

Sustainable Land use and Organic Farming

Land

There are 1.9 hectares of productive land available for each of the 6 billion people living in the world at present. In our industrialised Western society it is sometimes hard to realise quite how fundamental land is to our life on earth. The top six inches of land, which is soil, has to provide us with all our food. The land has to absorb much of our waste and is the catchment and filter for our water. It has to provide us with recreation and is essential to the supply of minerals and materials for our agriculture and industry. This land and its resources are finite, as is its capacity to absorb waste.

Land is not an inert material, a stable growing medium or cache of minerals, but a living community. It is living in the sense that it is home, above and below ground, to many millions of species. Soil may look inert but it is in fact a living community upon which all life on earth depends. The maintenance of this life is important for its own sake and also because it is part of a natural system, a complex web of biological and chemical interactions in which change in one component results in change in another. Therefore our management of the living earth is critical because of knock-on effects including those on our own home environment.

Land, and the consequences of its management, impacts throughout our society; on food supply, water, air, recreation, employment and our living environment, and ultimately its health is revealed in our health.

The urgent challenge for our world is therefore to develop practices which deliver a sustainable and stable global system, one which minimises the consumption of finite resources and pollution, provides sufficient for the needs of the human race and maintains the natural world. It is imperative that new land management systems are developed which, instead of dealing with individual problems in isolation, properly address the full impact that they have on all these critical issues of sustainability.

Key Concerns

The need for change is starkly demonstrated by our 'ecological footprint': the 1.9 hectares which are available to every human being, compared with the 4.8 hectares currently used by the inhabitants of the UK or the 9.5 hectares used by the inhabitants of the USA to support their lifestyles. In the new millennium, world-wide, we are faced with critical land use problems, not only the inequitable and excessive use of resources by some but also air pollution and rising carbon dioxide levels (causing ill health and climate change), soil degradation and erosion (resulting in famine and flooding), chemicals and hormones in our drinking water and many millions of people deprived of adequate land from which to feed themselves. Such imbalances, damage to climate, rising sea levels and exploitation of limited resources, particularly oil, all result in hardship, social unrest and ultimately wars.

The key concerns of soil, water, land and finite resources are all inextricably interconnected. We, to be healthy people in mind, body and spirit, are totally dependant on a healthy environment and our care for it. Ecology, the study of creatures in their natural home, and economy are both words deriving from the Greek word 'ecos' meaning house. Economics is therefore concerned with the functioning of our 'home', that is "good housekeeping" and requires wise use of all resources. It is not simply about flow of money, which is actually only a means of exchange. Present day concentration on only the so-called "growth" of our economy is not only misnamed, but also highly damaging socially and environmentally and is unsustainable.

Sustainability, now a much used and frequently misused term, can be equated to good housekeeping or ensuring that the books balance. The word was most succinctly defined as early as 1987 by the Bruntland Commission, which called for Sustainable Development "that meets the needs of present generations without compromising the ability of future generations to meet their own needs." This is development in terms of moving towards a more sustainable system *for the benefit of all*, not so called "growth" to benefit the few. *Land use, agriculture and food production is the basis of all human activity, hence ensuring sustainable farming practice is of primary importance to achieving a sustainable world.*

Implications for Agriculture

Agri- culture is primarily about cultivating our land for the production of food, our most basic human need. In many countries it is the predominant human activity and even in the UK where the percentage of the population directly involved in working the land is small it is still the majority land use. Far from being an irrelevance as some politicians seem to view it, it is a key activity influencing nearly 80% of our country, in rural counties it still employs up to 20% of the people, and it is critical to the well being of our entire population.

The agriculture of this new millennium has to meet the food, health and re-creational needs of everyone without taking a heavy toll on our earth, wildlife and the many peoples of this world. Farming has to be financially viable, productive and rewarding whilst working to reduce consumption of finite resources including soil, nutrients and oil, decrease transport burdens and minimise pollution and damage to wildlife. It needs to cease the use of poisons in the production of food, to stop overcrowding and routine use of antibiotics in animal production and to avoid mono cropping with its consequent build up of plant pests.

Organic Farming

Organic farming is an integrated system of food production that is defined by law and based on internationally agreed principles. These are set out by the International Federation of Organic Agriculture Movements (IFOAM), a membership organisation for groups, companies and individuals. Central to these principles are the conservation of soil, working within a closed system, avoidance of pollution, working with rather than against natural processes, the production of healthy, quality food, reduction of energy use and working towards localised food supply in an equitable society.

Farming according to these principles results in farm practices that aim to maintain or build soil fertility, often through the use of rotations and nitrogen fixing legume crops such as clover and beans. Artificial pesticides, herbicides and fertilizers are avoided because of the negative impacts on beneficial soil and plant organisms and human health. Successful organic production relies on the encouragement of natural predators and maintenance of natural habitats in order to keep pests and diseases at acceptable levels.

Organic farming is fundamentally about the operation of a farming system where management is used instead of external physical inputs, and the recognition that it is management of a living biological system. This is in stark contrast to the chemical and input orientated approach of 'conventional farming', which is characterised by the use of soluble artificial fertilisers, synthetic pesticides, and veterinary medication. The practical management found in organic farming may take all sorts of forms; for example crop rotation, use of nitrogen fixing legumes, effective recycling of manures, creating wildlife and predator habitats and breeding sheep for intestinal worm resistance. Not only does this 'system management' approach avoid the direct and undesirable consequences of increasing dependence on inputs but it also avoids many indirect effects. For example, without recourse to routine medication it is impossible to operate an intensive poultry unit with all consequent implications for animal welfare, importation of feed, disposal of manure and nutritional quality of the meat. The long-term aim is a farming system which is in balance with nature and therefore able to remain continually productive without damage to biodiversity. This is not say that conventional farming cannot use the techniques which organic farming uses, it is just that organic farming relies on them as the basis of the whole system.

The principles of organic farming are universally applicable. Since its inception in the first half of the 20th Century, organic farming sought to establish basic guidelines which would address the problems raised by conventional production methods and by the 1970s widespread uptake lead to the establishment of international standards and a flourishing market for organic food. Organic farming has been tackling the issues of sustainability for many decades now and consequently has developed some very successful commercial models which already deliver on many of the key elements of sustainability, it goes further than any other system of agriculture and has worldwide application.

Why we need to change – resources, environment and people

Top of the list of drivers for change is oil. The primary cause of climate change is the burning of fossil fuels which has resulted in a 21% increase in carbon dioxide emissions since 1980 and a call to reduce emissions by 60 – 70%. The production and supply of food is the second largest cause of carbon dioxide emissions in the average domestic household in the UK. There is an urgent need to reduce oil consumption in food production through a variety of mechanisms including reducing the use of nitrogen fertilisers (each tonne of Nitrogen requires two tonnes of oil in its manufacture, which at standard recommended application rates for dairy grassland involves the use of 0.7 tonnes of oil per hectare), developing more energy efficient cultivation systems and reducing the amount of transport involved in distributing food. Indeed a policy for localisation is required for food supply, not globalisation.

The problems are compounded by the fact that at current consumption levels world oil reserves are likely to be exhausted by 2040.

The consumption of other finite resources in agriculture raises similar concerns. The use of phosphate fertilisers is a prime example; limited reserves are rapidly dwindling, speeded up by inefficient on-farm use and a failure to recycle either at the farm level or at the human waste level. Again there are consequent pollution problems; phosphate run off from agriculture, along with detergents, is largely the cause of algal blooms in watercourses and declining biodiversity in lakes.

Water is often cited as the first indispensable resource and the one that will be exhausted soonest. Not only are reserves of 'fossil' water being used through wasteful irrigation systems and flushing toilets but rivers and underground aquifers are being variously polluted with nitrates, pesticides and hormones.

There has been a catastrophic wildlife and habitat decline as a direct and indirect result of farming practices. Particularly well documented in the UK, the scale of the problem is highlighted by the 90% decline in some common bird species during the last 30 years. Similar declines are evident from as far a field as Argentina and Holland. This decline continues in Western countries despite the removal of the more damaging pesticides.

The use of poisons on our food to control pests, disease and weeds is clearly undesirable; consequently there are ever-tighter controls being placed on their use with new legislation coming into force, which will prohibit many of the existing chemicals used in agriculture. A similar situation arises over veterinary medication; questions over the effect of residues on human health and the build of drug resistance by diseases due to the over use or misuse of medicines highlights the need to move away from the unnecessary dependence on medication. The prophylactic use of veterinary medicines is closely linked to and indeed supports the over intensification of animals, notably pigs and poultry. Widely used practices such as battery chickens and farrowing crates, which are unacceptable on welfare grounds, are now being phased out by legislation.

Finally change is needed in the way we manage our rural economy because of the impact on the people involved. In the UK the average farm income (Net Farm Income) is less than £10,000 per year, less than half this for upland and arable farms and farm staff are amongst the lowest paid workers, suicide rates amongst farmers is currently one a week and 25,000 farmers and farm workers are losing their livelihoods annually. The consequences are felt throughout the rural economy. A more prosperous agriculture is vital.

In total the 'external' costs of agriculture in terms of damage to water, air and soil have been estimated by the Environment Agency to be £1.25 billion per year in the UK. Elsewhere the costs have been estimated to be £208 per hectare per year, including the cost of damage to biodiversity and human health.

Ultimately agriculture is primarily concerned with food production and providing for an adequately fed and healthy population. While there has been considerable success in the West in providing sufficient food, this has been at the cost of health, our own

and our environment's. Increasing incidence of heart disease, cancer, stroke and obesity are all related, at least in part, to diet and demand a change in the balance of food types, nutrient content and contamination levels, all of which are influenced by the farming methods producing our food.

A minority view expressed by those closely linked to the established economic structure is that most of these issues identified above as key concerns for sustainability are not serious problems and that where they are real they can be overcome, not through any major changes in our in-put based farming system but through the application of some new technological fix. The latest example is genetic engineering which has parallels with pesticides which were offered as the fix for the pest and disease problems aggravated by chemical fertiliser use which was offered in turn as the fix for increased food production. The fallacy of such an approach is evident in the succession of food contamination and environmental disasters that have been a consequence of agrochemical use in food production. Many scientists agree that genetic engineering has been introduced with no adequate safeguards, its unknown effects cannot be withdrawn and there is little evidence of benefit to anyone other than the marketing companies pushing its use.

The basis for a more sustainable approach to agriculture is one that makes more efficient use of limited resources and avoids pollution through the use of natural biological processes, maximising recycling and minimising waste.

The Political, Global and Economic context

The so-called green revolution in post war agriculture brought increased quantities of food, at least initially, but its many problems are all around for us to see; degraded soils, poisoned wildlife and people dependant on costly inputs.

The drive towards free trade to boost economies is leaving land use exposed to serious risk since it prohibits safeguards for the disadvantaged and the environment. Trade is clearly an important component of a mixed economy but the scope for countries to support more sustainable practices is now being seriously restricted. Worse still free trade is strengthening the power of multi national corporations that have in the past been responsible for the most unsustainable practices.

One consequence of post war agricultural policy and the concentration of food wholesaling and retailing into the hands of a few is depressed world market prices for food, such that even in Europe and America, with their high subsidies for agrochemical farming, producers find it increasingly hard to make a living unless they push their land to the limit. There is much debate about the pros and cons of subsidies, but the crucial point to appreciate is that current world market prices for produce do not provide a living for even the largest farms in countries such as Argentina, let alone in this country with our high costs and our demands for high standards of environmental and animal care.

In the UK agricultural policy is poised for radical change. Following signals from the EU and with a drive for the removal of production support subsidies in line with the World Trade Organisation's Free Trade policy, there is commitment on paper to a move to more environmental friendly land management. The latest evidence of this is

the Curry Report which envisages a substantial reduction in production subsidies, increasing support for conservation and greater reliance on the farmer to achieve higher prices through direct marketing and branding. It remains to be seen whether such a policy will be effectively implemented or adequately financed.

Implementing sustainable land management in our present commercial world presents real problems. The market economy within which we work offers no mechanism for paying for wildlife, protecting the environment, supplying food of a higher quality or using fewer finite resources; indeed our national economy is judged on the basis of Gross Domestic Product that is actually increased by activities such as removing pesticides from our water supply. Therefore we are dependant on a new concerted Government policy which rewards farmers for more sustainable practice, for example grants for organic farming, and which both penalises unsustainable practices, such as the proposed pesticide tax and legislates against them.

The millennium challenge is for farming to become conserving rather than consuming, to produce a positive energy balance, high quality sufficient food and high animal welfare standards and result in attractive, renewing and rejuvenating countryside, not just for conservationists, wealthy individuals or corporate interests, but for all. This will necessitate great commitment from land managers, society and government. A sustainable agriculture is one that addresses all these challenges.

Herefordshire and Sustainable Land use

Herefordshire is notable as an extremely attractive county, has high quality farmland, successful farmers and a still largely rural economy. This is currently threatened by poor returns from farming, damage to soil, particularly through potato growing, pollution of watercourses and loss of permanent pasture in the flood plain leading to increased flooding and water contamination. The Wye is a very important river in terms of wildlife, economics and water catchment. As a largely agricultural county with a small and central city, Herefordshire is ideally suited to developing sustainable food production and local supply for the benefit of its populous and environment. Within the West Midlands region, it is also an important “green lung” providing nourishment for people’s health and rejuvenation, as well as actual food supply.

Much of the population is still close to the land and a high percentage still directly dependent on it. The county also has the largest number of organic holdings in the country. From this strong agricultural base a truly sustainable countrywide model can surely be developed, addressing in particular, threats to soil, water, biodiversity and livelihoods.

Organic Farming and Sustainability

The concept of sustainability has to date been very loosely applied to agriculture, to some it means ensuring profitability, to others it means wildlife protection. Only by taking a comprehensive view of what sustainable land management actually means will be able to develop a farming system which addresses all the issues; not just profit and wildlife but also resources and pollution, animal welfare, quality food production and health. Organic farming addresses all these issues, with more or less success. The following summarises its key impacts:

1. Organic Farming and Resources

Reliance on legumes, particularly clover, for nitrogen fixation in the fertility-building phase of crop rotations and in pastures avoids the need for energy consuming nitrogen fertilisers. This is the greatest contributory factor to making a farming system that is more energy efficient on the basis of weight of food produced per hectare. Not only that but the fact that nitrogen fertilisers are not used means that organic farming has a lower output of green house gases and consequently has less impact on climate change.

Soil minerals are utilised more efficiently in organic farming; emphasis on encouraging soil life and its ability to make nutrients more available, together with the avoidance of products that inhibit nutrient availability such as super phosphate and nematocides, all contribute to a lower level of resource input, without any consequent depletion of soil reserves. This, with efficient recycling of the farm’s own manures as well as the use of green and municipal waste results in lower use of fertiliser inputs.

Organic farming aspires to local food supply. In practice it has lead the way in the development of farmers’ markets and box schemes but it should also be recognised that organic food distribution is getting caught up in the increasing globalisation of food and is in danger of contributing nothing to addressing the food miles issue.

2.Organic Farming and Pollution

Synthetic pesticides are prohibited in organic farming, consequently chemical pollution of ground water is not an issue, with obvious benefits for drinking - water and wildlife. Crop rotations which include two or three years of clover and grass ley will build soil organic matter, aid structure, act as a carbon sink and reduce soil erosion. Organic rotations reduce nitrate leaching and consequent ground water pollution due to the reduced cultivation and lower levels of nitrogen in the system. The effective storage and appropriate rates and timing of manure application that are a requirement of organic farming, ensure the risks of pollution are minimised.

3.Organic Farming and Livestock

The requirement to base organic livestock management on a Health Plan ensures that there is a properly thought out strategy on stocking rates, breeding for health, natural rearing systems, spacious housing conditions and appropriate feeding regimes. Apart from this focus on management, organic livestock husbandry makes effective use of complimentary treatment such as homoeopathy. It also puts animal medication firmly in its rightful place as an adjunct to good management, only used where necessary and never as a means of propping up over intensification. All this results in the highest welfare standards, reduced reliance on medication and wormers and reduced antibiotic use and consequently less risk of build up of resistant strains of disease.

4.Organic Farming and the Environment

Research on organic farming demonstrates numerous environmental benefits due both to active management of wildlife habitats and the natural consequences of the farming system:

- more abundant soil life and bird populations due to the absence of pesticides and slug pellets,
- increased invertebrate, and therefore bird, populations resulting from the lower use of wormers,
- higher levels of beneficial and popular wildlife species due to the encouragement of wildlife generally and natural predators in particular,
- more varied landscape,
- generally smaller fields and more spring-sown crops and a mix of arable and grass,
- increases in soil organic matter which acts as a carbon sink,
- prohibition of the use of genetically engineered crops and products.

5.Organic Farming and the Economy

Financial viability is fundamental to any farming system if it is to succeed in the commercial world. Organic farming has developed the best brand marketing scheme in existence, establishing itself as the leader in the field of sustainability and appealing to a wide range of consumers willing to pay a premium for a quality product. It has done this through establishing a rigorous set of production standards which are policed and accepted throughout the world. It has been able to compensate for lower yields and higher production costs by obtaining higher prices and developing innovative marketing strategies

Even though organic markets in the UK are growing rapidly currently they only occupy 4% of the total food market. This organic market is still far from satisfied and it offers great potential for providing the financial incentive to more farmers to adopt

sustainable organic farming methods. However the market cannot be seen in isolation from conventional farming, which still receives Government support that encourages unsustainable practices. Nor can it be seen in isolation from the positive drive from Government to support wildlife conservation and environmentally friendly farming. Organic farming is unique in that through its standards scheme it offers a self auditing mechanism through which Government can direct support to farmers operating more sustainable farming methods. Consequently we see organic farming throughout Europe receiving direct payments as well as being eligible for some conservation grants.

In developing countries organic farming is proving a viable proposition because it is less dependant on the purchase of inputs which are often not affordable by small farmer and it avoids the devastating health consequences of pesticides resulting from use without adequate information, education or personal protection.

From the above it is clear that organic farming already delivers on many key elements of sustainability, but the system as we know it has not yet found all the answers, indeed it is an evolving system and no one can claim that it actually achieves sustainability. In practice organic farming fails to deliver in several respects due in large part to the small amount of research and development that has gone into it compared with that for high input “conventional” agriculture. Yields for example are typically 60 – 80% of conventional. Also, a critically important issue is the use of domestic sewage; currently the high levels of heavy metals caused by industrial waste contamination make the use of sewage unacceptable. Clearly it is essential to find ways of recycling the nutrients consumed by us all in our food through the use of sewage on the land.

It is often implied that there are other sustainable farming systems or that there is something ‘beyond organic’. Such views fail to recognise that organic farming is an evolving system and that it is the essential principles of organic farming that are fundamental to sustainable farming. Unless these principles of a systems-based farming with reliance on biological processes, recycling and minimisation of inputs is put into practice then the objectives of sustainability – environmental protection, food quality and quantity, resource conservation and human health – will never be achieved.

This is not to dismiss the efforts of many others working to address the problems of sustainability where serious steps are being taken to change the farming approach, for example those using minimal cultivations or introducing new crop rotations which are not routinely dependant on pesticide inputs. Significant benefits can be achieved, albeit often only addressing a single issue in the process; for example a high standard of conservation management may be good for many species of wildlife, particularly those found in the non-cropped areas of a farm but it does nothing to address the wider issues of sustainability. Currently in some commercial situations, particularly where the organic market is not able to offer sufficient price premiums, such farming approaches may be the only economically viable option in the short term, but for the long term organic farming is unique in that it offers the basis for solutions across the board and in the medium term offers cultural techniques which are applicable to lower input or so-called integrated farming systems.

Organic farming offers the best system available to us on which to build a sustainable future. It is a system which it has been demonstrated farmers can adopt, it is successful, it produces good quality healthy food, it is favoured by the public, is beneficial to biodiversity and reduces pollution risks. Most importantly it conserves soil, reduces energy use and is working towards achieving a resource conserving closed system. The biological, management and systems approach offers the most robust basis for sustainable land management, hence its implementation at the Holme Lacy Estate on which Carrot is based.

The Holme Lacy Estate experience

Ultimately the sustainability of a farming system can only be judged on the basis of practical experience. Holme Lacy College has devoted its entire estate to putting sustainable management into practice, using it as a test-bed for the ideas that it espouses. It has not set up a comparison of organic with so-called “conventional” farming, this is a futile exercise unless it can be fully replicated over a long period of time and there are replicated comparisons in the USA and Switzerland which have been operating for twenty years now and have more than adequately demonstrated that organic delivers more than conventional in every respect. What is happening at Holme Lacy is a working commercial farm putting organic farming into practice. This has two functions; firstly demonstrating ‘best practice’ to farmers and policy makers – “seeing is believing” – and secondly providing a site for research and development.

It is still early days; the farm only started conversion in July 2001, however the experience has been a positive and interesting one to date and very encouraging for other farmers.

The Holme Lacy College estate totals 224 hectares of which 55 hectares are woodland and 160 hectares are farmland. The farm comprises 50 hectares of permanent pasture, including the partly wooded medieval Deer Park, 3 hectares of cider orchard and 107 hectares of land suitable for arable cropping. The farm is located in the village of Holme Lacy and encompasses the alluvial soils of the Wye floodplain, the gravel terraces and rises to 300 feet where there are red clay-loam soils.

Formerly a beef, sheep and arable farm the inheritance is a mixed one. Being a mixed farm it does at least have sufficient livestock buildings and a resident flock of sheep. On the down side it has fields which have been in long term arable, with many of the weed problems associated with this and there are no facilities for grain drying or storage, a must with our weather. The problem is compounded by the fact that a medium sized farm such as this is unprofitable in the current economic climate. So some major changes have been required.

Farm planning has played a central role in setting and implementing the management strategy. In the first instance a Conversion Plan was drawn up, it identified the targeted crop rotation, stock numbers, conversion program and financial budgets. Also a detailed Livestock Plan was developed and a Wildlife Conservation Plan prepared. So far there have been substantial savings in inputs however advice and information, a crucially important part of establishing an organic system, has incurred significant costs from the Organic Advisory Service, the Farming and Wildlife Group and the vet.

Machinery has been purchased including a range of new and innovative weed control and composting machinery; an automatic guidance inter-row hoe, flame weeder, compost turner and associated tractor, spring tine weeder and mulching machine for green manures.

A comprehensive soil analysis program has been undertaken to provide base - line information and to identify any major mineral deficiencies. These have been rectified in a few fields with applications of lime and rock phosphate. Generally soil mineral

levels are satisfactory although organic matter levels are low in some of those fields that have been in long term arable cropping. Analysis of soil biology has been undertaken – a new technique for the UK – which has raised many questions on how to manage this most fundamental element of farming – soil life.

The planned crop rotation comprises two years of grass-clover ley, followed by potatoes, wheat, beans and finally barley. The ley will therefore move around the entire arable block and consequently there will in future be a smaller percentage of cash crops than in the past. In order to build fertility into the soil and reduce weed populations it has been necessary to amend this crop rotation during conversion; beans, undersown cereals and green manures have all been used during the first year.

Weed levels have been surprisingly low, even the invasive dock has been effectively controlled through cultivations and the high-tech inter row hoeing has been very effective and provided good confidence for weed control in the future.

White clover, red clover and lucerne leys, the nitrogen-fixing basis of all organic rotations, have been very productive. Improving the botanically species-poor permanent pasture by direct drilling clover has not been particularly successful. Overall forage production has been good and the sheep and cattle have struggled to keep up with grass growth.

Crop yields have been higher than expected, particularly given that this is the first year of conversion and there has not been time for the necessary fertility building: triticale following grass yielded 5 tonnes per hectare and winter beans yielded 3 tonnes per hectare, both very respectable yields for this stage in conversion.

The farm has 3 hectares of standard cider apples; they have not received fertilizers in the past so their yield has not been affected.

In the autumn of 2001 the calf rearing and finishing unit was phased out and a magnificent herd of pedigree Hereford cows was introduced. While it is not fashionable to keep pure British breeds we believe that the eating quality of Herefords reared on grass is unrivaled. The Livestock Health Plan provides an essential review of animal health and ensures that we do everything we can from a management angle to avoid health problems in order to minimise, though not eliminate the use of veterinary medicines.

The sheep have been more problematic, as is the way with sheep. Historically there have been quite a few health problems with the flock on the farm; some of these have been avoided by changing to outdoor May lambing. This has, however, resulted in a lower lambing percentage of 150%. Cobalt and selenium deficiency has also been experienced; this has probably been an underlying problem in the flock for many years but only appeared obvious since ceasing the use of routine wormers that contain mineral supplements. A start has been made to change the breed from Welsh Mules, replacements being brought in annually, to a self-contained flock of Llyns, renowned for their good lambing, health and ease of management.

Overall the livestock have seen a substantial reduction in the use of antibiotics and wormers and the health status of both the sheep and cattle has improved.

In Britain wildlife and landscape are largely dependant on farm practices. Organic farming provides an excellent environment for wildlife, particularly in the fields themselves. However we also need to enhance wildlife habitats: wildlife diversity is not only a good thing in itself but it also helps the farming, for example by providing habitat for a range of pest predators. The farm was already spectacular from a landscape point of view being on the banks of the Wye, an SSSI, and centered on the medieval deer park of Holme Lacy House. To protect and enhance the estate the Conservation Plan will be implemented, recently receiving funding from the Countryside Stewardship grant scheme.

The extensive area of woodland on the farm is also in the process of changing management. A new Woodland Management Plan will be drawn up to meet organic woodland standards that will protect the ancient woodland and re instate some of the parkland trees, as well as exploring ways in which a viable forestry program can be operated.

The farm is still in business after 5 years of organic management; indeed it has proved to be more profitable than under its previous conventional management in every year since conversion started. The DEFRA grant for organic conversion has assisted greatly here. However, in order to be effective in its sustainability aims substantial investment will be required in buildings, compost site and equipment. Further development into vegetables, pigs and poultry is desirable from a diversity point of view but this will require more investment, notably pools for irrigation using stored surface water.

So is the farm any more sustainable than it was under previous management? The short answer is that it is still too early to quantify, but it is clear that a number of practices have been introduced which are more sustainable and that the system that is being put into place will, once established, be able to bring substantial benefits.

On the resources front less energy is being consumed due to the avoidance of nitrogen fertilisers. Previously 70 tonnes of nitrogen fertiliser were used annually. The organic system, including better manure management, is requiring lower use of finite potassium and phosphorus fertilisers.

Pollution has already been reduced. The use of pesticides has been reduced from £8,500 worth a year to zero and the increasing use of grass clover leys in the rotation will reduce soil erosion and reduce nitrate pollution of ground water. Better manure management avoiding run off and returning the flood meadows to grass will reduce the risk of soil erosion.

The changes proposed in the animal Health Plan have reduced reliance on medication; outdoor lambing has eliminated prophylactic use of antibiotics, while the clean grazing system will reduce use of anthelmintic wormers next year.

Food production is the key output from the farm. During conversion crop output has declined substantially and it is only in the last two or three years of full organic management that yields have increased to about 70% of conventional. In an effort to

improve returns to the farm business there is a new focus on food processing and direct sales.

The Holme Lacy Estate demonstrates how a farm can become more sustainable. The system is not yet fully established and there are still important aspects of sustainability remaining to be tackled but it does provide an important basis for analysis, demonstration and development.

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