and compare that with other farming systems. A monoculture of cotton or tobacco is going to have a negative impact on biodiversity whether it is conventional or GM.

Why do plant breeders want to produce GM crops?

GM offers the opportunity to develop new varieties to meet specific needs. It may help to introduce a range of pest and disease resistance into varieties, so reducing the need for insecticide and fungicide use.

Should we buy GM seed?

At present, GM crops have not been properly evaluated. Few varieties have been produced which bring clear benefits for subsistence farmers. There are many things that can be done to improve yields without spending extra money on GM seed. Farmers should continue to learn and understand more about the concerns and the benefits of GM crops as this is a rapidly changing situation.

Neem: who owns it?



TRADITIONAL PROPERTY RIGHTS AND BIOPIRACY

by Nigel Poole



For many centuries, the medicinal value of the leaves and seeds of neem (*Azadirachta indica*) has been known in India, its country of origin. Neem products have valuable medicinal properties and many traditional uses as medicines, pesticides, insect repellents, fertiliser, diabetic food, soaps, toothpaste and contraceptives.

Recently there has been much research to investigate and prove these properties. Neem products are also commercially important. The neem industry in India, and in other countries where neem has been introduced, has focused particularly on producing pesticides that do not damage the environment.

It is not surprising that there should be large-scale commercial interest in neem. Since the 1950s, many patents have been taken out for neem products in the US, Japan and in European countries, covering a range of products from toothpaste to contraceptives.

In 1994, a US firm and the US Department of Agriculture were jointly granted a patent for a fungicide made from neem oil. This ruling brought considerable opposition from NGOs and environmental organisations opposing biopiracy. A petition against this patent was made arguing that:

- biological resources are a common heritage and should not be patented
- a patent would prevent local communities (who have used the

product for centuries) from continuing to use neem

- the patent might block economic development in developing countries.

The European Patent Office agreed to withdraw the patent in May 2000 arguing that nothing has been invented, and that the knowledge and use of neem had been widespread in India and other places for many decades. Support from India was vital in overturning the patent. Indian laws to prevent biopiracy are now likely to be strengthened.

What is the issue?

Biopiracy is now a topic of much concern, with neem as just one example. The World Trade Organisation still allows for the 'ownership' or patenting of genetic materials unless, as with neem, it can be proved that the development of a product is not new because it is traditional knowledge.

What can be done?

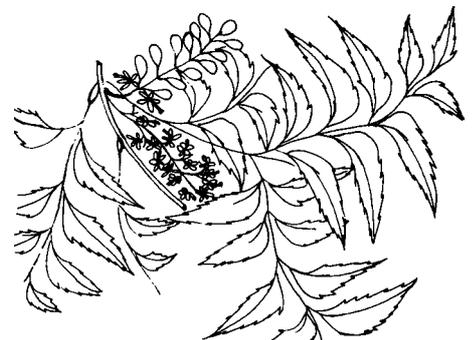
At stake are the rights of people in poor countries, particularly traditional users

of indigenous plant and animal products, to continue to use those materials. For example, the right of farmers to save their own seed without paying royalties to seed companies.

What can be done if outsiders threaten the livelihoods of communities who traditionally use a product about to be patented? At community level, documenting the traditional knowledge of plant products by local people has many benefits. This may include the protection of traditional users against false claims about so-called 'new' products, processes and uses.

Secondly, new laws need to be made to provide adequate protection for traditional resource use by poor people. Local advocacy organisations such as India's Research Foundation for Science, Technology and Ecology, have been important in protecting traditional knowledge from commercial exploitation. There are international organisations at work such as the UN World Intellectual Property Organization.

Biodiversity is a matter of life and death for plants and animals. Biopiracy may or may not harm biological diversity, but it will certainly harm the prospects of the fair and equal sharing of the benefits from using natural products. In certain cases, biopiracy may mean life or death for local communities.



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Information for this article came from Down To Earth: Vol 9, No 2, p13 (2000).

Useful websites:

www.biodiv.org

www.wipo.org/traditionalknowledge/introduction

Producing neem oil

Neem trees live for between 100 and 200 years, growing up to 30 metres high. They start producing fruit after a few years and become fully productive after ten years.

The Sanskrit name for neem means ‘the curer of all ailments’ and the Swahili name, *mwarubaini*, means 40 because it is believed to cure 40 different diseases. It is best to grow neem from fresh seed – less than three months old. You can also try taking cuttings, removing the leaves and planting in moist soil.



Neem fruits provide food for bats and birds. They eat the sweet flesh and spit the kernels out. Collect these seeds from the ground and wash them. Leave them to dry in the sun for a few days and then store in containers where air can circulate such as jute sacks or baskets.

To produce neem oil, gently pound well-dried seeds in a large mortar to split the shells open, without crushing the kernels. Pour the mixture from a height into a basket (winnowing). The kernels should fall into the basket and the lighter shells be blown away. Remove any rotten kernels as they may be poisonous. Return the kernels to the mortar and pound to form a brown sticky paste. Knead this paste by hand, adding a small amount of clean water. After kneading for a while, the oil begins to ooze out. Continue kneading and squeezing until no more oil comes out. About 100–150ml of oil can be extracted from 1kg of neem seeds. The seed cake remaining is an excellent fertiliser or animal feed.

Some uses of neem oil

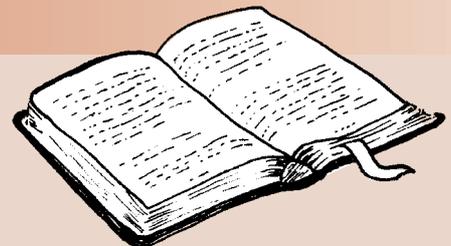
Footsteps 48 will include treatments using neem leaves and bark.

- For treating skin infections such as acne, psoriasis, scabies, eczema and fungal infections, take 100g of a low-cost ointment (such as Vaseline) and add 10g of neem oil. Rub into affected areas.
- For Candida fungal infections that cause lesions in the mouth and vagina, mix one part neem oil with nine parts of:
 - honey for mouth infections
 - yoghurt or vegetable oil for vaginal infections.
 Apply three times a day to affected areas.
- Add a tiny amount of neem oil to the fuel in kerosene lamps to keep mosquitoes away.
- Take 100g of ordinary soap, break into pieces, add a little water and 10g of neem oil. Pound together, shape and allow to dry. This will produce a medicated sweet smelling antiseptic soap.
- For coughs, add three drops of neem oil to a spoon of honey or sugar and take three times a day.

BIBLE STUDY

Biodiversity in the Bible

by Calvin B DeWitt



‘Be fruitful and multiply, and fill the skies and seas.’ With this blessing in Genesis 1:22, God filled the sky, land, and sea with abundant and diverse life! ‘How many are your works Oh Lord! In wisdom you have made them all; the earth is full of your creatures’ (Psalm 104:24). And responding, all creatures pour out their praises to God (Psalm 148).

Read John 3:16 and Psalm 104

- How much does God care about the world he has created?

Read Genesis 6-9

- What did God do when Creation was threatened?

Later he promises eternal life to those who truly follow Jesus (John 3:16), but he warns of destruction to those who destroy the earth (Revelation 11:18).

God wants us to conserve Creation’s fruitfulness.

Read Ezekiel 34:17-19

- What does this passage reveal about how we should treat God’s

creation? How should we consider the needs of other people and other creatures?

Because God made all things and holds all things together through Jesus (Colossians 1:15-20), everything belongs to him. While God leads us to green pastures and pure water (Psalm 23), the earth belongs to God alone (Psalm 24:1). His are gifts we do not own. His are gifts that must never be taken from us or the other creatures!

What are we doing to care for creation and God’s creatures? Do we resist the desire to be greedy? (Matthew 6:33). Do we provide places for flowers and birds on our land or in our communities? Do we preserve the diversity of our food and medicinal plants? Keeping our places fruitful for all God’s creatures brings praise to God, the creator and owner of all things!

Calvin B DeWitt is Director of Au Sable Institute of Environmental Studies and Professor of Environmental Studies at the University of Wisconsin-Madison.

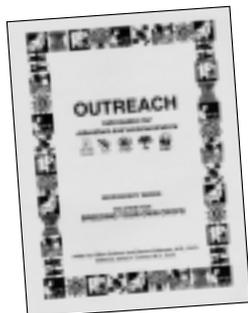
Books Newsletters Training materials

Outreach education packs



There is a set of three useful Outreach packs on Genetic Diversity and Food Crops with a total of over 200 pages. These packs are available free-of-charge to 'multipliers' in the Outreach network. Multipliers include newspaper journalists, radio broadcasters, community workers, representatives of NGOs, teacher trainers, curriculum developers and others involved in educating children in third world countries about environmental and health issues. If you would like to apply to join the Network, please write, explaining how you would use the materials, to:

TVE USA
PO Box 820
Shelburne
VT 05482
USA



If you are not a multiplier, you can buy this set of three packs on Genetic Diversity (available only in English at present) at a price of US \$27 including postage (\$33 airmail). Make dollar cheques payable to Outreach/TVE USA.

The Mediator

This is a magazine which aims to encourage peace in Africa through building up the churches' ministry of healing and reconciliation. It has useful and challenging articles for church leaders, youth and community leaders and anyone interested in promoting peace and reconciliation. It is published in English, French and Kiswahili. It is produced every three months and costs US \$18 for a years subscription including postage. Please write to:

The Mediator – Subscriptions
c/o MAP International – ESA
PO Box 21663
Nairobi
Kenya
E-mail:
pokaalet@map.org



MIDP technical manual

This manual details the components and methodologies of the MIDP (which are summarised on pages 8–9 of this issue). It contains technical information on good stewardship of the environment and in particular the benefits of encouraging tree growth which is likely to be appropriate for most of West Africa and similar climatic regions elsewhere. It is available in English, French and Hausa, and costs US \$20 including postage. Write to:

MIDP – SIM
BP 121, Maradi
Niger
E-mail: midp@maradi.sim.ne

Setting up community health programmes

by Dr Ted Lankester
2nd Edition 2000



This excellent book is written primarily for field workers but is also useful for planners, managers and course organisers. It is a practical manual for use in developing countries covering the full range of community health topics, in simple English with many illustrations. The book is available at a special price of £6 (including postage) to *Footsteps* readers only and is highly recommended. It is available from:

Community Health Book Offer
PO Box 200, Bridgnorth
Shropshire, WV16 4WQ
UK
E-mail: resources@tearfund.org

Physiotherapy manual for nurses



Free copies are available of this manual, which is designed for the use of nurses in rural hospitals. It contains practical information on various kinds of fractures, amputations, joint disorders, deformities and diseases of the nervous system. There are detailed descriptions of all kinds of exercises and also ideas for making simple equipment. The manual was developed from the course notes of a basic training course in physiotherapy in Rwanda. Please write with brief details of how you could use this book in your work to:

Resource Development Team
Tearfund
PO Box 200, Bridgnorth
Shropshire, WV16 4WQ
UK

Pratique d'élevage de poulets



This is a practical manual about raising chickens produced by Peace Corps in Morocco. It is full of illustrations and practical low-cost tips for improving chicken husbandry. It is available only in French and Arabic. Peace Corps are offering free copies to *Footsteps* readers who can make good use of it. Please contact:

Peace Corps (IRC)
1 Rue Benzerte, Rabat
Morocco
E-mail: melkadi@ma.peacecorps.gov

Free newsletters and journals

The fourth edition of *Free Newsletters and Journals* from Healthlink Worldwide gives details of 145 international newsletters, magazines and journals relating to health and disability issues which are available free or at low cost to readers in developing countries. Also listed are 22 newsletters and journals available on subscription.

This resource list is a valuable networking tool for learning about the activities of other organisations. A brief description of each publication is given together with their address and internet contacts. The publication costs £5 (US \$10) including postage. Single copies are available free to readers in developing countries. Write to

Healthlink Worldwide, Cityside, 40 Adler Street, London, E1 1EE, UK
E-mail: info@healthlink.org.uk

Training in faith and community health

For more than 50 years our seminary trained hundreds of pastors to work in the rural areas of Peru. However they often struggled to help people with issues concerning their health and development. Our seminary in Lima, Peru, has now converted to become a university (Universidad de Peruana Unión) with a new degree combining theology and community health education. For further information please contact:

Juan Choque Fernández
Associate Professor
Universidad de Peruana Unión, Lima
Peru

E-mail: escristo@mixmail.com
Web page: www.upeu.edu.pe

Training for development workers

Le pont in Togo provide regular training courses in French aimed at development workers, NGO members, village committees and counsellors. The training includes project management, negotiation, conflict resolution, women and development, and sustainable development.

The fees are heavily subsidised by charities but each application must be from someone working with a specific development project – not from individuals.

For further information contact:

Le pont
BP 2273, Lomé
Togo
Fax: +228 21 19 60
E-mail: lepont@bibway.com

Diversity not Adversity

IIED has some new publications on the subject of biodiversity. *Diversity not Adversity* looks at the issue of biodiversity and explores ways for the poor to benefit from preserving biodiversity. The paper is targeted at development agencies, NGOs and companies and explores the issue of biodiversity in depth. It is beautifully illustrated. A companion book, *Living off Biodiversity*, considers how to combine different livelihoods with preserving biodiversity.



For the first 50 Footsteps readers who quote the special reference BLG101, *Diversity not Adversity* is available for £3 or both books are available for £11 including postage. The normal cost is £62.50 including postage. Please contact:

IIED Bookshop,
3 Endsleigh St, London, WC1H 0DD
UK

E-mail: bookshop@iied.org
Website: www.iied.org

Les Enjeux Internationaux du Compostage

by Bernard K Martin

This book looks at the problems of erosion and desertification, and asks what are the basic conditions that plants need in order to be productive? Recycling organic matter is an essential technique for growing vegetables but also a means of influencing the climate, biodiversity, famine, drought and human migration. The author has experience in Ethiopia and Haiti and is a compost adviser. It is available only in French for 40 francs from:

SPE
6 Rue St-Ours, 1205 Genève
Switzerland

or:
SECAAR
06 BP 2037, Abidjan
Ivory Coast

Trees and multistorey agriculture in Africa

by H Dupriez and P De Leener

This is an excellent book, full of practical information and ideas. It has 280 pages with many illustrations and drawings. The first part of the book discusses in full the relationships between people and the way they plant and use trees. The second part looks at the many possibilities and methods of multi-storey agriculture.

Free copies may be available to members of the Publications Distribution Service (PDS) from CTA (see Agrodok box on right).

Copies are also available at a cost of £22 including postage from the following address:



The Agrodok series

This is a series of over 30 practical publications on small-scale sustainable agriculture. The series is published by Agromisa Foundation – a knowledge centre for small-scale and sustainable agriculture in the tropics. The books are aimed at people who work directly with the small-scale farmers in the South.



Each volume costs US \$6 including postage. For a complete list of Agrodoks write to Agromisa. Here are a selection of their publications available in English, French, Spanish and Portuguese.

Preparation and use of compost (No 8)
Composting methods, materials, liquid manure.

Vegetable gardening in the tropics (No 9)
Vegetables, small-scale crops, cultivation, garden tools.

Small-scale poultry production in the tropics (No 4) Layers, broilers, housing, breeding, nutrition, health care.

Hatching eggs by hens or in an incubator (No 34) Artificial incubation, construction of incubators, improved natural hatching.

Storage of tropical agricultural products (No 31) Storage methods, dry seeds, oily seeds, root crops.

Write to:
Agromisa Foundation, PO Box 41
6700 AA Wageningen, The Netherlands
Fax: +31 317 419 178
E-mail: agromisa@wxs.nl

Agrodok publications are available free of charge for members of the Publications Distribution Service (PDS) of CTA. Membership is open to inhabitants of African, Caribbean and Pacific countries, working in the field of agriculture or rural development. For an application form, write to:

CTA, PO Box 380
6700 AJ Wageningen, The Netherlands
E-mail: cta@cta.nl

Terres et Vie
Rue Laurent Delvaux, 13, B-1400 Nivelles
Belgium
Tel: +32 67217149
Fax: +32 67217149
E-mail: terres.et.vie@linkline.be

Setting priorities

For health or development workers, each day is likely to bring many problems and concerns that need immediate attention. However it is easy to let these immediate problems take over any long term planning. We all need to set priorities in our lives and in our work and try to make sure that these really do 'take priority' and take up most of our time. Otherwise we will look back over the past year and realise that we have not helped achieve any practical and long term benefits.



Common interruptions that take our time and attention may include:

- reading the paper
- visitors needing hospitality
- friends and relatives needing help with transport
- officials requesting assistance for their work
- lack of fuel to make planned visits
- losing important documents or letters.

Rather than always dealing with the immediate, we all need to ensure we

have a long-term vision as well and give this our full attention. Below are some ideas for a meeting that may help participants learn how to effectively set priorities.

Once people have tried these exercises and become familiar with the idea of prioritising, these skills can be used in any situation. Recording information is important for planning. People can list the problems or concerns of the people they work with, or of their organisation, clinic or school, either on their own or in pairs and combine these on a chart, such as the one below. People could then

indicate which are the priority concerns. In this example, 25 people were asked to prioritise between three local problems in terms of how common and how serious they were.

Problem	How Common	How Serious	Total
Lack of water in dry season	✓✓✓✓✓✓✓✓	✓✓✓✓✓✓✓✓	26
Drunkenness	✓✓✓✓✓✓✓✓	✓✓✓✓✓✓	15
Few latrines	✓✓✓✓✓✓	✓✓✓	9

The issues with the highest scores indicate the likely priorities for action. But remember, we also need to seek God's priorities too! Share these skills with the wider community and encourage them to prioritise their own concerns.

Adapted from the Resource Manual for the Organisation and Training of Community Health Committees by Keith Wright, produced by UCBHCA, Box 325, Entebbe, Uganda.

Published by: Tearfund, 100 Church Rd, Teddington, TW11 8QE, UK

Editor: Dr Isabel Carter, PO Box 200, Bridgnorth, Shropshire, WV16 4WQ, UK



Ideas for meetings

- Divide people into pairs and read this story aloud.

You have just returned from the market and see your house on fire. The entire roof is on fire and there is nothing you can do to save the house. You have just two or three minutes to take out the five things that are most important to you. What would you take out?

- Give people a few minutes to decide which five possessions they would take out first.
- Ask several pairs to share with the others what items they have chosen .
- Then ask each pair to decide which item they would take out first and why?
- Explain that they have made a priority list. From all their possessions, they prioritised the five most important. Then they decided on their top priority and gave the reasons for this.

Try repeating this exercise in other ways. Here are some suggested situations.

- *You hear on the radio that a cyclone bringing severe winds and flooding will reach your area in one hours time. Think of your community and decide on what five actions you would take to save as much life and property as possible. Which would be the top priority?*
- *The community health worker in your community is leaving to work in the town. The community needs to choose a replacement. What are the five skills and characteristics that you will look for when choosing a new health worker? Which is the most important?*
- *Consider your work and work situation. What are the five things that you would like to see improved, changed or achieved during the next year? Which is the most important and why? What steps can you take to ensure you are able to achieve this?*