What’s in it for you...
Profit from a good environment

best farming practices
We are the Environment Agency. It’s our job to look after your environment and make it a better place – for you, and for future generations.

Your environment is the air you breathe, the water you drink and the ground you walk on. Working with business, Government and society as a whole, we are making your environment cleaner and healthier.

The Environment Agency. Out there, making your environment a better place.
Foreword

Farmers have a big influence on the way our countryside is cared for. Agriculture accounts for three-quarters of the land area of England and Wales.

Farming practices make an impact both on the farm itself and on the wider environment. A well-managed farm can protect against pollution and flooding and provide a haven for wildlife as well as for crops and livestock.

As a farmer you have to face a formidable assortment of regulations and European directives. It’s easy to feel overwhelmed by the red tape and to lose sight of the environmental and financial benefits of best farming practice.

It’s also easy for us to underestimate the constraints that you may be working under. A lack of time and money and the fickle weather may put limits on your capacity to do the best thing environmentally.

That’s why we’ve revised, expanded and republished this booklet. We recognise the tough business environment you are operating in and we want to offer practical, down-to-earth advice. We want to show simple, low-cost actions you can take that make good sense both for the environment and for your farm business. We’d much rather help you to profit from a good environment than see you penalised for bad practice.

When you protect your soil, you make your land more productive. When you manage nutrients carefully, you make more cost-effective use of manure and fertilisers. When you use less water and fuel, you reduce bills and improve your bottom line. When you save energy, you save money and reduce climate-changing greenhouse gas emissions.

I hope you will find this a helpful publication. I hope, too, that you will take advantage of the opportunities it presents, to work together for a better environment and a more profitable farming future.

Tricia Henton
Director of Environment Protection
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### Key
- Arable
- Dairy
- Horticulture and intensive crops
- Beef
- Pigs
- Poultry
- Sheep

⚠️ indicates where you may get grant funding in support of particular practices – see section 14 for more information

⚠️ indicates where you may be at risk of a fine or other financial penalty if a practice is not followed
The Environment Agency’s job is to help improve the environment for everyone. To do this effectively we work increasingly closely with farmers and businesses.

**Real farms, real benefits**

On these pages you’ll find plenty of information to demonstrate that what’s good for the environment can also be good for your farm and business.

Wise stewardship of resources such as soil, nutrients, water and energy will help you to cut costs while maintaining or improving the productivity of your land and livestock.

The ideas presented here are delivering real benefits for farmers. We feature 15 of them across England and Wales. Whether you’re in arable, dairy, horticultural or livestock production, we hope you find food for thought and inspiration for action.

**Want to know more?**

Each section of this booklet includes a short list of resources to help you explore the topics covered in more detail.

We give you details of useful publications, websites and telephone contacts. You can also refer to [www.environment-agency.gov.uk/bestfarmingpractices](http://www.environment-agency.gov.uk/bestfarmingpractices) for the latest information.

You may find it helpful to use the Whole Farm Approach’s Catchment Sensitive Farming Advisory Tool, or the LEAF (Linking Environment and Farming) audit – see [www.leafuk.org/leafaudit](http://www.leafuk.org/leafaudit). These give easy-to-follow online guidance on many of the issues and measures we identify in this booklet.
Farm locations

The case studies in *Best Farming Practices* feature a wide range of dairy, livestock, arable, horticultural and mixed farms – from Pembrokeshire to Norfolk and from the Devon hills to the Yorkshire moors.

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Guiting Manor Farms, Gloucestershire

**Case study 15** (page 87)
Jonathan Brown
Hill Farm, Flintshire
Manure, compost and sludge supply at least £60,000 worth of nutrients each year

Philip Chamberlain farms 1,200 hectares of arable land in Oxfordshire.

Crowmarsh Battle Farm uses manure, compost, crop rotation and precision-farming techniques as part of an integrated approach that has significantly reduced spending on fertiliser, pesticides, fuel and seeds. The farm is part of the Linking Environment and Farming (LEAF) demonstration farm network. As well as saving Philip money, reducing inputs and cultivations helps him to minimise pollution and damage to the soil while enhancing wildlife and the landscape.

Philip partly satisfies soil nutrient requirements by regular applications of sewage sludge, well-rotted pig manure and compost from a green-waste plant on the farm.

A neighbouring farmer provides the manure as part of a straw-for-muck exchange deal.

Integrated farm management and precision farming allow Philip to assess soil and crop variations within fields and adjust his use of fertilisers and pesticides accordingly. He takes account of residual nutrients, historic yields and the findings from soil sampling when planning his cultivations and deciding his fertiliser applications.

He grows crops in a six-year rotation, and closely monitors their growth to help manage them effectively. Increasing the levels of organic matter has helped to make cultivation easier on heavy land and to improve moisture retention in light soils.

**Counting the cost and reaping the benefits**

The nutrients Philip applies in the form of pig manure, compost and sewage sludge would cost him £60,000 each year if he had to pay for the equivalent in fertiliser.

With fewer inputs and cultivations, labour costs are also lower and there is less wear and tear on machinery.

Our aim is to supply all the phosphate and potash requirements of our crops from organic sources. We value our current organic inputs at about £100 per treated hectare per year.

Philip Chamberlain
Crowmarsh Battle Farm, Oxfordshire
Tradition and technology

Today’s farmer can increase profits and minimise risk to the environment by integrating the best of traditional methods and advanced technologies. This booklet provides simple, practical advice on how to adopt an integrated farm management approach.

You can use soil sampling and nutrient planning, field by field, to establish exactly what each crop needs. Minimum-till cultivation, in the right soil and crop conditions, can protect and improve soil while saving time and fuel. Crop rotation helps control pests and diseases, reducing reliance on pesticides. Manure and compost make soil more fertile without using so much manufactured fertiliser.

Recent research into UK farming experience suggests that an integrated approach to agriculture based on best environmental practice can yield significant savings:

• a 20-30% reduction in variable costs;
• a 30-70% reduction in pesticide inputs;
• a 16-25% reduction in nitrogen inputs.

The researchers also found that farmers generally achieve these savings without a decline in produce quality.

The potential benefits of best farming practice

• Increased profits through reduction of inputs
• Better and more productive soils
• Healthier and more productive livestock
• Better opportunities for diversification
• Reduced runoff and water pollution
• More biodiversity and better wildlife habitats

Introduction

Tackling soil erosion reduces contamination of streams and rivers with sediment.

Composting manure concentrates nutrients and reduces fertiliser costs.
Tackling diffuse pollution

The Water Framework Directive is a new piece of European legislation that replaces seven earlier directives and influences the application of others. Its aim is to improve the whole water environment using River Basin Management Plans. It promotes efficient water use and the reduction of water pollution to achieve ‘good ecological status’ targets by 2015.

Water pollution from farming can be caused by a particular point source, such as a leaking storage container. It may also take the form of diffuse water pollution, where groundwater, rivers and streams become contaminated with sediment and chemicals as a result of gradual nutrient leaching and soil erosion from farmland.

Both these types of pollution have an effect on the environment and a cost to the farmer. Soil and nutrient losses through runoff cost farmers more than £500 million a year. These losses are also a big problem for the water industry, which spends nearly £200 million a year on treating pollutants from agriculture.

You can ease diffuse pollution problems – and protect yourself from losses of topsoil, seeds, fertiliser and pesticides – through careful soil and nutrient management.

Pollution from organic manure, fertiliser and pesticides is often caused by over application or poor timing. When you plan your manure and fertiliser applications, taking soil nutrients and weather conditions into account, you can avoid over application and unnecessary expenditure. But ideal conditions are not always present, even with planning.

Develop a nutrient management plan for your farm, and refer to the fertiliser manual and T-sum information provided by Defra. You could use a computer fertiliser programme such as PLANET, or Tried and Tested – the paper-based plan developed through industry collaboration.

A changing world, a changing climate

Farming is one of the sectors of the economy most vulnerable to the weather and the effects of climate change.

Farmers in England and Wales are bracing themselves for wetter winters, for hotter, drier summers and for extreme weather events such as scorching heat and intense rainfall.

The consequences are likely to include rising sea levels, more frequent and severe flooding, and less water in summer to irrigate crops. Farmers also face the prospect of more pests surviving the winter, more heat stress in stock and changes in the soil water balance. These risks may outweigh benefits such as the better crop yields that a warmer climate is likely to bring.
**Introduction**

*Best Farming Practices* explores how you can protect against (and sometimes profit from) climate change. One new section in this edition focuses on combating the increased risk of flooding. Another examines how to save energy and reduce waste – an imperative as the prices of fuel and electricity escalate and society struggles to cut greenhouse gas emissions.

If you cut waste and carbon emissions, you will make limited resources go further. You can also help to reduce the impact of climate change on your farm, your business and the wider economy.

**Making the most of natural resources**

Ultimately, we can only build a sustainable agricultural sector by managing our natural resources more effectively. That means making the most of the soil, water, air, energy, plants and animals that form the building blocks of our farm enterprises.

When you look after these resources well, the benefits will extend far beyond the food you produce. Agriculture provides fibre and bio-fuels too, and most of our landscape and natural environment are shaped by farming. Agricultural land has aesthetic and amenity value: it gathers water, recycles and holds carbon and nutrients, forms soil, and protects us from storms and floods.

The agri-environment schemes run by Defra and the Welsh Assembly Government can help you make the most of your natural capital and reward you for conserving it.

**Making the most of this booklet**

This booklet sets out practical steps you can take to protect the environment and benefit your business, often with short payback times.

Each section covers a separate topic but there are also a number of cross-references between sections. These linkages show the benefit of an integrated approach both in farm management and in reading this booklet, so we encourage you to take time to look through the entire booklet if you can.

Use a farm map to identify where you can make a difference on your farm. Prioritise the actions you take in order of benefit to the environment and to your bottom line.

Used in conjunction with the requirements of agri-environment schemes, *Best Farming Practices* can help you:

- protect natural resources;
- take actions that may reduce flooding;
- conserve wildlife and biodiversity;
- maintain and improve your local landscape;
- conserve genetic resources;
- promote public access and understanding of the countryside;
- achieve all this while protecting or enhancing the income of your farm.

Keeping outdoor pigs away from steep slopes and watercourses reduces the risk of soil erosion and runoff.

Upland grips are contributing to a deterioration of peat and carbon stores. Blocking grips can help conserve peat and reduce lowland flooding.
Actions marked with 🏦 indicate where aid may be available from Defra, the Welsh Assembly Government, Natural England or your Regional Development Agency – see pages 82-95 for more details.

The ☢️ symbol shows where lack of action may lead to prosecution, or penalties under cross-compliance.

Each section starts with a summary of benefits and actions, and each includes a farm case study. There’s also a series of symbols on the contents page to indicate the relevance of each section to different types of farm enterprise. The booklet ends with a section detailing grants and aid that might be available to reduce the cost to you of the measures we suggest.
Using water wisely

What’s in it for you?

Using less water saves money

Agriculture is an important part of the water cycle, accounting for around 70 per cent of the land area of England and Wales and using a significant volume of water.

The way you farm can have a big influence on water quality and availability. Understanding how water flows around your farm, and recognising how farming practices affect flows, will help you control costs and reduce pollution risk.

Water supplies are being squeezed in parts of the UK as a result of droughts and increasing demand. This section of Best Farming Practices explores how you can use water more efficiently and reduce losses through leaks. It also highlights the value of collecting winter rainfall in a reservoir to support summer irrigation.

Hints on harvesting roof water and separating clean and dirty water are covered in a separate section on the well-managed farmyard, pages 70-75.

Want to know more?

Further reading

Waterwise on the Farm
(Defra/Environment Agency/LEAF/NFU)
Thinking About an Irrigation Reservoir?
(Environment Agency)
Save Water and Money – Irrigate Efficiently
(Natural England)
Irrigation Best Practice – A Water Management Toolkit for Field Crop Growers (Defra)
Effective Use of Water on Dairy Farms (DairyCo)
Conserving Water in Buildings
(Environment Agency)

Useful websites

www.environment-agency.gov.uk/savewater
www.ukia.org
www.defra.gov.uk
www.wales.gov.uk
www.naturalengland.org.uk
www.mdc.org.uk
www.eca-water.gov.uk

Contacts

Environment Agency 08708 506 506
LEAF 0247 6413 911
Farming Connect 08456 000813
National Farmers’ Union 0870 845 8458
Farmers can help secure the supplies everyone will need in the future by using water more efficiently.

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<td>Carry out a water audit</td>
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<td>Reduced consumption</td>
<td>Check for, and deal with, drips, overflows and leaks</td>
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<td>Less dependence on abstraction licences</td>
<td>Harvest rainwater and develop alternative supplies</td>
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<tr>
<td>Lower irrigation costs</td>
<td>Schedule irrigation applications</td>
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<tr>
<td>Reduced dirty-water disposal costs</td>
<td>Use less water for washing down</td>
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<tr>
<td>Shared knowledge and the opportunity to influence abstraction policy</td>
<td>Join or form a water abstractors’ group</td>
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Case Study 2

New winter reservoir secures irrigation for 3,000ha

Since 1990 Russell Smith Farms of Duxford, Cambridgeshire, has shifted production from cereals to premium-quality vegetables on its 800 hectares of light, sandy-loam soils.

This change would not have been possible without irrigation, so the future of the business relies on secure water supplies. But summer abstraction from the River Cam and some boreholes is becoming increasing unreliable.

Robert Smith decided to work with neighbouring farmers to build a 500,000m³ (110 million gallon) reservoir. Filled through winter rainfall, it will feed 24km of underground distribution mains to support summer irrigation on up to 18 farms.

In addition to securing the water supply, the reservoir will unlock a further 3,000ha of land for irrigated production. It will also allow longer rotations and help reduce pesticide use. Cutting chemical use is important for Russell Smith Farms, which is part of the Linking Environment and Farming (LEAF) demonstration farm network.

The farm’s reservoir infrastructure has been supported with grant aid from the East of England Development Agency.

This quote is from Russell Smith Farms, Cambridgeshire.

Growing high-value, high-risk crops without a guaranteed water supply can only be described as commercial suicide.

‘Robert Smith
Russell Smith Farms, Cambridgeshire

Counting the cost and reaping the benefits
Average costs from a number of construction projects suggest that building a 100,000m³-plus clay-lined reservoir would cost around £1 per m³.

Using an artificial lining adds £1-3 per m³ to this.

Annual repair and maintenance costs for a clay reservoir are likely to be about 1 per cent of the capital cost of the reservoir and ancillary works.

The cost of land sacrificed to make way for a reservoir may be offset by an increase in the value of land that can be irrigated and by additional income from irrigated production.
Protecting a precious resource

Water is an important resource for farming but it is sometimes taken for granted. In the East and South East of England water resources are under pressure from rising demand. Costs are increasing every year throughout England and Wales.

Climate change is creating a pattern of wetter winters and drier summers, so it’s increasingly important to use limited resources as effectively as possible. Farmers and other abstractors need to be able to demonstrate efficient water use to renew abstraction licences.

There are a number of low-cost measures to improve water efficiency that can be taken on most farms.

You can save water relatively quickly by changing washing regimes. If you reduce milk collection to every other day, you can halve the water used for bulk tank cleaning. You can also make savings by reusing vegetable washing water for irrigation.

When you use irrigation, ensure that applications of water are timed for maximum effect. Use a scheduling service and/or monitor soil moisture content to identify when and how much to irrigate.

Efficient water use should be part of every farmer’s management strategy. Developing a ‘water wise’ action plan – a tool widely used by farmers – will save you water and reduce pollution risk and costs.

Helpful hints

- Review water use quarterly. Look out for any increase in use that may indicate leaks.
- Reuse water where possible.
- Use a pressure wash instead of a low-pressure hose.
- Install a high-pressure wash system for bulk tanks.
- Irrigate at night and consider using trickle irrigation.
- Use a more accurate boom irrigator in place of a rain gun, so that you lose less water through evaporation.
- Use a tied ridger to create ridges between rows of crops, holding back water and preventing erosion.
Reducing leaks and avoiding contamination

Leaks in farm water supplies cost farmers money. Livestock farmers may suffer the additional cost of extra slurry storage and application.

Every outlet and joint in a water system is an opportunity for leakage. A single dripping tap can cost as much as £33 a year in mains water.

To check for leaks take a meter reading before and after a period when water is not being used. If they’re different, there is a leak. If you can’t see any obvious leaks, an underground supply pipe may be responsible. Your water company should be able to help find and fix it.

Livestock watering systems are vulnerable to damage and abuse but simple equipment is available to reduce the risk of uncontrolled loss.

Excessive pressure in distribution systems can cause leaks. The sudden burst of water caused by rapid opening or closing of valves can damage pipework.

Water contaminated with bacteria or chemicals can harm livestock and people. Contamination can enter supplies via leaks or open pipes, through unprotected storage tanks and through pollution of a spring, well or borehole.

Simple actions, such as dealing with leaks swiftly and cleaning your storage tanks, can reduce the risk of contamination, protect against sickness and avoid clean-up costs.

Helpful hints

Sketch out your water supply network and check regularly for leaks.

Check taps, drinkers, troughs and nozzles for leaks as part of a regular six-month audit. Replace washers when necessary.

Install trigger-operated hoses to avoid having uncontrolled running water.

Install a control valve to reduce pressure in your system.

Use a covered, contained area for mixing pesticides and filling sprayers.

Enhanced Capital Allowances (see www.eca-water.gov.uk) may be available for leak detection and metering and for water harvesting equipment.

Drip irrigation, delivered with the help of equipment that constantly monitors soil moisture, improves crop quality and yield while using less water.

Pressure washing and trigger-operated hoses ensure that less water is wasted.
Alternative supplies

Not all water used on farms has to be from the mains.

You can use recycled plate-cooler water for washing down and for stock drinking, provided it is not at risk of bacterial contamination. Plate-cooler water can supply between half and two-thirds of a herd’s daily water requirement.

You can use water collected from roofs for washing and stock drinking, although you may need long-term storage to balance supply and demand.

You can also use ground and surface water for stock drinking and irrigation. You may be able to irrigate in drier months by using stored water from winter abstraction or rainfall.

Make sure that alternative water supplies you use are at low risk of microbial and chemical contamination. Use a UV filter to remove any faecal contamination from roof water that you use for stock drinking.

Helpful hints

Use past rainfall records to estimate what you will have available for harvesting.

Investigate groundwater abstraction. You only need a licence to abstract more than 20m³ per day.

Consider working with others to provide winter storage capacity – see example on page 12.

Use vegetable washing water for irrigation.

Some farmers offset the costs of a winter reservoir by stocking it with fish and renting out fishing rights. You will need planning permission for a fishing lake in use more than 28 days a year.

Funding is available under the England Catchment Sensitive Farming Delivery Initiative to install a ram pump or pasture pumps that enable stock to drink from watercourses.

Your Regional Development Agency may provide funding for water-management schemes that go beyond legal requirements.

Filtered roof water is pH neutral, and so it is good for spraying some crop protection products – glyphosate, for example.

Private supplies (that is, boreholes) used in parlours and dairies need to be tested annually by the local authority.

Stock-operated drinkers enable you to use river water without damaging river banks.

A reservoir on your farm will enable you to collect winter rainfall for summer irrigation.
Combating floods

What’s in it for you?

Reduce your impacts beyond the farm

Over one tenth of land in England and Wales is at risk of flooding from rivers or the sea. More than 4.5 million people live in these vulnerable areas.

Farmers and growers need to be aware of flood risk and to plan ahead for the impact of climate change. Floods are becoming more frequent and more severe as global warming brings heavier rainfall and wetter winters.

If you can slow down and store excess water on your land to improve absorption, you can reduce the damage done to your soil and crops by runoff during heavy rain. You can also help reduce the risk of flooding on neighbouring farms and in built-up areas. This section introduces ideas to reduce and control runoff, an important recurring theme throughout Best Farming Practices.

There are grants for agri-environment measures and catchment sensitive farming that could help you to reduce runoff and adapt to flood risk – see pages 82-95.

Want to know more?

Further reading
ECSFDI Capital Grant Scheme Farmer Handbook
(Natural England)
Making Space for Water
(Defra/Environment Agency; projects HA6 and HA7)

Useful websites
www.environment-agency.gov.uk
www.defra.gov.uk
www.wales.gov.uk
www.naturalengland.gov.uk
www.ccw.gov.uk
www.farmingfutures.co.uk
www.wwt.org.uk
– the Wildfowl and Wetlands Trust
www.constructedwetland.co.uk/growing.html

Contacts
Environment Agency 08708 506 506
Natural England 0845 600 3078
Countryside Council for Wales 08451 306229
In England alone over 1.3 million hectares of farmland are within flood plains, **including more than half of the most productive land.**

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<td>Reduced flooding and enhanced biodiversity</td>
<td>Establish a wetland or create runoff ponds and sediment traps</td>
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<tr>
<td>Slower and less destructive movement of water</td>
<td>Leave a rough soil surface and use grass strips or woodland belts to intercept water flows</td>
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<tr>
<td>Reduced phosphate and nitrogen pollution and lower fertiliser costs</td>
<td>Ensure good soil structure, where practical, in every field on the farm</td>
</tr>
<tr>
<td>Reduced pesticide pollution and lower pesticide costs</td>
<td>Establish no-spray buffer zones by watercourses</td>
</tr>
<tr>
<td>Avoidance of compaction and poaching</td>
<td>Remove stock when soils are wet in high-risk fields</td>
</tr>
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<td></td>
<td>Use low-ground-pressure tyres</td>
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<td></td>
<td>Use early-harvesting varieties in wetter fields or those at risk of compaction</td>
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Anthony Ogg is the tenant at College Farm in north Lincolnshire, which used to be a 178-hectare arable farm. He’s a good example of the part that some farmers can play in managing flood risk to protect the wider community. His experience also shows how adapting to climate change can create opportunities for farm businesses.

From 2001 to 2008, Anthony converted 89 hectares of his farm to wetland pasture, in collaboration with the Environment Agency. We bought the land from Anthony’s previous landlord, and the relatively low rent we charge him reflects the environmental value of his farming practices. His fields will act as floodwater storage areas when the tide is high, reducing flood risk elsewhere along the Humber Estuary.

The new grassland is now home to a 70-cow pedigree Limousin suckler herd. Anthony’s son Gavin established the herd, and it is managed by father and son working in partnership. Thanks to local authority funding, the farm also has a tea room which is proving popular, even in winter.

Anthony anticipates that business will continue to increase as he opens all the permissive footpaths on his land. When the £10 million Humber flood defence scheme is finished, he hopes to enter Higher Level Stewardship (HLS) and to increase his income and visitor numbers still further.

The new wetland is attractive to many species of wildfowl and wading birds. This means that the farm’s established caravan park is likely to be frequented by increasing numbers of bird watchers and conservationists in the future.

Initially I was very apprehensive about the flood scheme, but now it has started to operate properly I can see many opportunities for increasing my income through diversification, while helping to protect Goole and Hull from flooding.

Anthony Ogg
College Farm, Lincolnshire
Reducing runoff

You can help prevent runoff from your land. The key to this is understanding the soil risks on your farm and planning your land use and cultivations accordingly.

Use the right cultivations at the right time and change your stocking rates in line with weather conditions. This will not only reduce the risk of flooding but also stop losses of soil and nutrients to rivers and streams.

A simple measure – such as loosening the soil and creating a rough soil surface after harvest, then leaving it for as long as possible – will allow water to soak in rather than run off.

Use appropriate cultivations and establish natural breaks such as beetle banks or rough grass strips that can divert water and slow it down. A 6m buffer strip can reduce the amount of soil particles reaching an adjacent watercourse by up to 60 per cent.

You can also counter the risk of runoff by planting woodland belts, drilling early, undersowing spring crops with a cover crop such as grass or mustard, and avoiding high-risk crops on steep slopes.

If you keep animals outside through the winter, keep them away from watercourses. Set stock levels according to soil and weather conditions to avoid too much damage to soils.

You will find more information and ideas on reducing runoff throughout this booklet, particularly in the sections on soils; establishing crops; grass and moorland; livestock management; and tracks and gateways.

Helpful hints

Cultivate along contours where it is safe and practical to do so.

Research suggests that tramlines can be responsible for as much as 60 per cent of runoff on some soils. Consider loosening tramlines on high-risk land, as this can be effective if done at right angles to the slope. Avoid loosening tramlines running up and down slopes, as this can lead to channelling of runoff and gulley erosion.

Establish coarse seedbeds on unstable soils.

Incorporate more organic matter into your soil where needed.

Keep cattle away from watercourses during the winter.

Establish cross-slope beetle banks.

Cultivate as soon as possible after late harvest to loosen the soil. This will help to reduce runoff.
Protecting wetlands

Wetlands are present in both the uplands and the lowlands and can play a vital role in flood control. Some wetlands slow the speed at which water flows off higher land and can store water that might otherwise inundate homes and businesses.

But the value of the wetlands on your farm goes far beyond this. They absorb and process sediment and nutrients such as nitrogen and phosphate, preventing pollution of lakes and rivers. They support a unique variety of wildlife and provide attractive landscapes for recreation and tourism. In periods of drought they recharge rivers and aquifers.

You can share in these benefits by looking after existing wetlands and establishing new ones on your land.

Avoid draining natural wetlands – too many were drained in the past. Wet grassland that is seasonally flooded can be grazed and cut for hay in late summer. Areas of bog and marsh can be grazed lightly with appropriate breeds of cattle, and you can use grazing to control the encroachment of willow and alder scrub and coarse grasses. Funding is available for this through Higher Level Stewardship on high-value sites.

Helpful hints

Use light grazing to remove scrub from natural wetlands or prevent it from becoming established.

Increase biodiversity and help combat flooding downstream by creating wetland buffer zones, including wet woodland, along watercourses.

Rejuvenate farm ponds and establish new ones. They can be used to encourage wildlife, trap excess nutrients and sediment, and provide water for fire fighting.

Create a reed bed to treat contaminated runoff or weak effluents from your farm buildings and yards. A variety of plants including common reed and yellow flag iris can be used. By incorporating a willow plantation in your treatment system you can grow a biomass fuel crop as a by-product.

Consider using Higher Level Stewardship or Tir Gofal funding to create new wetlands or restore degraded ones.

Managing land drains, ditches and streams

Carefully managed ditches and drains can improve access to land, help flood management and increase biodiversity.

We at the Environment Agency are responsible for maintaining the main rivers in England and Wales. Farmers are responsible for looking after streams and all other smaller watercourses that pass through their land.

A well-managed land drainage system, ditch or stream allows water to drain freely enough to prevent saturation of soils. Badly managed watercourses and land drains may inhibit drainage.

Clear large debris from watercourses, and prepare a ditch management plan to help you clear vegetation from ditches in rotation. Ensure that you maintain the flow of water but avoid clearing too much vegetation too often, as this will damage wildlife habitats.

Directing water flow into a well maintained ditch will help you prevent soil loss and damage to fields and tracks. Creating a pond in a ditch will slow water down even more and provide a wildlife asset for your farm.

See pages 64-69 for more on managing ditches and protecting riverbanks.

Helpful hints

Avoid directing runoff towards roads and watercourses.
Discharge roof water into swales or soakaways around the farm, to slow water down and recharge groundwater.
Mark land-drain outfalls to ease maintenance and avoid damage.
Use agri-environment funding to establish ponds.
Maintain ditches on a rotational basis to achieve a good balance between habitat and flow.
The England Catchment Sensitive Farming Delivery Initiative can provide aid for cross drains for farm tracks and swales.

A well-managed watercourse ensures good drainage but has enough vegetation to filter out sediment.
Soils

What’s in it for you?

Protecting your soils means better returns

Soil is the farmer’s biggest agricultural asset. A healthy soil helps ensure the best returns from every kind of farming.

A well-structured soil is less vulnerable to erosion and runoff. This ensures that seeds, fertiliser and pesticides aren’t washed away, and reduces the risk of flooding. Well-managed soils are easier to cultivate and more likely to retain the water that crops need to thrive.

Erosion will remove soil, nutrients and organic matter from your land and reduce the depth of your soil. It can also deposit soil on roads and pollute rivers and streams with chemicals and sediment. When you manage your soils well you can reduce the risk of losses and make significant savings in the long term.

Want to know more?

Further reading
thinksoils (Environment Agency)
Code of Good Agricultural Practice (Defra)
Visual Soil Assessment – Innovation for the Future of Farming (Soil Management Initiative)

Useful websites
www.environment-agency.gov.uk
www.defra.gov.uk
www.wales.gov.uk
www.naturalengland.org.uk
www.ccw.gov.uk
www.smi.org.uk – Soil Management Initiative
www.soilscientist.org – Institute of Professional Soil Scientists
www.farmingfutures.co.uk
www.basis-reg.com

Contacts
Environment Agency 08708 506 506
LEAF 0247 6413 911
Farming Connect 08456 000813
You can increase biological activity and improve soil structure by incorporating organic matter.

<table>
<thead>
<tr>
<th>Benefits</th>
<th>Actions</th>
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<tbody>
<tr>
<td>More stable soils and easier working of the land, with fewer cultivations and inputs</td>
<td>Assess your soil structure and texture to identify appropriate management practices</td>
</tr>
<tr>
<td>Improved soil structure and water retention</td>
<td>Use manures and compost to increase organic matter in the soil</td>
</tr>
<tr>
<td>Less damage to soil structure</td>
<td>Use a cultivations plan to help you work the land with the right machinery and at appropriate times</td>
</tr>
<tr>
<td>Increased infiltration of water</td>
<td>Drill earlier in fields that are most difficult to cultivate</td>
</tr>
<tr>
<td>Reduced waterlogging and soil loss</td>
<td>Use early-maturing varieties of maize</td>
</tr>
<tr>
<td>Reduced runoff</td>
<td>Assess and remove soil compaction</td>
</tr>
<tr>
<td>Prevention of capping</td>
<td>Cultivate across slopes</td>
</tr>
<tr>
<td></td>
<td>Do not overwork unstable soils</td>
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Comparing good and poor soils
Well-managed soil (1) and compacted soil (2). It pays to check your soils regularly for signs of degradation.
Fined £9,000 for avoidable soil erosion

John Chinn of Cobrey Farms, Herefordshire, is an arable farmer who specialises in growing potatoes and asparagus. His sandy-loam soils are prone to capping and runoff, which has cost him dearly in the past. Cobrey Farms was fined £9,000 for pollution of watercourses caused by major soil loss following heavy rain. The increasing frequency of extreme rainfall and the risk of further fines encouraged John to work with the Environment Agency and try some new techniques in his high-risk potato fields to prevent further loss of soil.

He now leaves unplanted fallow strips three to four metres wide across his potato rows, which have to be planted up and down the farm’s sloping fields. After planting, John uses a subsoiler to roughen the surface and improve drainage. The strips intercept rain flowing down the rows. He also uses bunding around low field margins and has planted additional grass strips to filter out sediment.

John’s unplanted fallow strips cause a loss of production of 2-6 per cent in each field. In the longer term, however, the field retains its soil and fertility and John doesn’t have to dig soil off the road after rain.

‘These simple measures have prevented any further fines and allowed me to keep the soil in the fields,’ he says.

Soil erosion is the farmer’s problem until it leaves his land, then it becomes the community’s problem.

John Chinn
Cobrey Farms, Herefordshire

Counting the cost and reaping the benefits
Leaving three-metre unplanted fallow strips in potato rows reduces production by 2-6 per cent.

There is an additional cost of £1-£2 to subsoil each hectare of potatoes. This means an overall cost of £78-£232 per hectare to prevent soil loss and all its consequences.

If farmers do not take such measures, they risk undermining the long-term productivity of their soil. They may also risk being fined for the effects of runoff on surrounding rivers and roads.

It costs local authorities up to £30 million a year to deal with the effects of soil loss.
Understanding soils

You need to know your soils if you want to get the best from them. Soils vary across the farm, within individual fields and down through the soil profile. You cannot easily change soil texture and stone content, but good management can influence soil structure, pH and porosity.

When you know your soils and their capabilities, you can adapt your land use to avoid damage to the environment and choose the most appropriate crops, varieties and cultivations.

Soil texture is the balance between sand, silt and clay particles in the soil. Sandy soils have relatively large pores, or gaps between particles. Water can move freely through these soils but they are vulnerable to capping and to wind and water erosion.

As levels of silt and clay increase, pore space decreases. This restricts the movement of water, and so heightens the risk of compaction and runoff.

Soil structure refers to the way that soils are bound together. In a well-structured soil, water and air can move freely through cracks and pores. But a poor soil structure prevents water and air movement, and increases the risk of runoff.

Soil structure is damaged when pressure is applied to soft and wet soil, forcing units of soil together in a dense mass. A dry soil can withstand pressure without being damaged.

Some soils are vulnerable to damage when the levels of clay, calcium or organic matter are low. These unstable soils break up when wet and form a solid mass as they dry out. When this happens on the surface, a cap or crust can form.

It pays to check your soils regularly, and it is best to do so in winter. Look out for areas where water has gathered above drier soil beneath. Dig an inspection pit to look at pores and fissures in the subsoil.

In a well-structured soil the aggregates fall apart easily when moist if the soil is gently teased. But compacted soil does not break down in this way when pressure is applied. It has few pores and fissures, and blocks of soil feel heavy.

Restricted root growth can be a good indicator of compacted soil. Refer to our manual thinksoils for more guidance. Consider employing a specialist for diagnosing more subtle problems and those associated with land drainage systems.

Helpful hints

- Carry out a soil protection review (England) or compile a soil assessment record (Wales) if you’re claiming the Single Farm Payment.
- Use observation pits to build up a detailed understanding of soil texture, structure and slope. Record your findings on a farm map.
- Use a spade to inspect the soil profile. Look at the structure and roots for signs of degradation and at the colour for signs of poor drainage.
- Identify and remove soil compaction – particularly before sowing on slopes.
- Plan to remove compaction when the soil is dry and there is an opportunity between crops.

A well-developed subsoil structure allows strong root growth and aids infiltration of rain water.
Avoiding damage to soils

You can avoid damage to soils if you carry out appropriate cultivations in good weather conditions where possible.

Cultivation and harvesting in wet conditions can damage the structure of your soils. Maize and other forage crops are often harvested in wet conditions, which makes soils vulnerable to compaction.

Shallow cultivation over poor structure will increase the risk of runoff if you do nothing to improve the structure below through deeper cultivation and subsoiling. Compacted tramlines and wheelings can also pose runoff problems.

Headlands and tramlines in fields used for potato and vegetable production are at risk of compaction and susceptible to runoff. Autumn harvesting carries similar risks, and can result in wheel ruts that channel runoff.

Late-sown crops without established crop cover are susceptible to capping, as are fine seedbeds on sandy and light, silty soil. Fine, dry, sandy tilths are vulnerable to wind erosion. For more on crop establishment and crop cover, see pages 40-45.

Grassland soils are susceptible to compaction, especially in wet conditions. Poaching from animals, spreading slurry in winter and silaging in difficult weather can all lead to soil structural problems and can increase the risk of erosion and runoff. For more on grassland management see pages 46-51.

Outdoor pigs can damage soil structure and increase the risk of runoff if kept on unsuitable soils. See page 60 for an example of a farmer who has taken action to prevent soil damage from outdoor pigs.

Helpful hints

Create rough-grass buffer strips in downhill field margins – 6m strips can filter out up to 60 per cent of soil particles.

Leave a rough surface or sow into loosened stubble on slopes at high risk of runoff. Check the soil before you do this – if there is a compaction problem lower in the soil profile you can use a subsoiler to avoid runoff problems stemming from waterlogging in the topsoil.

Undersow spring crops, such as arable and forage crops, with a crop such as grass or mustard. This will provide vegetative cover once your spring crop is harvested, soaking up nutrients and helping to reduce erosion and runoff.

Move outdoor pigs regularly, particularly in periods of wet weather, to avoid excessive compaction and loss of vegetation. Avoid keeping them on steep slopes and in areas below large catchments.

Comply with the restrictions governing mechanical operations on waterlogged soils.

Use low-ground-pressure tyres, and run powered cultivators at the slowest acceptable speed. Avoid wheel slip by considering vehicles’ weight and power, as well as the drawbar pull on the tractor/harvester and the trailer.

Use nurse crops such as winter rye, winter barley and mustard to limit wind blow.

Avoid overstocking moorland and grassland during winter where there is a risk of damaging the soil.

Capped soils stop rain soaking into the soil, creating runoff and denying water to your crops.

Sowing winter cereals in late October and November can put your land at risk of erosion and runoff on sandy and light silty soils.
Maintaining and improving soil structure

You can improve the structure of your soil by increasing its organic matter content and using the right cultivations at the right time.

Most opportunities to improve soil structure arise between harvest and planting. If you know your soils – and understand how they vary across your farm and within individual fields – you can plan cultivations to benefit germination, rooting and yield.

Healthy soils depend on biological processes – from bacteria to earthworms. Use cultivations and pest control carefully, combined with manuring and good crop rotation, to promote biological activity.

Incorporating organic manures or crop residue can help improve the structure and water-holding capacity of your soil and provide nutrients for plant growth.

Many factors influence how well you maintain soil structure. These include the timing of your cultivations, when you choose to spray and spread, and when you graze your stock.

Contour ploughing, where appropriate, helps to slow down the speed of runoff. This can subsequently improve infiltration provided the soil is not compacted. A rough soil surface also helps to slow down runoff, as well as improving infiltration and reducing wind erosion.

You can improve drainage by subsoiling clay soils that you have identified as compacted. Do this when the soil is dry. Subsoiling tramlines and headlands can also help to reduce runoff.

It is always cheaper to avoid damage to your soil than to rectify it Afterwards.

Helpful hints

Use a cultivations plan to help minimise soil working and create the best seedbed possible. Cultivate fields identified as ‘risky’ earlier in the season, such as those on steep slopes or those with unstable or sandy soils.

Explore using minimum or non-inversion tillage to increase topsoil organic matter, reduce runoff and cut costs. Include periodic ploughing or subsoiling in minimum-tillage systems.

Increase soil organic matter using livestock or green manure, or compost.

Cultivate wheelings between beds to aid infiltration.

Set tillage equipment before use. Dig holes to check that it’s working at the correct depth to remove compaction.
Nutrients

What’s in it for you?

Plan your inputs and add profit

Nutrients are essential for crop growth. Where there is a lack of water, light, air or nutrients, the crop will suffer.

When you achieve the right balance in your soils, you can improve the quality and yield of the crop. Careful nutrient planning ensures that the right quantities of nutrients are available when the crop needs them and that these nutrients are applied appropriately.

A good nutrient management plan takes account of the supply of nutrients from all sources, including the soil, mineralisation of organic nitrogen in the soil, and the addition of organic manures and manufactured fertilisers. If you apply more nutrients than the crop can take up, you will waste money and increase the risk of nitrate and phosphate pollution.

You should sample your soil every three to five years to make sure that you use enough nutrients.

When producing a nutrient management plan in a nitrate vulnerable zone (NVZ), take account of the NVZ regulations. These are designed to reduce the amount of nitrate in rivers, lakes and groundwater.

Want to know more?

Further reading
RB209 – The Fertiliser Manual (Defra)
Guidelines for Farmers in NVZs and Manure Planning in NVZs – useful Defra publications due for revision/republication in late 2008
Managing Livestock Manures booklets (Defra – also available from ADAS)
Tried and Tested – The Whole Farm Nutrient Management Plan (NFU, CLA, AIC, LEAF, FWAG)

Useful websites
www.environment-agency.gov.uk
www.defra.gov.uk
www.wales.gov.uk
www.adas.co.uk/manner
www.planet4farmers.co.uk
www.basis-reg.com
www.nutrientmanagement.org

Contacts
Agricultural Industries Confederation 01733 385272
FACTS 01335 343945 (at BASIS office)
Potash Development Association 01904 492009
Agricultural Lime Association 01733 385240
A good nutrient management plan will enable you to address the nutrient needs of your crops field by field.

<table>
<thead>
<tr>
<th>Benefits</th>
<th>Actions</th>
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<tbody>
<tr>
<td>Correct fertiliser application</td>
<td>Understand your soil nutrient levels and the needs of the crop</td>
</tr>
<tr>
<td>Reduced risk of water pollution</td>
<td>Prepare a nutrient management plan</td>
</tr>
<tr>
<td>Potential for lower fertiliser costs</td>
<td>Make use of slurry, manure, sludges and compost</td>
</tr>
<tr>
<td>Crop health and higher yield</td>
<td>Keep clean water out of slurry</td>
</tr>
<tr>
<td>Improved soil fertility and structure</td>
<td></td>
</tr>
<tr>
<td>Less manufactured fertiliser needed</td>
<td></td>
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<tr>
<td>Lower volumes of slurry to be handled</td>
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Elwyn Jones is an agricultural contractor in North Wales who specialises in slurry spreading. He uses a calibrated tanker with injectors to deliver slurry accurately to the roots of the grass. The main benefits of this method are that grass can be grazed sooner and there is no contamination when silage is cut. Some of Elwyn’s farmer customers calculate that they have saved as much as 40 per cent in fertiliser costs. This saving will increase as energy and fertiliser prices rise.

Slurry should be analysed before spreading to establish the quantities of nutrients it will provide to the growing crop and to reap the greatest benefits.

Slurry is an important alternative to large quantities of bagged fertiliser. It can save farmers a lot of money when applied at the right time and in the right place.

“Elwyn Jones
Agricultural contractor, Conwy
Nutrient and manure management planning

Regular soil analysis and a nutrient management plan can help you make the most of all your inputs. They can also help minimise nutrient losses through runoff or leaching into watercourses and groundwater.

Good planning will enable you to ensure that applications are timely and appropriate and that organic matter is used effectively to maintain soil fertility.

Take into account nutrients from autumn applications that will not be available to crops in the following spring. You may find it helpful to use Tried and Tested – the industry’s new nutrient management planning tool.

Helpful hints

Prepare a nutrient management plan to make the most of your inputs. Use fertiliser efficiently by basing applications on soil analysis and crop need.

Use computer-based decision-support systems such as MANNER and PLANET.

Monitor crop nutrients by leaf analysis or by asking a FACTS-qualified adviser or agronomist to look for signs of deficiencies. This will help you make accurate fertiliser applications during the growing period.

Testing soils

A healthy soil can often supply the majority of a crop’s nutrient needs.

Nutrient levels in soil vary according to soil type and depth, and the type of crops grown previously. Take these factors into account when planning your applications.

The chemical properties of soils can change quickly, so make regular checks and estimate annually.

Helpful hints

Develop a soil testing programme and nutrient budgeting system with a registered FACTS-qualified adviser or agronomist.

Check soil nutrient levels every three to five years.

Where you use organic manure extensively, use MANNER to check or estimate how much soil nitrogen is lost in winter. Consider whether you need to change the timing of your applications.
Using fertiliser with care

Manufactured fertilisers play a major role in farming. Rising prices mean it is more important than ever to make sure you hit the spot with your fertilisers and make good use of manures and slurries.

If you use fertilisers accurately you can improve crop nutrition, save money and reduce the risk of pollution. Maintain and calibrate spreaders regularly so that you apply fertiliser accurately and evenly.

You can use precision farming techniques to vary nutrient applications within a field according to soil nutrient levels, past yields or even measured crop requirement in the case of nitrogen.

Helpful hints

Avoid applying nitrogen or manure on cold soils before the crop is actively growing.

Vary application rates within fields to match soil nutrient levels, if you have the necessary equipment.

Take into account organic manure applications and soil nutrient levels.

Check the spread pattern and rate of application for your spreader at the start of the season and each time you change fertiliser product.

Use wider buffer strips alongside streams and rivers. Use a deflector plate, or switch off your boom, to avoid applying fertiliser to field headlands or near watercourses, hedges and boreholes.

Cover crops planted on land destined for spring crops can reduce nitrate leaching by 50 per cent and help you to reduce fertiliser applications.

In nitrate vulnerable zones, keep records of your applications to comply with the Nitrates Action Programme.

Manure and slurry storage

The way you store organic manures can help avoid pollution risk, protect soils and nutrient content and minimise greenhouse-gas emissions.

Keep rainwater out of your slurry, to maintain a good concentration of nutrients and reduce spreading costs. When you divert clean roof and yard water and cover slurry stores, you keep unwanted water out and increase your effective storage capacity.

Avoid spreading farmyard manure when it is fresh, as this may reduce its fertiliser value and pose a risk of water pollution. Stored manure undergoes changes that make it easier to spread and also make subsequent cultivations easier.

Composting does not mean leaving manure to rot down. It means enabling organic matter to break down quickly by aeration and form a good soil conditioner. The composting process reduces viable weed seeds, pathogens and odour. It also helps organic matter to mix into grass swards.

Helpful hints

Make the most of nutrients in organic manures by having enough storage to enable spreading at the best time.

Understand the value of the nutrients in your organic manure. Estimate nutrient content using standard values in Defra’s fertiliser manual (RB209) and analysis on the farm or in the laboratory.

Grant aid may be available under the England Catchment Sensitive Farming Delivery Initiative and the Rural Development Programme for England for covering slurry and silage stores or diverting clean water.

Compost farmyard manure to reduce volume and odours and increase the concentration of nutrients.

Incorporate poultry litter within 12 hours of application. There is a high risk of nitrogen loss to air after application.
Applying organic manures

Other forms of organic matter, such as sewage sludge and composted wastes, can give nutritional and financial benefits similar to those from traditional livestock manures.

To make the most of such organic materials, find out exactly what they contain. Suppliers should tell you the nutrient content.

Spread manure accurately. Calibrate your machines so you know exactly what is being applied and what savings you can make in fertiliser applications. You can do this by weighing your machine full and empty or by spreading metre-square sheets across the spreading bout, weighing the deposit and adjusting machinery to suit the application area.

Incorporate manures into the soil as soon as possible, and within 24 hours, to minimise nutrient losses.

Avoid spreading slurry and manure in wet conditions. This damages soils, wastes valuable nutrients and increases the risk of polluted runoff from your fields.

Helpful hints

- Prepare a manure management plan to identify spreading risk. You can use the step-by-step plan on the Defra website.
- Test manure for nutrient content or use Defra’s fertiliser manual (RB209) as a guide. Match nutrients to crop requirements.
- Use an ammonium-N test kit such as Agros or slurry hydrometer to do field analysis of slurry and manure. This helps remove the guesswork from assessing nutrient content when planning fertiliser applications.
- Minimise nutrient loss by rapid incorporation, injection or band spreading.
- Slurries, sludges and poultry manure contain readily available nitrogen, so it is best to spread them in the spring to minimise nutrient loss and maximise returns.
- Avoid applying manures and slurry to land for which the phosphate index is greater than 3. Your registered FACTS-qualified agronomist can advise you on this.
- Calibrate your manure and slurry spreaders, just as you would with fertiliser spreading equipment. Recalibrate equipment at least once a season and with each type of muck applied.
- In nitrate vulnerable zones (NVZs), follow the timings and applications laid out in the NVZ action programme.

Spreading in wet conditions, particularly on sloping fields, risks wasting nutrients and causing polluted runoff.

Slurry injection equipment ensures better targeting and less wastage by cutting slits in the ground and injecting the slurry close to the roots of the grass.
Crop protection

What’s in it for you?

Better returns while maintaining weed, pest and disease control

You can reduce your costs without reducing yields by tackling weeds, pests and diseases with a balance of mechanical, chemical and biological controls.

The best way to achieve a good balance is to establish a vigorous crop. Vigorous growth will help crops to out-compete weeds, pests and diseases, which will make their eradication unnecessary.

When you establish beetle banks and managed field margins you can reap twin benefits: a habitat for beneficial insects and a reduced risk of water pollution and soil erosion.

Even very small quantities of pesticides can present a risk to the water environment, so make sure you carefully manage their storage, transport and use. A BASIS-registered adviser can help develop an integrated crop protection plan for your farm, and there are planning tools/models on the LEAF and Voluntary Initiative websites.

Want to know more?

Further reading
The Code of Practice for Using Plant Protection Products (Defra)
Guidance on Storing Pesticides for Farmers (Health and Safety Executive)
Every Drop Counts: Keeping Water Clean (Voluntary Initiative)
Guidance on Using a Lined Biobed (Environment Agency)

Useful websites
www.pesticides.gov.uk
www.leafuk.org/leafaudit
www.voluntaryinitiative.org.uk
www.environment-agency.gov.uk
www.cropprotection.org.uk
www.wasterecycling.org.uk
www.caip-uk.info
www.biobeds.info

Contacts
Environment Agency 08708 506 506
Defra 08459 33 55 77
Welsh Assembly Government 08450 103300
Crop Protection Association 01733 367213
LEAF 0247 6413 911
You can control costs and help protect soils, water and wildlife with a combination of mechanical, chemical and biological controls.

<table>
<thead>
<tr>
<th>Benefits</th>
<th>Actions</th>
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<tbody>
<tr>
<td>Sound and cost-effective crop protection</td>
<td>Plan the measures you need and integrate biological, chemical and mechanical methods</td>
</tr>
<tr>
<td>Vigorous crops that resist infestation and disease</td>
<td>Rotate crops and select appropriate cultivations and varieties</td>
</tr>
<tr>
<td>Better targeted and more effective use of chemicals</td>
<td>Use spray thresholds and consult a BASIS-registered agronomist</td>
</tr>
<tr>
<td>Increased diversity of wildlife</td>
<td>Maintain and calibrate sprayers regularly</td>
</tr>
<tr>
<td>Protected watercourses and wildlife habitats</td>
<td>Encourage natural predators and parasites</td>
</tr>
<tr>
<td></td>
<td>Establish no-spray buffer zones</td>
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</tbody>
</table>
James Hinchliffe farms a 142-hectare arable unit with an alluvial soil in East Yorkshire. For over ten years he has run fungicide trials at the farm alongside conservation practices designed to improve biodiversity. This work, conducted in partnership with BASF, has helped increase the number and variety of birds visiting the farm.

All fields originally had six-metre margins, now reduced to three metres. The margins are sown with a wide range of plants to provide a variety of food sources for birds throughout the year. James has also adopted a minimum-tillage cultivation system, which allows the survival of more beneficial insects that live in the soil during winter.

While not directly increasing farm income, the new cultivation techniques have reduced crop establishment costs. The ditches left unmown provide food and cover for birds. Uncultivated margins can also be used to access the fields occasionally without adversely affecting biodiversity.

**Counting the cost and reaping the benefits**

Using a minimum-tillage system and stale seedbed saves machinery passes.

At 2008 prices conventional cultivation costs are about £110 per hectare, so you can save at least £22 per hectare — mainly on fuel and labour.

This approach also reduces the risk of runoff and erosion damage.

James Hinchliffe has found that the time and money he is saving on cultivations significantly outweigh the added costs he has to consider because he is not ploughing — a little extra time spent walking his crops to identify weed problems and the herbicides he uses to deal with these weeds. The farm has not had to do any summer spraying to control aphids for over a decade, in part because of a surge in beneficial insect populations under minimum tillage.

Arable farming methods can operate alongside an enhanced biodiverse environment, encouraging large numbers of small birds to my farm.

James Hinchliffe
Top House Farm, Yorkshire
Integrated crop management

Integrated crop management brings together various techniques to reduce costs and protect the environment.

Crop rotation reduces weeds, pests and diseases by interrupting their life cycles. Some crops, such as brassicas, potatoes and sugar beet, need rotations to be longer than four years to control soil-borne pests and diseases.

You can reduce the herbicide needed within a growing crop if you encourage annual weeds and volunteers to germinate and then treat them before drilling the crop.

Helpful hints

Rotate crops to suit your soil type and farming business.

Develop a crop protection management plan for your farm – see www.voluntaryinitiative.org.uk.

Incorporate straw to increase organic matter and improve soil fertility.

Select disease-resistant varieties for fields that are more prone to particular pests and diseases.

Leave a rough seedbed and drill as late as possible in the autumn to reduce weed competition, insect damage and soil erosion.

Planning pesticide applications and using sprays wisely

You can reduce costs by choosing the appropriate pesticide and ensuring that its application is well targeted and timely.

Often there is no alternative but to use a chemical treatment to solve a specific disease, weed or pest problem. But there are a number of ways to optimise the inputs you use.

Walk your crops regularly to identify early signs of attack or weed growth. Anticipate insect attacks and disease outbreaks by using weather forecasts, diagnostic techniques, industry warning networks and decision-support systems. Dealing with problems early makes it possible to reduce your use of chemicals.

Where appropriate, use low-volume applications. Make sure your applications are effective by using the appropriate rates through the correct nozzles in suitable weather conditions.

The slug pellet pesticide, metaldehyde, has recently been found in rivers as a result of its use in farming. Store, handle and apply pellets in line with guidance from the Voluntary Initiative, ensuring that there are no farmyard or field pathways where runoff can carry slug pellets into ditches and streams.
Helpful hints

Walk crops regularly to check for problems. Record weed infestations, and use the information to identify problem areas in future years.

- Use a Local Environment Risk Assessment for Pesticides (LERAP) where required.
- Reduce applications and prevent pollution by establishing six-metre buffer strips next to watercourses and sensitive areas.
- Monitor insect and disease levels using traps, bait and diagnostic kits. Only take action when treatment thresholds are reached.
- Calibrate your sprayer each time you use it.
- Keep a copy of Defra’s plant protection code of practice on your farm. Familiarise everyone who works with pesticides with the requirements of the Food and Environment Protection Act 1985.

Storing, handling and disposing of pesticides

Poor handling or inappropriate use of pesticides can pollute the environment and harm wildlife.

Keep pesticides in a secure, bunded store to reduce the risk of theft and pollution from leaks.

Use a dedicated area for filling and cleaning your sprayer, with disposal facilities that won’t adversely affect drains, watercourses, soakaways, wells and boreholes. Use a pressurised clean water supply for washing down.

You can collect and dispose of sprayer washings in a number of ways:

- spray over the crop that has just been treated;
- establish an approved treatment system;
- employ an approved disposal contractor;
- spray onto a designated vegetated area of land (groundwater authorisation required from us);
- use a permitted lined ‘biobed’ system.

A biobed is a lined structure filled with biomix: a mixture of topsoil, a peat substitute and straw. The biomix removes the pesticides from contaminated water, which can then be re-used. Research has shown that pesticide pollution originating from the farmyard can be reduced by as much as 99 per cent when biobed-based handling areas are used.

If using contractors, ensure that they are members of the National Register of Sprayer Operators. Make sure that they know where the wells, drains, boreholes, soakaways and watercourses are on your farm, and that they use suitable sites for filling and cleaning equipment.

They should comply with any Local Environment Risk Assessment for Pesticides (LERAP) where this applies. They should also calibrate sprayers before use and record all applications, passing on the details to you.
Helpful hints

Have an emergency plan accessible to all staff and contractors to help deal with pesticide spills.

Keep cat litter or other absorbent material in your pesticide store and near your filling area, ready to mop up spills.

Use stored water or a bowser to fill your sprayer. Only use a mains supply if it is fitted with a double-check valve.

Check your sprayer for drips, leaks and hose condition before leaving the yard.

Avoid handling pesticides near an open drain or watercourse.

Wash the outside of the sprayer and tractor tyres before leaving the field.

Get a permit from us if you dispose of chemicals or washings on your farm other than by application to the crop.

Dispose of all non-approved pesticides safely through a licensed contractor – see www.recycling.org.uk.

Use pesticides in accordance with advice on the label, the recommendations of a BASIS-registered adviser and the principles of integrated control.

Encouraging predators of crop pests

Many crop pests have natural predators that can help your pest control.

You can plant grass strips around arable field margins to provide shelter for beneficial insects, a buffer against competitive weeds and a useful habitat for wildlife.

Where fields are too big for margins to be effective havens for insects, consider splitting the field with a beetle bank sown with tussock grasses such as cocksfoot and Yorkshire fog. Beetle banks along contour lines have the added benefit of reducing runoff and soil erosion.

Managed field margins of the right height and width can reduce the risk of spray drift affecting hedgerows and watercourses.

Helpful hints

Make use of grants for beetle banks and margins.

Use fallow land to provide additional insect refuges.

Plant non-invasive perennial grass species such as red fescue and smooth meadow grass to compete with aggressive annual weeds.

Consider including native perennial wildflowers in your seed mix for field margins, to provide food for birds.

Spray drift and runoff can pollute water and damage wildlife habitats and fisheries.

Tussock grasses provide a good habitat for beneficial insects.
Crop establishment and crop cover

What’s in it for you?

Give crops a good start and protect your soils

Where the soil is compacted or eroded, this affects yields and profits. If you overcome these problems you can give your crops a good start and achieve a healthy yield.

The key to success is to establish a seedbed that can withstand all weather conditions but retain a surface texture that supports germination and a soil profile that drains freely. To do this you need to understand your soils and make the right choices in your cultivations – see soils section on pages 22-27 for more information.

The time available for autumn fieldwork varies considerably across England and Wales, and not all techniques can be universally applied with success. Wherever you farm, select the most appropriate establishment system for your land. Decide when to plough or use shallow minimum tillage to minimise soil loss by considering cropping, weather and soil conditions.

You will damage soil structure if you work the land in unsuitable conditions or work it too hard. When this occurs, the soil can take years to recover.

Want to know more?

Further reading
Cross Compliance Handbook for England (Defra)
Target on Establishment (Soil Management Initiative)
thinksoils (Environment Agency)

Useful websites
www.environment-agency.gov.uk
www.smi.org.uk
www.environmentsensitivefarming.co.uk
www.teamshare.co.uk
www.appliedresearchforum.org.uk
www.farmingfutures.co.uk
www.basis.org.uk
www.leafuk.org/leafaudit

Contacts
Home-Grown Cereals Authority 020 7520 3920
British Grassland Society 01285 885166
Maize Growers’ Association 01363 775 040
If you understand your soils you can give your crops the good start they need to achieve a high-quality yield.

<table>
<thead>
<tr>
<th>Benefits</th>
<th>Actions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less soil damage and better establishment</td>
<td>Plan for reduced cultivations and treatments</td>
</tr>
<tr>
<td>Less crop damage</td>
<td>Carry out field operations at the right time and in the right conditions</td>
</tr>
<tr>
<td>Optimum plant density</td>
<td>Match your seed rates to cultivations and soil conditions</td>
</tr>
</tbody>
</table>
Nurse crops protect salads from wind erosion

Thane Goodrich of New Downs Farm, Kent, is a specialist salad grower whose sandy soils are susceptible to wind erosion. The crops he produces include lettuce, endive, herbs and spinach for most of the major supermarkets.

New Downs Farm has encountered problems with wind blow and nutrient leaching because of the lack of organic matter in its soils. Thane cannot graze sheep or use farmyard manure as they are both ruled out by strict technical specifications aimed at avoiding microbial contamination. He had to abandon trial spreading of composted municipal waste because of plastic contamination in the crop. Irrigation has compounded the problems facing the farm, causing runoff and soil loss.

The solution has been to plant a cover crop of winter barley to stabilise the soil. The cover crop is sprayed off and left in the ground until salad crops are planted. Before planting the salad crops, Thane inverts the barley leaf and root structure with a rotary cultivator to incorporate organic matter into the soil.

This method improves soil structure and helps prevent nutrient leaching. The farm also uses grass strips around its headlands to prevent soil runoff.

**Counting the cost and reaping the benefits**

Changing from plough-based cultivations to a cultivator-drill system can cut crop-establishment costs by 25-40 per cent. This saves money because the cultivator-drill approach is less time consuming, which reduces fuel and labour costs.

Based on establishment costs of £139 per hectare when ploughing and £95 per hectare for minimum tillage, you could easily save £40 per hectare.

Additional benefits include better timing, increased organic matter, reduced erosion and more effective spray use.

Improvements in soil management have helped us increase the yield of our salad crops and decrease soil erosion on our susceptible fields.

“Thane Goodrich
New Downs Farm, Kent”
Planning cultivations

Correct cultivations can cut costs, reduce damage to the environment and increase yield.

Many farms still need the plough, but subsequent operations can be combined to reduce passes over your land and reduce soil compaction.

Power-driven equipment is often used to create fine, smooth seedbeds that support good establishment and make management easier. But excessive or inappropriate use of powered cultivations can increase the risk of soil damage and erosion on some soils. It can also damage your crops or coat them in soil, which increases processing costs.

On sandy and silty soils fine seedbeds can slump when it rains. This can seal the surface and increase runoff and soil erosion. If you work the soil when it is wet you will cause similar problems.

You can also cause compaction if you use tractors and other vehicles on wet soils, and this is difficult and expensive to put right. You can often avoid damage by reducing tyre pressures. This has the added advantage of providing better traction, and often improves fuel consumption too.

You may end up with a plough pan if you plough constantly to a single depth. Examine your soils regularly to check for panning and compaction. Take corrective action, such as ploughing deeper or subsoiling, where necessary.

Helpful hints

As far as possible, plan cultivations for when there is least risk of bad weather.

Don't work wet land: check the soil profile before you start. Avoid rolling a wet soil, as you may form a surface cap and increase runoff risk. Allow soils to dry sufficiently before sowing.

Reduce the risk of capping on sandy soils by not leaving a fine tilth.

Join a machinery ring and work to agreed schedules so that you have the right machine for the job at the right time.

Encourage drainage by rough ploughing or discing after late-harvested crops such as maize, then establishing a cover crop to reduce the risk of soil and nitrate loss.

Apply animal manures or organic waste where soils lack structure and are difficult to work. This will help break down the soil so that it has greater contact with seed.
Ploughing – less is more

If you use the plough less you can reduce cultivation costs, increase organic matter and improve soil structure. Non-inversion tillage protects against erosion, encourages earthworms and provides a food source for birds.

Drilling directly into stubbles can be highly effective in some situations. Direct drilling also cuts costs, although poor weed control can affect the subsequent crop. To minimise this allow volunteers and other weeds to germinate, then eradicate with a broad-spectrum herbicide before drilling.

Avoid direct drilling into wet soils, which can lead to smearing and poor germination in an anaerobic seedbed.

The time you save by reducing cultivations should make it easier to achieve your target sowing date, or enable you to take on more land.

Incorporating organic matter not only enriches the topsoil but also improves drainage and cuts nitrate leaching and CO₂ emissions.

Don’t abandon ploughing and subsoiling completely — they still have a role to play in weed control and reviving damaged soils. If you have a major blackgrass problem, research suggests that rotational ploughing may help. By using the plough every five to seven years you can reduce blackgrass significantly without losing the cost and environmental benefits that accrue from minimum tillage.

Helpful hints

Check your soils for compaction below the cultivation layer and correct if necessary.

Do not direct drill into wet soils or land that has a blackgrass problem.

One-pass cultivations save fuel, reduce compaction from vehicles and machinery and help incorporate straw and stubbles into the soil.

Do not over-consolidate wet or light land – this can cause capping and compaction.

Improve weed control and reduce costs by allowing all weeds to germinate before using chemicals on them.

Leave some areas fallow or put them into environmental stewardship measures if they are too small or awkward to cultivate easily.
Maintain crop cover to avoid bare soils

Bare soils are vulnerable to damage and degradation. Vegetation provides a protective covering that helps prevent the loss of seeds, nutrients and organic matter.

Cover crops can reduce nitrate leaching by 50 per cent, enabling you to reduce fertiliser applications and save money. Cover crops established over winter can be used for lamb production before returning to arable production in the spring.

Planting rough grass strips across slopes reduces runoff and helps to stop soil and nutrient loss. Where it is possible to add a permanent feature, you could plant a hedge that will not only slow down runoff but also protect against wind erosion.

Under-sowing forage maize with ryegrass can protect soils through the winter.

Direct drilling into a loosened stubble or sprayed-off cover crop helps increase topsoil organic matter. It also protects vulnerable soils from capping and wind blow.

Delay spring landwork as long as possible for crops such as potatoes, vegetables and salads. This will reduce the time that soil is exposed and vulnerable to damage.

Helpful hints

Ensure good crop cover to protect vulnerable soils and make use of nutrients.

Establish rough grass buffers at least six metres wide alongside ditches and streams, plus grass strips within fields to intercept runoff.

Don’t use the tramline setting on your seed drill for fields with a high risk of runoff. Use GPS to establish tramlines in the growing crop.

Consider direct drilling sugar beet into loosened stubbles on light land.
Grass and moorland, hedges and trees

What’s in it for you?

Retain soil and restore your land

Grassland and moorland areas are among the most cherished landscapes in England and Wales. They support a wide variety of wildlife and form the head waters of many lowland rivers.

The uplands play a significant role in storing and purifying our drinking water. They also serve as a natural buffer that helps to control flooding. Upland streams and burns provide important spawning and nursery areas for salmon and sea trout.

Compaction caused by grazing in wet weather can increase the risk of poaching and runoff. This section of Best Farming Practices explores how you can prevent this kind of damage to grassland soils.

Good grassland and moorland management protects your land. It also enriches wildlife habitats and landscapes, enhances tourism, protects soil carbon and helps prevent water pollution and flooding.

A large amount of carbon is stored in upland soils – particularly in peat – which makes them an important resource for helping to combat the effects of climate change.

Want to know more?

Further reading
England Catchment Sensitive Farming Capital Grant Scheme Farmer Handbook (Natural England)
Peak District Moorland – Gully Blocking in Deep Peat (Moors for the Future)
The Heather and Grass Burning Code (Defra)
Upland Management Handbook (Natural England)

Useful websites
www.defra.gov.uk – see guidance on biomass crops
www.wales.gov.uk
www.environment-agency.gov.uk
www.naturalengland.gov.uk
www.ccw.gov.uk
www.forestry.gov.uk
www.nationalparks.gov.uk

Contacts
Environment Agency 08708 506 506
Forestry Commission 01223 314546 (England) 0845 604 0845 (Wales)
Natural England 0114 241 8920
Countryside Council for Wales 08451 306 229
The things you do to protect your land and the health of your stock can also improve the landscape and encourage wildlife.

<table>
<thead>
<tr>
<th>Benefits</th>
<th>Actions</th>
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</thead>
<tbody>
<tr>
<td>Improved grazing and nutritional value</td>
<td>Manage livestock numbers and location to avoid under-grazing, over-grazing and poaching</td>
</tr>
<tr>
<td>Reduced sward restoration costs</td>
<td>Reduce soil damage, erosion and runoff caused by vehicle and stock movements and the lack of ground cover</td>
</tr>
<tr>
<td>Sustained yields and productivity</td>
<td>Avoid applying manure and fertiliser near streams and rivers, on steep slopes or in fields that are prone to flooding</td>
</tr>
<tr>
<td>Cleaner rivers and streams</td>
<td>Protect features such as streams, trees and hedges. They enhance the landscape, help to protect soils, and provide shelter for livestock and habitats for wildlife</td>
</tr>
<tr>
<td>Higher capital value for your farm</td>
<td>Use wide buffer strips and woodland to intercept sediment before it reaches streams and rivers</td>
</tr>
<tr>
<td>Increased diversity of wildlife</td>
<td></td>
</tr>
<tr>
<td>Less time and money spent clearing ditches and roads</td>
<td></td>
</tr>
<tr>
<td>Enhanced fisheries</td>
<td></td>
</tr>
</tbody>
</table>
Better moorland management means better grazing as well as more grouse

Simon Bostock runs the 3,200-hectare Dallowgill Estate in Yorkshire – a traditionally managed grouse moor with sheep grazing tenancies. Dallowgill is a fine example of a well-managed grouse moor. Its three gamekeepers help to produce good sheep grazing and grouse shooting and a rich diversity of birds and other wildlife.

There is a five-year Wildlife Enhancement Scheme agreement with Natural England, which stipulates a number of management practices to deliver conservation benefits. These include a detailed burning plan and the blocking of grips in a number of areas of blanket mire. The estate employs a shepherd to ensure even grazing by sheep over the moor.

Arthur Ward, a tenant farmer on the Dallowgill Estate since the mid-1970s, has reduced his flock of Swaledale sheep from 630 to 550 to help prevent overgrazing of Eavestone and Skelding moors. He has also abandoned sheep dipping in favour of pour-on parasite treatments recommended by the estate.

‘If you have good moorland management and you get the parasite treatment and stocking right, it makes for better grazing and better lambs,’ he says.

Counting the cost and reaping the benefits
The Dallowgill Estate has created a better environment for sheep farming. It has achieved this through a combination of controlled heather burning, good bracken management, correct stocking rates and timely and appropriate parasite treatments.

Arthur Ward is able to finish his lambs up to four weeks earlier than in previous years. This can potentially save him around £725 per season in concentrate costs alone.

Arthur also loses fewer young lambs to drowning as deep grips either fill in naturally or are blocked to rewet blanket mire and help reduce flooding downstream.

Traditional moorland management, refined in line with modern best practice, has produced a good crop of grouse and quality upland grazing for sheep.

"Simon Bostock
Dallowgill Estate, Yorkshire"
Grassland

Permanent grassland accounts for more than two-thirds of English farmland and almost half the agricultural area of Wales, including many upland areas. Farmers have played a big part in shaping the upland landscape by managing their land to support livestock grazing.

Erosion and runoff problems often occur when soil is compacted by the feet of livestock in wet conditions. Problems also occur when farmers and moorland managers remove grass and other vegetation – such as scrub, bracken and heather – from hill slopes and valley bottoms. When you retain your grassland and look after it well, you can protect the soil and reduce the risk of polluting streams and rivers.

Overgrazing of grassland can cause vegetation loss and erode riverbanks. This increases the amount of sediment getting into streams and rivers, making them wider and shallower and affecting fish and other wildlife. See pages 52-57 for more on livestock management.

If you farm on steeply sloping land or on a floodplain, your management of grassland and other permanent vegetation could make an important contribution to reducing flood risk. See pages 16-21 for more on combating floods.

Helpful hints

Retain existing areas of unimproved and semi-improved grassland.

Reduce the risk of runoff and erosion by establishing permanent grass or broad-leaved woodland on light soils and slopes steeper than 11 degrees.

Create new grassland and buffer strips along field margins, streams, rivers and natural drainage channels.

Place ring feeders or supplementary feeding areas away from rivers, streams and wet areas where there may be excessive poaching or susceptibility to flooding.

Avoid creating quad-bike tracks up and down slopes. They will collect water and become channels for runoff.

Aid is available in England (Entry Level Stewardship) and Wales (Tir Cynnal) for grass margins, low-input maintenance of lowland grassland and the management of rough grazing and rush pastures.

Aid is available in England (Higher Level Stewardship) and Wales (Tir Gofal) for the restoration and maintenance of moorland and upland rough grazing.

This funding also supports the use of grassland to control erosion and runoff, and the creation and management of wetlands.

Avoid actions that contribute to overgrazing or undergrazing, pollute water or damage soil structure.
Moorland

Rough grazing and moorland dominate the uplands, providing a wide range of landscapes and habitats.

Poor land management degrades moorland and makes it vulnerable to erosion. Control stocking densities and introduce burning plans to avoid loss of vegetation, soil and peat.

Where peat and soil erosion occur, discoloured water and sediment may be carried into water-treatment works and affect the water supply. It costs the water industry a lot of money to deal with this problem, and uses energy unnecessarily.

Soil erosion in the uplands can pollute the gravel-bedded streams that fish need for spawning. Soil compaction reduces the water-holding capacity of the land, influencing the frequency and severity of downstream flooding.

Upland peat soils are a major carbon reservoir – more important than forested areas in England and Wales. When you protect these soils, you will help to prevent the release of carbon dioxide into the atmosphere and reduce the burden of climate-changing emissions.

Hedges and walls

Farmers have enclosed many grassland and moorland areas to help manage stock effectively. Upland enclosures typically consist of walls and banks of local stone. On lower ground these give way to hedges and fences.

As well as allowing stock to be moved around, preventing overgrazing, enclosures provide barriers that slow down the flow of runoff.

Traditional walls and stone hedges are valuable assets that require care and attention. They can be good stock-proof boundaries and an attractive part of the wider landscape.

Hedges provide a haven for birds and insects, including species that help keep crop pests at bay. They can be used to break up long slopes on vulnerable land, reducing the risk of soil erosion. To ensure the best defence against runoff and erosion, run new hedges parallel to the contours on your land.

You can restore neglected hedges by filling in gaps and by coppicing overgrown shrubs. Cut hedges rotationally so that not all are cut at once. This will help conserve biodiversity and provide a good variety of nesting habitats and winter food for birds.

Helpful hints

Block some grips on moorland to reduce runoff.
Seek our advice and approval when planning this.

Reduce grazing pressure to allow soils and heather to recover.

Prepare a burning plan and follow the Heather and Grass Burning Code.

Follow management practices sensitive to the needs of ground-nesting birds.

Government support is available for the management of moorland, rough grazing and rush pastures in Less Favoured Areas. This is within the Entry Level Stewardship (ELS) scheme in England. A moorland restoration option is available in Higher Level Stewardship.

Do not out-winter stock on semi-natural habitats.

Plant hedge and tree barriers, at a density of six plants per metre, to reduce the risk of wind erosion.

Plant new hedges across slopes to reduce the risk of runoff and soil erosion.

Restore sparse hedges to encourage birds and insects that help control pests.

Use native species local to the area and appropriate for the habitat.

When cutting hedges, aim for an ‘A’ shape or topped ‘A’ shape. This will reduce wind speed and wind erosion, provide shelter for livestock, and offer a safer nesting habitat for birds.

Create new enclosures in upland areas to help with grazing management.
**Woodland**

Planting trees helps reduce the risk of soil erosion by wind and water. Trees are good for soaking up excess nutrients, and in some instances they can hold back flood waters.

Woodland areas can provide wildlife habitat and a valuable source of income for farmers. Wet woodlands are a particularly rare habitat, and they can play a part in reducing the risk of flooding downstream.

Use appropriate native trees to prevent erosion. Willow is good for protecting riverbanks, and Scots pine for reducing wind erosion on sandy or acid soils.

Like hedges, tree belts break up long slopes, reducing runoff risk and providing protection for vulnerable crops. A 30m woodland buffer strip can filter out most suspended particles from runoff. Research with farmers in mid-Wales has found that infiltration of rainwater is 60 times better in belts of broadleaved native trees planted on steep slopes than on nearby grassland.

The English Woodland Grant Scheme and Better Woodlands for Wales provide grant support for new planting and also for improving woodland. Strategically placed biomass crops can play a useful role both in protecting your land and in providing a renewable source of energy.

**Helpful hints**

Use tree belts or create new wet woodland in the floodplain of rivers to protect vulnerable soils and riverbanks from erosion.

Take advice on planting woodlands from the Forestry Commission.

Fence new or regenerated woodland to control livestock and wildlife access.

When planting, always stagger trees so as to intercept flow and provide maximum space for growth.

Whenever possible use local strains of native species.
Livestock

What’s in it for you?

Prevent water pollution and protect soil

You may be able to get more from your land and avoid polluting surface water by reviewing the way you graze and feed livestock.

Consider introducing mobile feeders and improving tracks and gateways (see pages 58-63). You can also use lightweight vehicles fitted with low-ground-pressure tyres. These measures may help you to avoid damage to soils while using your land to maximum effect.

Our changing climate, with warmer winters and earlier springs, is tempting some farms to extend the grazing season. This will increase the risk of water pollution in some of the wetter areas of England and Wales. Consider how suitable your fields are, assessing the increased risk of soil damage and the possibility of runoff.

Reducing the amount of dirty water your farm produces can bring significant savings by reducing costs of slurry storage and application. See pages 72 and 74 for our main text on this topic.
You can reduce the costs associated with winter housing, parasite treatments and dirty-water storage by changing some livestock management practices.

<table>
<thead>
<tr>
<th>Benefits</th>
<th>Actions</th>
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<tbody>
<tr>
<td>Savings on additional storage and disposal of dirty water</td>
<td>Cover outdoor loafing areas around the farmyard</td>
</tr>
<tr>
<td>Lower housing costs</td>
<td>Make better use of autumn grazing (after your final silage cut), and consider renting land from neighbours to graze young stock</td>
</tr>
<tr>
<td>Avoidance of poaching</td>
<td>Choose suitable locations for water troughs and improve the footing around troughs in fields</td>
</tr>
<tr>
<td>More use of well-drained areas by stock</td>
<td>Plant hedges and shelter belts to make underused areas more attractive for grazing</td>
</tr>
<tr>
<td>Reduced water and chemical use</td>
<td>Establish a less wasteful cleaning strategy for the milking parlour</td>
</tr>
</tbody>
</table>
Subsoiling improves grassland by ensuring better drainage

Julian Hurford runs a 100-hectare dairy farm near Colyton in Devon. His 180 cows graze dense, white-clover leys that have been introduced to cut fertiliser costs and boost protein intake. Julian wanted to tackle drainage and runoff problems on the farm. Most of his land is under-drained, yet water was ponding on the soil surface and this was contributing to rapid runoff on steep slopes.

Soil examination revealed a number of problems. These included topsoil compaction near the soil surface caused by cows trampling, and deeper problems caused by heavy vehicles such as silage trailers. One field also needed a new land drainage system to reduce waterlogging.

Julian decided to invest in a subsoiler to deal with soil compaction in his grassland. He chose one with disc coulters to limit sward damage, and varied the depth of subsoiling according to the depth of compaction. Julian has also tackled soil erosion and damage by building new tracks for his dairy herd and by bringing his harvesting of maize forward from October to September so that he can establish good ground cover before the winter.

Periodic subsoiling of grassland has reduced runoff problems and we have noticed better growth of grass.

“Julian Hurford
Farwood Barton, Devon

Counting the cost and reaping the benefits
Subsoiling should only be carried out as a remedial measure where needed and when conditions are suitable.

The benefits of grassland subsoiling include improved grass yields and better access to the land because of drier soils. Julian has seen a marked reduction in waterlogging and runoff, and the cost of subsoiling at £40 per hectare is a small price to pay for this.

To build his cow tracks, Julian received £15 per metre from the England Catchment Sensitive Farming Capital Grant Scheme. The tracks have reduced damage to the ground, and reduced the incidence of lameness in the dairy herd.
Out-wintering stock

The soil and weather conditions on your farm may mean it is not possible to out-winter stock without damaging the land or compromising the welfare of your animals. Out-wintering large numbers of stock is a pollution risk both for groundwater and for surface water. But in some areas of the country you can extend the grazing season or keep stock outside throughout the winter if you take precautionary action to protect the soil.

Take care when identifying fields for out-wintering stock. Free-draining fields, away from watercourses, are at least risk of poaching and of breaking cross-compliance rules. Move electric fences frequently and use back fencing to prevent poaching and to control access to forage crops, supplementary feed and cut grass left on your fields.

You can use stand-off pads to enclose large numbers of sheep and cattle in winter, as long as the pads are lined and you build in enough storage to safely contain and recover the effluent produced. Discuss your plans for stand-off pads with us so that we can help you come up with an environmentally sound design.

You can retain topsoil strength and resilience to trampling by drilling forage crops directly into glyphosate-treated old pasture. But beware of compacted soil that is at risk of runoff.

Place winter feed in the fields in dry weather to avoid traffic on wet soils. You can improve access by creating suitable tracks for stock and vehicles, reinforcing gateways with stones and using mobile feeders on hard surfaces.

Outwintering in upland areas is more difficult, but low stocking rates and regular movement of feed sites can make the risk acceptable. Move stock to fresh land when field conditions deteriorate or when there are clear concerns about animal welfare. Plan ahead for extended periods of bad weather by identifying and preparing the land you will use.

You can back fence to control access to heavily used areas, and fence off watercourses and boggy areas to avoid soil loss.

Construction of a well-drained lying area with its own shelter belt will provide cattle with a refuge where they can rest with minimal heat loss.

Helpful hints

Use level, well-drained fields – away from watercourses – for outwintering stock.

Move supplementary feeders to prevent poaching.

Reduce stocking by selling barren ewes after scanning in mid winter.

Provide dry lying areas and shelter belts for periods of bad weather.

Direct drill suitable forage crops into sprayed off grass or stubbles with good soil structure.

Back fence stock and place feed before the winter.

Do not cause damage by overgrazing or supplementary feeding.
In the dairy and parlour

There are many opportunities to save water, and money, in the dairy and parlour.

If you control water use in these areas you can keep your bills low and reduce the volume of dirty water produced. This cuts the cost of slurry storage and spreading.

Plant washing accounts for 4-10 per cent of water consumption on dairy farms. You can reduce what you use by introducing a more efficient system, and by reusing water to wash down the dairy floor.

You can reuse the water used for pre-cooling milk for plant washing and stock drinking. You can use rainwater harvested from rooftops for washing down, and also for stock drinking if you use a UV filter to treat it for faecal contamination.

In high rainfall areas, you can minimise your water needs through an effective recycling and recovery strategy. Good management of rainwater will also give you more control over when you can spread slurry, rather than allowing the weather to dictate what you do.

Helpful hints

Damp down the parlour before milking and soiled surfaces before washing off.

Install a pressurised wash-down system to cut water use in the parlour and collecting yard.

A fast-wash system uses as little as 1.5 per cent of bulk tank capacity.

Use trigger outlets on all hoses.

Check regularly for leaks and repair them promptly.

Animal health products

Preventive treatments can be costly. They also pose a risk to human health and the environment. A single teaspoon of sheep dip can wipe out life from hundreds of metres of river.

You can reduce risk and costs with a parasite-control strategy based on a closed flock or herd. Produce a health plan for your farm, and quarantine any new stock you buy.

Injection and pour-on products can be very effective in the correct circumstances, and relatively cheap. Take advice from your vet if you are buying in new stock or hiring rams.

You can help break parasite life cycles by reducing stocking densities and rotating your use of stocked and conservation ground. Bracken control will also help you to keep parasite numbers down.

Our changing climate is already bringing milder, wetter winters, which increasing numbers of parasites will survive. Monitor the health of your flock or herd and adjust treatments accordingly.

Helpful hints

Consult your vet or supplier to check on the best use of animal health products.

Plan shared treatments with neighbouring farms where feasible, to improve area parasite protection and reduce costs.

Rotate the products you use to avoid a build-up of resistance to treatments.

Promote better biosecurity, to reduce the need for treatments.

Exclude stock from wet areas to break the liver fluke cycle.

Monitor worm burdens. Only use wormers when the faecal egg count is particularly high.

Animal health products – including swabs, dressings, syringes and dirty packaging – are controlled wastes, that must be disposed of correctly.
Silage

Silage effluent is highly polluting – 200 times more polluting than raw sewage – but you can avoid the damage it causes if you follow our helpful hints below.

Warm, wet and unsettled weather brings problems at silage time. Rapid grass growth usually increases moisture content, while humid conditions disrupt wilting. Avoid overfilling trailers, as heavy loads of silage can cause deep soil compaction in wet conditions.

Silage that is high in dry matter will hold its shape better when baled and go further when fed. You can virtually eliminate effluent if you wilt grass completely.

You can also reduce the time needed for wilting by using a mower conditioner and by tedding grass soon after cutting. Well-scattered and exposed silage can achieve full wilt in 24-36 hours.

Helpful hints

Draw up an emergency plan to deal with escapes of silage effluent. Make sure you are able to block drains and ditches easily.

- Check that your silage-effluent storage, including field heaps, satisfies the Silage, Slurry and Agricultural Fuel Oil Regulations.

Before you make silage, check that your silo will not leak effluent to the surrounding soil. Develop a maintenance plan to stop leaks and extend the life of silos.

- Monitor the levels in your effluent tank regularly, and make sure it is empty at the start of silage making.

- During and after silaging check ditches, drains and streams near your silage stores for signs of effluent leaking into them.

- Consider loosening grassland soils to remove compaction.

- Slit aeration can help soils recover from surface compaction.

- Do not place field silage heaps within 10m of a watercourse or drain or within 50m of a spring or borehole used for potable supply.

- Only use wormers when the faecal egg count is particularly high. This cuts costs and increases numbers of dung beetles and the bats that feed on them.

- Electric fencing can be used to protect the banks of ditches and streams from erosion by cattle.
Farm tracks and gateways

What’s in it for you?

Protect land and conserve soil

Good tracks and well-maintained gateways help farmers to get around their farms easily and to make the most of what every field has to offer. But it’s important to guard against tracks and gateways becoming channels for runoff in wet weather.

When adding new tracks, careful route planning and positioning, sound construction and regular maintenance are all important. They will help you prevent erosion of track surfaces, minimise runoff problems and avoid damage to machinery and injury to livestock.

Want to know more?

Further reading
Access Track Construction in Small Woodlands (Forest Research; Technical Note 27/98)

Useful websites
www.environment-agency.gov.uk
www.defra.gov.uk/farm/environment/water/csf
www.wales.gov.uk
www.environmentalsensitivefarming.co.uk
www.naturalengland.org.uk
www.ccw.gov.uk

Contacts
Environment Agency 08708 506 506
Natural England 0845 600 3078
Countryside Council for Wales 08451 306229
LEAF 0247 6413 911
Careful management of tracks and gateways can protect cattle and machinery and help you make the best use of your land.

<table>
<thead>
<tr>
<th>Benefits</th>
<th>Actions</th>
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</thead>
<tbody>
<tr>
<td>Access to all areas of the farm throughout the year</td>
<td>Create well-drained tracks with appropriate surfaces</td>
</tr>
<tr>
<td>Versatility of field use</td>
<td>Position tracks to suit potential uses</td>
</tr>
<tr>
<td>Less lameness and fewer punctures and machinery repairs</td>
<td>Improve track surfaces and repair any damage promptly</td>
</tr>
<tr>
<td>Reduced runoff and lower pollution risk</td>
<td>Provide good drainage</td>
</tr>
<tr>
<td>Avoidance of muddy gateways</td>
<td>Avoid routes with steep slopes that lead to unvegetated land, roads or watercourses</td>
</tr>
<tr>
<td></td>
<td>Site gates at the top of sloping fields where possible</td>
</tr>
</tbody>
</table>
New farm tracks cut clean-up costs after heavy rain

Roger Combe farms on the Bayfield Estate in North Norfolk – 770 hectares of gravelly soils that are prone to runoff.

The land is mainly in arable production, with cattle and outdoor pigs. Roger is keen to avoid polluting the River Glaven, which flows through the estate.

In recent years heavy rainfall has caused excessive runoff onto nearby public roads. The estate decided to tackle this problem, and the threat of river pollution, by applying for grant aid from the England Catchment Sensitive Farming Delivery Initiative (ECSFDI). This has enabled Roger to repair and upgrade 400m of tracks used by farm traffic and for access to woodland for timber felling.

The tracks have been improved with crushed concrete, tarmac and road planings. Each track was graded and rolled with a camber so that water drains easily into the surrounding fields.

‘These farm tracks have prevented water and soil finding its way onto the public highway, so I have not been prosecuted or warned by the authorities for malpractice,’ says Roger.

Roger has also taken action to reduce runoff from the outdoor pig fields. He has moved the herd to fields with less of a steep gradient. The new fields are surrounded by bunds to prevent runoff, with grass strips to filter sediment and improve access.

We made big mistakes in the past with soil erosion and we’ve learned a great deal. Our new farm tracks have helped us adapt our system to suit the environment and improve our profitability.

Roger Combe
Bayfield Estate, Norfolk

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Roger Combe
Bayfield Estate, Norfolk
Vehicle tracks

Where a single mud track becomes established in a field but is not well maintained or reinforced, it may develop a rutted surface. This can channel rainwater in wet conditions and cause runoff problems.

On the other hand, drivers who can’t see a clear single track will be forced to do their own thing. This may create several different routes through fields, leading to widespread soil compaction.

Unstable, slippery soil surfaces make it difficult to control tractors, especially when hauling heavy loads at speed. Traction is severely reduced and braking becomes less effective. You may need an extra tractor and trailer for corn or grass hauling where rough farm tracks slow down operations.

Among the many types of farm tracks are grass strips that separate groups of outdoor pigs, or divide up crops within a field managed on a rotational basis. You can use these tracks as buffer zones to prevent runoff and as wildlife corridors. They should be laid across slopes whenever possible.

Helpful hints

Ensure tracks are well drained, and keep them firm and dry. Create new tracks away from wet areas, and relocate old tracks with persistent runoff problems.

Divert runoff from tracks into vegetated field margins or swales where it can be intercepted and filtered, rather than into unvegetated land, roads or watercourses.

On slopes, make tracks along contours to prevent runoff.

A dual-purpose track for vehicles and livestock may be cheaper in the long term.

Use lightweight vehicles such as quad bikes on grass tracks.

You may be able to get grant funding for new tracks under the ECSFDI.
Cow tracks

Bigger herds mean that cows have to travel farther to pasture. Uncomfortable or slippery surfaces can slow your animals down and limit feeding time, which reduces productivity.

Good cow tracks keep animals cleaner, cut milking time and reduce teat and udder damage. They can also help to limit mastitis and foot problems.

Cows prefer to walk on tracks that are soft on the surface but also firm and even. Try using bark over graded stone for a sound surface and good drainage. You can omit the bark, but avoid sharp objects such as flint or large uneven stones in the surface covering.

Paddock systems connected by cow tracks can provide a number of gateways to grazing. This helps alternate access points to avoid poaching in overused gateways.

You can use recycled materials, such as tyre rubber, to surface tracks. But don’t allow this material to wash onto roads or into ditches and streams. Make sure you have the appropriate permission to reuse waste materials: contact us for advice.

Crossing watercourses

Livestock and farm vehicles frequently cross watercourses to enter fields, reach feeding areas or return to the farmyard for milking.

Stock and machinery can erode banks and damage riverbeds if they have unrestricted access to watercourses. Uneven or unstable riverbeds can injure animals and damage vehicles.

Watercourses can transmit infections between farms, and animals cause water pollution through muck and urine. Ditches and boggy areas near crossing points can increase the chances of fluke infestation.

If you provide simple bridges across ditches and streams, you can keep your animals clean, prevent injuries and reduce vet costs.

Helpful hints

Plan grazing areas carefully and establish suitable access tracks. Avoid wet areas and watercourses.

Construct well-drained tracks, with a surface that is soft to walk on but also firm and even.

Divert runoff from cow and vehicle tracks into a bunded swale or runoff buffer in a field margin, where it can be intercepted and filtered (see illustration on page 51). Do not allow dirty water from cow tracks to pollute surface water.

Follow contours, avoiding steep slopes that encourage rills to form.

Inspect and maintain tracks regularly.

Do not drive tractors on specialised cow tracks.

Cow tracks may be eligible for grant aid under the England Catchment Sensitive Farming Delivery Initiative.

Don’t allow stock unrestricted access to streams.

Construct simple bridges over larger streams.

Restrict access if a bridge is not feasible: consider using piping and/or filling in some ditches in consultation with the Environment Agency. Constructed stream crossings, culverts and in-stream works may need land drainage consent from us.

Fence off wet areas to prevent livestock access.

Field tracks can provide a channel for runoff, soil sediment and pollutants to enter watercourses.
Gateways
The bigger the field, the more likely it is that gates will be heavily used. Consider creating additional gateways, and moving existing ones, if heavy traffic is increasing the risk of soil damage and runoff.

Make sure that gateways have good drainage and are kept as dry as possible. To improve your gateways, add stone and compact the soil to provide firmer footing.

You may be able to use a sandwich of crushed limestone, permeable membrane and woodchips to create a well-drained gateway with a firm surface. Use stones carefully, to avoid foot damage to livestock.

You may need planning permission for gates that open onto public roads.

Helpful hints

- Divert water away from your gateways.
- Avoid feeding stock or siting water troughs near gates where these are prone to causing runoff.
- Keep gateways level, firm, stable and dry. Position them at the top of your fields if you can, and certainly away from the lowest point in each field, to reduce soil loss.
- If a gateway is frequently used by stock, consider covering the area with sand, bark or another soft surface.
- Create extra gateways for frequently used fields.
- Consider a paddock system served by cow tracks, with a choice of gateways to pasture.
- Move gateways that suffer permanent damage.
Ditches and riverbanks

What’s in it for you?

Responsibilities and returns

Farmers with land adjacent to rivers, streams and ditches have responsibility for the state of their beds and banks. The way you manage your land and livestock will affect water quality not only on the farm but also well beyond the farm boundary.

Well-maintained ditches can improve drainage and access to land. But their value is much broader than this. They can also soak up nutrients, control the flow of water to rivers, filter out soil particles and allow water to infiltrate into groundwater reserves. They are rich in flora and fauna and can serve as a bank of beneficial insects for your crops.

Watercourses that are open to livestock access often have high levels of bacterial contamination. This can jeopardise the health of animals drinking downstream, particularly pregnant stock.

By controlling stock access to surface water, you can reduce waterborne infection and protect banks and stream beds from damage.

Want to know more?

Further reading
Waterways and Wetlands (British Trust for Conservation Volunteers)
Living on the Edge – A Guide to the Rights and Responsibilities of Riverside Occupation (Environment Agency)

Useful websites
www.environment-agency.gov.uk
www.defra.gov.uk
www.wales.gov.uk
http://handbooks.btcv.org.uk
www.fwag.org.uk
www.rspb.org.uk/farming

Contacts
RSPB 01767 693690
Farming and Wildlife Advisory Group (FWAG) 02476 696699
British Trust for Conservation Volunteers (BTCV) 01302 388883
Well-maintained ditches, streams and rivers help create ideal conditions for crop growth.

<table>
<thead>
<tr>
<th>Benefits</th>
<th>Actions</th>
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<tbody>
<tr>
<td>Preventing damage to land drains</td>
<td>Mark drainage outfalls</td>
</tr>
<tr>
<td>Reduced loss of sediment and potential pollutants from the farm</td>
<td>Rotate ditch clearance</td>
</tr>
<tr>
<td>Improved stock health and reduced vet bills</td>
<td>Control or prevent stock access to ditches and watercourses</td>
</tr>
<tr>
<td>Early pollution warning</td>
<td>Inspect ditches and watercourses around your farm regularly</td>
</tr>
<tr>
<td>Improved biodiversity</td>
<td>Maintain habitat in watercourses</td>
</tr>
</tbody>
</table>
Fencing off ditches ensures lower vet bills and fewer lambs lost

Robert and Sarah Helliwell are National Trust tenants of an upland farm in the Derbyshire Peak District.

The Helliwells sell produce from their suckler beef, sheep and poultry enterprises directly to locals, walkers and visitors staying on the farm’s campsite. Farmers Weekly named them ‘Countryside Farmers of the Year’ in 2007 for their conservation efforts, and Upper Booth Farm is a demonstration farm for LEAF (Linking Environment and Farming).

Many streams and deep cloughs run through the farm, which is in a drinking-water catchment. The Helliwells have fenced along both sides of wet ditches on the farm to protect water supplies. They have also planted over 1,000 metres of new hedges alongside ditches.

They’ve created valuable wildlife corridors through a combination of hedges, double fencing and enclosure of ditches. The hedges will eventually provide valuable windbreaks, too.

The farm’s use of rabbit netting with sheep fencing will provide shelter for lambs as grass grows between the two. Cloughs are fenced to protect watercourses, reduce bank erosion, and maintain water quality. Fences have also eliminated the loss of two or three lambs through drowning each year.

The farm is in an Environmentally Sensitive Area. Aid from this scheme has paid for new hedges and fencing.

Counting the cost and reaping the benefits

At 2008 prices the cost of hiring a contractor to fence 500m of watercourse and exclude a dairy herd was £3.80 per metre – £1,900 in total. You also need to plan and budget for maintaining your fences once they are in place.

Savings on vet bills as a result of reduced lameness could amount to an estimated £3 per animal in a 150-cow dairy herd. This is enough to recover the cost of a 500m fence within four years.

We are committed to improving the environment and maintaining the natural resources on our farm. As a result we have seen an increase in biodiversity.

Robert Helliwell
Upper Booth Farm, Derbyshire
Ditch clearance

Waterside vegetation binds and protects vulnerable banks. When banks are damaged, this contributes to the silting of watercourses and can accelerate erosion and loss of land.

Regular removal of debris and blockages will help the uninterrupted flow of water. But don’t clear your ditches every year. Instead rotate maintenance of watercourses over several years, leaving 30-50 per cent of vegetation in place each time you clean them out. This protects wildlife habitats and biodiversity, while allowing water to flow.

Planting waterside shrubs and trees, such as willow, can help stabilise banks. You can also protect or reinforce banks using live willow fence panels.

Walk waterside margins regularly to check water quality, erosion and levels of vegetation. Keep an eye out for noxious weeds that need to be controlled, such as Japanese knotweed, Himalayan balsam and giant hogweed.

You can manage weed growth by careful spot weeding, selective mowing and controlled grazing.

Helpful hints

- Take advantage of grants for planting waterside vegetation.
- Clear debris from watercourses – including blockages of culverts, screens, weirs and mill gates. Keep debris off riverbanks and floodplains.
- Allow vegetation to recover naturally after clearance.
- Maintain land drain outfalls regularly.
- Take advice on and suppress noxious weeds.
- Pollard nearby trees to reduce the risk of blocking watercourses.

Find out more about waterside vegetation. You can get information from the Farming and Wildlife Advisory Group, the RSPB or the British Trust for Conservation Volunteers.

Leave 30-50 per cent of vegetation in place when you clear out ditches.
Creating new ditches

New ditches can improve the drainage in your fields and reduce the potential for damage from flood water.

Ditches don’t have to be large works. A shallow trench or grassed swale alongside a track can improve drainage and prevent erosion of the track and nearby land (see illustration on page 51). Ditches may also serve as temporary ponds, providing a valuable habitat for insects and amphibians that help control crop pests.

You can control runoff into your farmyard by constructing a bypass ditch. This will reduce the volume of dirty water you have to deal with, and so cut the cost of slurry storage and spreading. For more on clean and dirty water separation see pages 72 and 74.

By controlling runoff before it builds up, you can avoid surface water accumulating and reduce the risk of erosion. Properly located ditches will also intercept sediment before it leaves your farm.

Apply for formal consent from us for any works in, over, under or adjacent to rivers. Speak to our development control team who will be pleased to advise you.

Helpful hints

Create new ditches or swales to intercept runoff from fields. This will reduce soil loss and pollution risk and may benefit wildlife.

Reduce dirty water and pollution risk by constructing a bypass ditch to prevent runoff from entering your farmyard.

Angle the surface of farm tracks to divert water into grassed ditches and prevent erosion.

Protect ditches and other watercourses from pesticides, fertilisers and dredgings.

Mark land drain outfalls and construct headwalls to prevent future damage.
Restricting livestock access

Uncontrolled stock access can cause a lot of damage to the banks and beds of watercourses. It also increases the risk of lameness, injury and loss, as well as water pollution and loss of habitat.

Waterborne infections can present significant risk to stock in late pregnancy or soon after birth. This is a particular problem downstream from upland areas where stock have uncontrolled access to water.

It may be most cost effective to limit access by fencing off most of the watercourse, while allowing access to small stretches of reinforced bank. You could also consider creating a piped supply or using a stock-operated drinker such as a pasture pump.

Helpful hints

- Restrict livestock access to prevent damage to beds and banks.
- Reinforce the areas around fixed drinking points, or use mobile drinkers to avoid poaching.
- Limit access to land in periods of increased flood risk.
- Speak to us about works to restrict livestock access that affect watercourses, such as bridge building and the creation of culverts.

This fence to prevent bank erosion was paid for by grant aid from the England Catchment Sensitive Farming Delivery Initiative.
The well-managed farmyard

What’s in it for you?

Save time and costs

A well-managed farmyard has routines that help to highlight potential problems and avoid waste.

Emergency plans to deal with spillages of fuel, fertiliser or pesticides are an essential part of the well-managed farm. Would you know what to do in the event of an emergency? Would anyone else, if you weren’t around?

You can reduce risk by draining off into separate gullies any areas used for risky operations, such as refuelling or washing machinery. You can then quickly isolate the gullies from the wider drainage system. Dirty yards must not drain directly into watercourses.

When you manage waste effectively you can improve its saleability. Clean silage wrap is worth more for recycling or energy recovery than plastic contaminated with soil and vegetation.

If you handle clean and dirty water separately, you can reap double benefits. Reduced slurry means a smaller storage volume and lower spreading costs, while separate clean water can be used around the farm.

Want to know more?

Further reading
What is a Hazardous Waste?
(Environment Agency)
Hosting Walks and Talks (LEAF)
– advice on managing farm visits

Useful websites
www.environment-agency.gov.uk
www.defra.gov.uk
www.wales.gov.uk
www.voluntaryinitiative.org.uk
http://sitem.herts.ac.uk/aeru/
www.hse.gov.uk/agriculture
www.defra.gov.uk/farm/wholefarm
www.leafuk.org/leafaudit

Contacts
Environment Agency hazardous waste registration 08708 502 858;
agricultural waste hotline 0845 6033113
Defra 08459 33 55 77
Welsh Assembly Government 08450 103300
Health and Safety Executive information line 0845 345 0055
LEAF 0247 6413 911
Better-managed farms have higher-than-average incomes and lower costs.

<table>
<thead>
<tr>
<th>Benefits</th>
<th>Actions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Saving time and money when handling waste</td>
<td>Keep your yard tidy, and do not allow waste to escape</td>
</tr>
<tr>
<td>Reduced disposal costs and risk</td>
<td>Separate clean and dirty water</td>
</tr>
<tr>
<td>Small spills mopped up before they become a problem</td>
<td>Keep a spill kit of sand or cat litter handy</td>
</tr>
<tr>
<td>Increased value of waste material</td>
<td>Keep clean all wastes for recycling</td>
</tr>
<tr>
<td>Reduced pollution risk</td>
<td>Supervise deliveries, map your drains and mark drain outfalls</td>
</tr>
<tr>
<td>Smaller amounts of pesticides kept on the farm</td>
<td>Use decision support services such as Blightwatch or weather forecasts to help order what you need when you need it</td>
</tr>
</tbody>
</table>
Alistair Vanstone runs a 142-hectare dairy farm in Devon. Taylors Down Farm is on high ground (nearly 170m) and receives 1,500mm of rain a year. Harsh field conditions for much of the year mean that the farm’s 180 cows have to be housed from October to May. Roofing covers the entire cow wintering area, which protects the stock from driving rain and makes it easier to manage manure and milking. All the roofs have large gutters to keep clean and dirty water separate. Roof water is diverted away from the slurry store, which saves spreading the equivalent of one full slurry pit each year. This cuts costs by approximately £10,000.

Alistair hopes that his enclosed cow housing will also help deter insects that may carry unwanted diseases in the future.

Roofing the entire cow area has saved me time and money. It’s also made it a more pleasant environment for the cows and the workforce.

Alistair Vanstone
Taylors Down Farm, Devon

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**Counting the cost and reaping the benefits**

In an area with 1,200mm of annual rainfall, a roof that covers a 20m x 10m open yard will save over £2,000 a year in slurry storage and spreading costs.

Allowing for annual interest at 8 per cent (including capital repayments), the saving made is enough to pay for the roof over 15 years. An added benefit is the opportunity to harvest rainwater.
Storing chemicals safely

Handling pesticides and fertilisers poses a high pollution risk.

Store pesticides in a convenient place close to the mixing area but well away from watercourses. Store fertiliser at a safe distance both from watercourses and from fire risks such as hay and straw.

Storage should have enough capacity for peak requirements. Set aside a dedicated area for keeping rinsed containers and bags awaiting disposal.

Your stores should be secure and bunded. Keep an emergency plan on display, and equip yourself with suitable fire extinguishers and something like cat litter to mop up spills.

Knowing your farmyard and what lies under it can help you deal with emergencies. Paint manhole covers blue and red to indicate clean and dirty drains. This will enable you to deal with spillages as quickly as possible, and will also help the emergency services.

Helpful hints

Prepare an emergency plan for spillages of fuel and oil, pesticides, fertiliser and slurry. Train your staff and inform contractors, so that they know what to do. Prepare your own health and safety assessment – go to www.hse.gov.uk/agriculture.

A lined biobed may be useful for washing down sprayers and other farm machinery. You will need to obtain a waste exemption from us (see page 38 for more on biobeds).

Keep liquid fertiliser, used oils and batteries in bunded stores. Inspect valves for corrosion every year and replace at the first signs of deterioration.

Store fertiliser and pesticides away from the risk of flood and fire.

Make sure stores are well lit so you can read labels, but away from direct sunlight that might damage chemicals and labels.

Rinse pesticide containers and fertiliser bags three times. Store them carefully for recycling.
Handling clean and dirty water

You can reduce pollution risk significantly by separating clean and dirty water. Identify the areas where dirty water is created and tackle them one by one. Start with the most cost-effective improvements first.

Simple maintenance of gutters, downpipes and drains will reduce dirty water immediately. You can repair leaks, dripping taps and overflowing water troughs around the farmyard to help reduce water loss and dirty water.

Separate clean and dirty yard areas. This will ease the burden on your slurry storage facilities and reduce the volume of slurry to be spread. If you put a cover on your slurry store or lagoon you can increase your storage capacity.

Construct a farm pond as part of your drainage system, to slow down water entering streams and rivers. A pond can also provide water for fire fighting, which may reduce insurance premiums.

You can collect water from roof areas and the covers of slurry stores to use for stock drinking water (after UV filter treatment) and for washing down yards and machinery. This reduces your use of mains water and cuts costs.

See pages 10-15 for more information on using water effectively.

An uncovered yard is vulnerable to polluted runoff in heavy rain (left). Roofing (right) reduces runoff and saves storage and spreading costs.

Helpful hints

- Modify drains to separate clean and dirty water.
- Do not allow dirty yard runoff to enter soakaways, blind ditches and watercourses.
- Maintain gutters, downpipes and drains, and repair leaking taps and pipes.
- Put a roof over open collecting yards, loafing areas and muck storage.
- Harvest rainwater from roof areas to use on your farm and save money.
- Slow down the flow of water from hard surfaces by creating balancing ponds or ditches near outfalls.
- Separate wastes at source and store separately.
- Install floating covers on slurry stores and lagoons. Check to make sure they work properly in practice.
- Colour-code manhole covers to show foul-water and clean-water drainage paths.
Waste disposal

Every farmer has a legal duty of care to handle and dispose of waste responsibly.

To avoid risk of prosecution you need to know what to do with all wastes on your farm. Some activities should be registered with us, such as when you keep demolition waste for use in construction.

You can register exemptions through the Whole Farm Approach. You will have to pay for some exemptions.

The Agricultural Waste Regulations mean that you can no longer dispose of most waste on your own farm. It must be sent to a licensed site. See www.wasterecycling.org.uk for details of suitable contractors.

You can continue to manage low-risk wastes on your farm. This depends on the type and amount of material to be dealt with, and you must register any exemptions with us.

If you use plastic covers, bags or wrap for silage, keep the plastic clean and free of soil contamination. You may be able to reduce collection costs and/or increase its value for recycling.

Deal with fallen stock promptly, and in line with the Fallen Stock Scheme. Guard against the spread of disease by keeping carcasses where other animals cannot gain access to them. Consider using a secure building or placing them under a tarpaulin away from the rest of your stock.

If you’re in doubt about how to deal with any form of farm waste, contact our agricultural waste helpline on 0845 603 3113 (Monday to Friday 8am-6pm). See pages 76-80 for more information on waste management.

Helpful hints

Register any exempt activities, either with the Environment Agency (0845 603 3113) or by using Defra’s Whole Farm Approach.

Keep used plastic dry, and store it in a bag that you can’t return for reuse.

Record purchases and use of costly items, such as pesticides and oils, to reduce waste.

Allocate responsibility for dealing with fallen stock.

If you produce more than 500kg of hazardous waste (such as oil or batteries) a year, you need to register with us. This excludes scrap vehicles.
Saving energy and reducing waste

What’s in it for you?

Reduce costs and environmental impact

The more raw materials and energy you use on your farm, and the more waste you produce, the higher the cost to your business.

Saving energy not only cuts costs but also enables you to help tackle climate change by reducing the carbon footprint of your business.

Minimising waste cuts the cost of initial purchase and saves you money on safe disposal. You may be able to achieve additional savings by bulking up waste and collaborating with neighbouring farmers on disposal and recycling.

Under the Environmental Permitting Regulations, farmers and growers have responsibility to register a range of small-scale waste-recovery activities. These include using tyres on silage clamps, using demolition rubble in construction and storing fertiliser bags before collection.

Register with us if you produce more than 500kg of hazardous waste per year.

Want to know more?

Further reading
FEC Services publishes a comprehensive range of technical leaflets on efficient use of energy in farming and horticulture

Useful websites
www.netregs.gov.uk/learning – see farm waste training tool
www.environment-agency.gov.uk
www.wasterecycling.org.uk
www.cla.org.uk
www.leafuk.org/leafaudit
www.energysavingtrust.org.uk
www.fecservices.co.uk

Contacts
Environment Agency 08708 506 506; Agricultural waste helpline 08456 033133
FEC Services (formerly the Farm Energy Centre) 0247 669 6512
LEAF 0247 6413 911
All farm businesses can profit from paying more attention to the four Rs of waste management – reduce, reuse, recover, recycle.

<table>
<thead>
<tr>
<th>Benefits</th>
<th>Actions</th>
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<tbody>
<tr>
<td>Less waste on the farm</td>
<td>Make better use of materials</td>
</tr>
<tr>
<td>Less time and money spent managing waste</td>
<td>Prepare a waste management plan</td>
</tr>
<tr>
<td>Compliance with waste regulation</td>
<td>Manage your waste responsibly, storing it safely and separating different types</td>
</tr>
<tr>
<td>Lower fuel bills</td>
<td>Replace worn vehicle parts and change oil and fuel filters regularly</td>
</tr>
<tr>
<td>Less reliance on expensive fossil fuels</td>
<td>Generate your own renewable energy through wind turbines, solar panels, anaerobic digestion or hydro-electric power</td>
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</table>
Wyn Evans runs a 61-hectare organic dairy farm in Pembrokeshire. He is passionate about renewable energy, having seen the effects of climate change around the St David’s coastline.

Wyn fuels his farmhouse Aga and gets hot water for his dairy through a home-constructed anaerobic digester that produces biogas from Caerfai Farm’s 70 cows. He has also installed a wind turbine, ground-source heat pumps and eight solar systems.

A combination of solar panels and heat pumps provides heating for the farmhouse and two holiday cottages. The heat from the pumps also provides hot water for the toilet and shower block on the farm’s campsite, which is open from May to September.

_Wyn has used a home-built digester but commercial units are available._

_Wyn’s digester produces fuel equivalent to 25-30 litres of oil per day. His solar panels can produce as much as 200 kWh on a sunny summer day. His wind turbine has an annual output of 30,000 kWh, of which about 10 per cent is exported to the National Grid._

_Wyn has spent £130,000 on renewable energy installations. He receives a £9,500 annual return on that investment at 2008 prices – a £4,000 saving on electricity bills, a £4,500 saving on diesel costs and £1,000 in income from Renewables Obligation Certificates (ROCs)._ He has also achieved a big energy saving by switching to organic farming in the early 1990s.

_Wyn Evans
Caerfai Farm, Pembrokeshire_

My interest in renewable energy began with wanting to save a bit of money but it has been strengthened by my concern about climate change and imminent shortages of oil.
Tackling farm waste

Most small businesses ignore the issue of waste, even though reducing it can save you money and cut the risk of prosecution for infringing regulations.

Even simple measures help, such as choosing the right tyres and using them at the appropriate pressure. This can extend tyre life, cut fuel costs by 5 per cent and reduce the risk of damage to your land.

Losses of crops and produce at harvest, combined with further losses through grading and during storage, can account for as much as 25 per cent of yield. Consider whether you may be able to reduce losses and increase income through changes in husbandry, harvesting, handling and storage.

Farms in England and Wales generate over 23,000 tonnes of waste each year in plastic packaging alone. Fertiliser and animal feed bags account for more than three-quarters of this total. Visit www.agwasteplastics.org.uk for details of recycling and collection services.

You can often reuse materials such as packaging or plastic crop cover. Cut the brittle edges off the covers used for wide-bed work so that the plastic film can be used again. At the end of its life it may be recycled.

Give your staff basic information or training so that everyone working with you can play a part in reducing waste.

Helpful hints

Challenge suppliers to use less packaging and more recyclable products.

Use Defra’s guide to carry out a waste audit. Identify the main waste issues on your farm and develop a plan to deal with them.

Register any exempt activities, either with the Environment Agency (0845 603 3113) or by using Defra’s Whole Farm Approach.

Use in-field guidance systems to reduce overlap of cultivations and treatments.

Send back returnable containers or reuse the larger ones for deliveries and storage.

Order materials ‘loose’ and in bulk so that fewer plastic bags are used.

Return worn parts and tyres to suppliers for disposal.

Manure is a potent energy source that can be used to generate biogas fuel for your farm using an anaerobic digester.
Waste on livestock farms

Waste and energy efficiencies take many forms on livestock farms.

The shape and density of your silage bales, for example, can make a difference to the amount of plastic you use. You can reuse high-grade bags to reduce waste and save money.

You can only dispose of sheep dip to land if you get an Environment Agency permit. Contractors must be authorised to carry any dip waste they remove from your farm. Exchange a transfer note to comply with your ‘duty of care’.

You can reduce feed costs for your livestock by cutting waste during storage and feeding. Well-designed storage and distribution systems can prevent waste through spoilage. Your choice of feeders or mangers can help prevent losses that may occur if stock play with their feed.

Helpful hints

Use timer switches or movement-activated lighting to reduce electricity use.

Upgrade to a clamp silage system to save plastic and cut costs.

Check dips, showers and treatment areas for losses and pollution routes.

Establish procedures to handle sick animals and dispose of carcases.

Saving energy

Most farming operations rely on energy to function – electricity, gas and fuel oil. Steep price increases have led many farmers to examine how they can save energy and cut costs.

Benchmarking your energy use against other farm businesses may help you find ways to improve your efficiency and reduce consumption.

Planned maintenance of equipment and replacement of worn parts can save fuel and extend life. Changing fuel and oil filters regularly can increase power output and reduce fuel use.

Livestock generate a lot of heat. Good building design can help retain this heat in winter to keep them warm. You can also use the heat in summer to drive convection and draw in cooler air.

Reduce your refrigeration costs by using simple pre-treatment such as plate cooling in dairies, or ambient air cooling in potato stores.

Check thermostats to avoid over-cooling or over-drying. A one-degree over-cooling of milk costs 40kWh per cow per year. Grain that is 1 per cent over-dried costs 10kWh per tonne and reduces the saleable weight.

Upgrading to a silage clamp system saves plastic and cuts costs.
Helpful hints

Use the Carbon Accounting for Land Managers (CALM) Calculator to estimate your carbon footprint and help plan efficiency savings.

Use the LEAF audit to compare your environmental performance with that of other farms.

Check your energy consumption against an industry standard. Efficient potato storage consumes around 55kWh of electricity per tonne of capacity, less than half the energy used on some farms.

Use tractors efficiently – work engines at 65 per cent of maximum output.

Adjust tyre pressures according to the task and ground conditions, to save fuel and reduce compaction.

Replace incandescent bulbs with low-energy lighting.

Consider using combination-tillage equipment to reduce the number of passes over your land.

Idling an engine for more than 20 seconds is wasteful. Restarting the ignition uses the equivalent of just 15 seconds of fuel at idle speed.

Producing your own energy

You can use the resources on your farm to generate much of the energy you need.

Biogas produced from anaerobic digestion can be used to generate electricity and waste heat can be used in livestock accommodation, glasshouses and polytunnels, and farmhouses. Clean, treated gas can power grain driers, tractors and other vehicle engines. Make sure you know the legal requirements before using biogas in this way.

Energy from small-scale hydropower, solar panels and wind turbines can provide electricity for your farmhouse, milking parlour, or processing operations such as cheese making. Solar pumps can help cut the cost of piping stream water for livestock to drink.

Heat-recovery systems can supply power to livestock housing and plant rooms, provide hot water for washing down and help to heat your buildings. Find out more at www.fecservices.co.uk.

Helpful hints

Explore the possibilities for alternative energy sources on your farm.

Consider using solar panels or a wind turbine to power electric fencing.

Your Regional Development Agency may help fund energy production.
Grant aid for farmers

What’s in it for you?

Help to improve your environmental performance

Do you know about the types of grant aid you can get to help you do more for the environment?

Funding from the Rural Development Programmes for England and Wales helps farmers to manage their land in ways which:
- protect soils;
- improve water quality;
- conserve and enhance wildlife populations;
- maintain and improve landscapes, historic features and public access;
- combat climate change.

This funding is available through agri-environment schemes in both countries. Woodland grant aid is also available.

In England you can get support from your Regional Development Agency (RDA) to make agriculture and forestry more sustainable and to encourage business opportunities in rural areas.

The England Catchment Sensitive Farming Delivery Initiative (ECSFDI) provides advice and grants to encourage farmers in priority areas. This can help you create or improve facilities to reduce diffuse pollution. Grants are available for grass strips to reduce runoff risk; farm tracks; fencing to protect watercourses; biobeds; and water facilities for grazing livestock.

Want to know more?

Further reading
Environmental Stewardship Scheme Outline Booklet (Defra)
Energy Crops Scheme Establishment Grants Handbook (Natural England)
A Clear Solution for Farmers (Defra) – catchment sensitive farming

Useful websites
www.naturalengland.org.uk
www.ccw.gov.uk
www.defra.gov.uk
www.forestry.gov.uk
www.englandsrdas.com
www.ukwas.org.uk

Contacts
Natural England 01733 455000
Countryside Council for Wales 08451 306229
Forestry Commission 01223 314546
Better Woodlands for Wales 0845 604 0845
England’s Regional Development Agencies 0207 222 8180
Over 2,300 farms in England receive grant aid under the Higher Level Stewardship scheme.

<table>
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<tr>
<th>Benefits</th>
<th>Actions</th>
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<tbody>
<tr>
<td>Protected soils and water, and a better environment for wildlife</td>
<td>Get grants to create and maintain habitats, enhance wildlife populations, protect watercourses and prevent soil erosion</td>
</tr>
<tr>
<td>Improved business image and higher capital value</td>
<td>Use grants to maintain and improve the landscape, public access and historic features</td>
</tr>
<tr>
<td>Maintained or improved profit potential</td>
<td>Diversify your business, sell direct to the public and attract farm visitors</td>
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</table>
Nick Bumford is farms director of Guiting Manor Farms Ltd, which runs an 800-hectare estate in the Cotswolds.

Three-quarters of the land is in arable production, and the rest consists of woodland and permanent pasture. The estate has benefited extensively from woodland grant aid for existing and newly planted wooded areas, as well as from Entry Level and Higher Level Stewardship schemes (ELS and HLS). The farming company that manages the estate has planted local hardwood trees in small arable fields and steep field corners – areas that were awkward to cultivate.

Sheep graze the farm’s grassland, which is managed under HLS. Some of the swards now have more than 130 different plant species.

Two tributaries of the River Windrush pass through the estate, and both are fenced to deny sheep access. Monitoring has shown water quality to be good, with healthy populations of brown trout and fresh-water shrimps and oysters. The farm’s ditches pass through permanent pasture under HLS management, where no fertilisers are used and pesticides are only applied to control pernicious weeds.

\[\text{Counting the cost and reaping the benefits}\]

The Guiting Estate will receive £547,000 over ten years through its ELS and HLS funding agreements. Support from the English Woodland Grant Scheme has enabled the planting of 13 hectares of new woodland.

Nick has not needed to use summer insecticides on his cereal crops for over a decade. He attributes this to the aphid control provided by insects living in the estate’s 50 km of arable field margins, as well as in the beetle bank and the grassed field corners and margins added under HLS.

The estate has used its own funding to carry out works over and above those required by HLS, providing a significant net benefit for the environment and the public.

We are delighted with the impact of planting small areas on the estate. It’s created significant opportunities for wildlife and enhanced landscapes.

“Nick Bumford
Guiting Manor Farms, Gloucestershire
Agri-environment grants

Defra’s Environmental Stewardship (ES) schemes support farmers in England who manage their land in environmentally beneficial ways. As well as providing you with financial aid, the practices encouraged by ES can make some aspects of farming easier and save you money.

The primary objectives of ES are to protect natural resources; combat and adapt to climate change; conserve biodiversity; maintain and enhance landscape quality and character (including the historic environment); and promote public access to and understanding of the countryside. The secondary objectives are flood management and the protection of genetic resources through conservation of wild plants and local breeds.

There are three parts to the scheme. Entry Level Stewardship (ELS) is open to all farmers and landowners to support simple and effective land management measures.

Organic Entry Level Stewardship (OELS) is open to all farmers who don’t receive aid under Defra’s Organic Farming Scheme. Higher Level Stewardship (HLS) is subject to competitive entry and involves more detailed environmental management and capital work plans.

Tir Cynnal is the Welsh Assembly Government’s entry-level agri-environment scheme. It rewards Welsh farmers for protecting and enhancing areas and features of environmental importance, for preventing loss of biodiversity, and for protecting and improving the quality of water, soil and air.

Tir Gofal is the Welsh Assembly Government’s higher-level agri-environment scheme. Farmers enter into a ten-year agreement to protect wildlife habitats and historic features, improve the landscape and provide opportunities for public access.

The creation of wetlands is supported through both English and Welsh agri-environment schemes.
Woodland and energy crops

The Rural Development Programme for England (RDPE) is part of Defra’s Strategy for Sustainable Farming and Food. It helps farmers and land managers to meet consumer expectations and become more competitive, diverse, flexible and environmentally responsible.

ELS, OELS and HLS are all RDPE schemes. The RDPE also includes grant schemes for woodlands and energy crops. The two most relevant to best farming practice are the Energy Crops Scheme (ECS) and the English Woodland Grant Scheme (EWGS).

The ECS aims to expand production of energy crops as substitutes for fossil fuels, which helps reduce greenhouse-gas emissions. Farmers in England can get grants to establish miscanthus and short-rotation coppice.

The EWGS helps farmers to create new woodlands and forests to generate income, improve the environment and provide new areas for recreation.

Better Woodlands for Wales (BWW) is the Welsh scheme for creating and improving woodlands. Woodland owners must commit to a five-year management plan that complies with UK Woodland Assurance Standards.

BWW management plans cover the full cycle of woodland creation, management, felling and replanting. They take into account the conservation and enhancement of biodiversity and public access.

Catchment sensitive farming

Catchment sensitive farming aims to reduce diffuse water pollution from agriculture. This will help farmers to meet the objectives of the Water Framework Directive.

The England Catchment Sensitive Farming Delivery Initiative applies in priority catchments in England. In these areas a network of local advisers promote catchment sensitive farming. The aim is to encourage best practice in the use of fertilisers, manures and pesticides; and to achieve good soil structure to maximise absorption of rainfall and minimise runoff and erosion.

Aid is available to:

• protect watercourses from contamination by using fences, creating stock drinking points and building bridges;
• reduce sediment and pesticide pollution by creating appropriately sized buffer strips;
• prevent soil damage by building farm tracks;
• reduce stocking densities and the intensity of grazing.

The fencing of watercourses may be supported by HLS or Tir Gofal funding, or through catchment sensitive farming grants.

You can create new woodlands on your farm with help from the English Woodland Grant Scheme or Better Woodlands for Wales.
Jonathan Brown keeps 100 dairy cows and all their calves at Hill Farm, Flintshire.

Part of the 130-hectare farm is on reclaimed land previously used for open-cast mining. It has wet meadows and pasture on the light valley floor and steep banks leading up to flat, clay soils on the higher land.

The farm is part of the Tir Gofal agri-environment scheme. This funding has helped Jonathan to establish many hedges on the large, restored fields. It has also encouraged him to include unsprayed arable fields in the farm’s rotation.

This has led to reduced stocking rates and has made it possible to grow 75 per cent of the feed he needs on the farm. Hill Farm has also created a wetland area with the help of Tir Gofal grants. This is on the lower fields where two rivers meet.

Jonathan has encouraged lapwings to spend the winter on the farm by restricting winter grazing. He has saved money on fertiliser, and gained greater control over the timing of slurry applications, by building a new slurry store financed by a grant from Farming Connect.

Tir Gofal and other grants have allowed me to increase my income while giving significant benefits to the environment.

“Jonathan Brown
Hill Farm, Flintshire

Counting the cost and reaping the benefits
Tir Gofal grants do not cover all costs but can help significantly in covering the cost of capital items that may help the husbandry of the farm.

Grass margins, one of the scheme’s annual options, can help minimise the problem of weeds such as cleavers and sterile brome spreading from hedges and entering crops. Beetle banks may help farmers to cut insecticide costs because of the role that ground beetles play in controlling pests.

A grant of £9,000 from Farming Connect has made it possible to establish new slurry storage at Hill Farm. This has allowed Jonathan Brown to time his applications to make best use of slurry, reduce fertiliser bills and improve biodiversity.
Summary of main grant schemes for agri-environmental best practice

Here’s a summary of national grant schemes that can help you implement best environmental practice on your farm. You may be able to get additional aid through your Regional Development Agency or other local bodies such as National Park authorities.

**Scheme:**
Entry Level Stewardship (ELS) – England

**Eligibility:** Whole-farm environmental improvement scheme. Agreements last for five years.
A certain level of points is required for payments. Points are available for:
- hedgerow and ditch management;
- stone wall protection and maintenance;
- protection of trees in fields;
- protection of historic and landscape features;
- buffer strips and field margins;
- beetle banks;
- field corners;
- wild bird cover;
- protection of soils;
- management of permanent grassland;
- mixed stocking;
- maintenance of traditional farm buildings.

**Contact:** Natural England (0845 600 3078)
www.defra.gov.uk/erdp/schemes/es/default.htm

**Scheme:**
Organic Entry Level Stewardship (OELS) – England

**Eligibility:** Similar to ELS. Open to farmers who manage either organic land or a mix of organic and non-organic land, and who are not receiving assistance under the Organic Aid Scheme or Organic Farming Scheme. The list of organic management options is largely the same as for ELS, but some options have been excluded because they are unsuitable for organic systems. OELS also assists with organic conversion.

**Contact:** Natural England (0845 600 3078)
www.defra.gov.uk/erdp/schemes/oels/default.htm

**Scheme:**
Energy Crops Scheme

**Eligibility:** Grants available to farmers and land managers in England for the establishment of miscanthus and short-rotation coppice (willow and poplar). Since 2007 support has also been available for planting a number of slower-growing traditional coppice trees: ash, alder, hazel, silver birch, sycamore, sweet chestnut and lime. The scheme is co-funded by Defra and the European Union, and pays farmers up to 40 per cent of their costs.

**Contact:** Natural England (01609 767400)
www.naturalengland.org.uk/planning/grants-funding/energy-crops/default.htm
Scheme: Higher Level Stewardship (HLS) – England

Eligibility: Implemented in conjunction with the ELS or OELS. Payments for sympathetic management of land of significant environmental interest, with capital grant options also available. Agreements are tailored to individual circumstances, with options available for soil and water management and for the creation, restoration and maintenance of habitats such as:

- hedgerows and woodlands;
- orchards;
- arable/grassland areas;
- watercourses (funding for fencing and maintenance);
- access options;
- heathland;
- moorland;
- species-rich grassland;
- historic environments;
- wetlands;
- inter-tidal and coastal options.

Contact: Natural England (0845 600 3078)
www.defra.gov.uk/erdp/schemes/hls/default.htm

Scheme: Tir Cynnal – Wales

Eligibility: Entry-level agri-environment scheme for Wales. Farmers who join are required to:

- supply information about semi-natural wildlife habitats and traditional farm buildings on their land;
- use farm practices that protect areas and features of environmental importance;
- protect wildlife habitats;
- ensure that at least 5 per cent of the farm area is a wildlife habitat;
- prepare a resource management plan for the farm.

Contact: Welsh Assembly Government farm liaison service – Caernarfon (01286 674144), Carmarthen (01267 225300) or Llandrindod Wells (01597 823777)

Scheme: Tir Gofal – Wales

Eligibility: Higher-level agri-environment scheme for Wales. The objectives of the scheme are to protect and improve habitats, landscapes, and historic and archaeological features; and to provide opportunities for new public access to the countryside.

To be accepted farmers must reach a points threshold which is based on habitats, environmental features and farm characteristics. Farmers can gain points through commitments to habitat improvement, permissive access and capital works.

Contact: Welsh Assembly Government farm liaison service – Caernarfon (01286 674144), Carmarthen (01267 225300) or Llandrindod Wells (01597 823777)
Scheme: 
**England Catchment Sensitive Farming Delivery Initiative (ECSFDI)**

**Eligibility:** Grants available for land managers in priority catchments to create or improve facilities that improve water quality by reducing diffuse pollution. Eligible items and activities include:

- fences and gates;
- water facilities for grazing livestock;
- management of runoff and drainage water;
- sheep dips;
- tracks, bridges, tree planting adjacent to watercourses, and so on.

**Contact:** Natural England (0845 600 3078)
www.defra.gov.uk/farm/environment/water/csf/delivery-initiative.htm
www.magic.gov.uk/staticmaps/national.asp – maps showing priority catchments

Scheme: 
**English Woodland Grant Scheme**

**Eligibility:** Grants available for the creation of new woodlands, including wet woodland, and for the careful management and improvement of existing woods. Grants for existing woodlands are only available for areas over three hectares. Grants for new woodlands are available on a competitive basis for applications that best fit with the public benefit. The scheme favours plans that are:

- near to where people live, particularly within the urban fringe;
- creating access and/or supporting recreation and sport;
- appropriately designed for wildlife;
- designed to enhance the landscape;
- aimed at restoring former industrial land.

**Contact:** Forestry Commission (01223 346004)
www.forestry.gov.uk/ewgs

Scheme: 
**Better Woodlands for Wales**

**Eligibility:** Grants available for new planting, restocking, and maintaining/improving the environmental and social value of existing woodland. Per-hectare payments cover between 25 and 75 per cent of woodland managers’ costs, depending on the type of woodland, its wildlife habitat value and the nature of work done. Environmental management options include squirrel control, deer management, post-establishment respacing, and the protection of Biodiversity Action Plan species and archaeological sites. Social options include health-and-safety risk assessments, public liability insurance, recreational and educational facilities (e.g. bike trails, car parking, information leaflets), amenity work (e.g. brashing, pruning, thinning around paths), and controlling and clearing fly tips. Assistance is provided with the cost of commissioning a woodland manager to develop a detailed management plan.

**Contact:** Forestry Commission Wales 0845 6040845
www.forestry.gov.uk/wales
Other relevant payment schemes

**Scheme:** Single Payment Scheme (SPS)

**Eligibility:** Farmers in England and Wales must meet cross compliance requirements to receive SPS payments. These payments cover:
- Maintaining land in Good Agricultural Environmental Condition (GAEC).
  The broad areas supported are:
  - soil management and protection (waterlogged soil, stubble burning);
  - maintenance of habitats and landscape features – uncultivated land, forestry, Sites of Special Scientific Interest (SSSIs), Scheduled Monuments, rights of way, watercourses, hedgerows, stone walls, etc.
  - Keeping to Statutory Management Requirements (SMRs)
  - Environment (wild birds and habitats, groundwater, nitrate vulnerable zones and sewage sludge);
  - Public and animal health (eg animal registration, chemical legislation).

**Contact (England):** Rural Payments Agency (0845 603 7777)
www.rpa.gov.uk/rpa/index.nsf/home
www.crosscompliance.org.uk

**Contact (Wales):** Welsh Assembly Government farm liaison service – Caernarfon (01286 674144), Carmarthen (01267 225300) or Llandrindod Wells (01597 823777)
http://new.wales.gov.uk/topics/environmentcountryside/farmingandcountryside/farming/singlepaymentscheme/?lang=en

**Scheme:** Hill Farming Allowance (paid within Severely Disadvantaged Areas of England)

**Eligibility:** Per-hectare payments available to farmers who manage cattle and sheep in Severely Disadvantaged Areas (SDAs), such as mountainous and upland areas. A new version of this scheme is due to be launched in 2010 following a review. Claimants must meet the following requirements:
- keeping eligible sheep and/or eligible cows;
- stocking at a minimum of 0.15 animals per hectare (unless other agreements dictate otherwise);
- undertaking to keep at least ten hectares of SDA forage land continuously for five years;
- adhering to the cross compliance requirements of the Single Payment Scheme.

**Contact:** Rural Payments Agency (0845 603 7777)
www.rpa.gov.uk/rpa/index.nsf/home
www.defra.gov.uk/rural/uplands/support.htm

**Scheme:** Tir Mynydd

**Eligibility:** Eighty per cent of Welsh farmland has Less Favoured Area (LFA) status. Under the Rural Development Plan for Wales (RDPW), Tir Mynydd supports livestock production in LFA to avoid land being abandoned and rural areas becoming depopulated. Farmers receive a per-hectare payment for eligible forage land. This scheme is due to be reviewed in 2010.

**Contact:** Welsh Assembly Government farm liaison service – Caernarfon (01286 674144), Carmarthen (01267 225300) or Llandrindod Wells (01597 823777)
Useful contacts

Organisations that can help you

The following government agencies, consultancies, charities and membership organisations provide a wide range of information, advice and support for farmers working to benefit the environment.

ADLib – Agricultural Documents Library
Subscription-based document resource featuring 1,600 indexed and cross-linked documents from over 50 organisations that supply advisory information to the agricultural, horticultural and land-use industries.
www.adlib.ac.uk/adlib/
01707 284548

AICC – Association of Independent Crop Consultants
Professional organisation that provides farmers with details of independent crop consultants.
www.aicc.org.uk
01730 823881

BASIS
Independent registration, standards and certification scheme serving pesticide, fertiliser and other organisations.
www.basis-reg.com
01335 343945

BIAC – British Institute of Agricultural Consultants
Professional organisation representing independent consultants for farmers and rural businesses.
www.biac.co.uk
01795 830100

Cadw
The Welsh Assembly Government’s historic environment division. Responsible for protecting historic buildings, ancient monuments; and historic parks, gardens and landscapes.
www.cadw.wales.gov.uk
01443 33 6000

ADHB – Agriculture and Horticulture Development Board
New overarching levy body established to help improve the efficiency and competitiveness of UK agriculture and horticulture. Consists of six organisations that can provide sectoral guidance: BPEX and EBLEX (with a remit in England for pig production and beef and lamb respectively); the Horticulture Development Company, Dairy Co and the Potato Council (all with a GB remit); and the HGCA (cereals and oilseeds; UK-wide remit).
www.ahdb.org.uk 020 7238 3079
www.BPEX.org.uk 01908 844368
www.EBLEX.org.uk 0870 242 1394
www.dairyco.org.uk 01285 646500
www.hdc.org.uk 01732 848383
www.hgca.com 020 7520 3920
www.potato.org.uk 01865 714455

www.BPEX.org.uk 01908 844368
www.EBLEX.org.uk 0870 242 1394
www.dairyco.org.uk 01285 646500
www.hdc.org.uk 01732 848383
www.hgca.com 020 7520 3920
www.potato.org.uk 01865 714455
CCW – Countryside Council for Wales
The Government’s statutory adviser on sustaining natural beauty, wildlife and public access in Wales.
www.ccw.gov.uk
08451 306 229

Coed Cymru
Charity that provides free help and advice to Welsh woodland owners on sustainable woodland management.
www.coedcymru.org.uk
01686 650 777

Country Land and Business Association
Web-based carbon footprint calculator helps farmers and land managers work out their greenhouse-gas emissions and the levels of carbon stored in trees and soil.
http://calm.circlesquared.com
020 7235 0511

Crop Protection Association
Website contains details of regulations relating to pesticide use.
www.cropprotection.org.uk/content/home.asp
01733 367213

www.dairyenergy.eu
EU-funded website aimed at helping dairy farmers to become more energy efficient.

Defra – Department for Environment, Food and Rural Affairs
The main UK government source of agricultural and environmental information. Website features the Whole Farm Approach, designed to help lighten the regulatory burden on farmers and growers in England.
www.defra.gov.uk
Agricultural information:
www.defra.gov.uk/farm/index.htm
Whole Farm Approach:
www.wholefarm.defra.gov.uk
08459 335577

ECSFDI – England Catchment Sensitive Farming Delivery Initiative
A Defra funded initiative that encourages the appropriate use of fertilisers, manures and pesticides to reduce diffuse water pollution. Website provides information on priority catchments and grants.
www.defra.gov.uk/farm/environment/water/csf/index.htm
08459 335577

English Heritage
Public body responsible for protecting England’s historic environment. Publishes a range of material on ‘farming the historic landscape’.
www.english-heritage.org.uk
0870 3331181

Environment Agency
The leading public body for protecting the environment in England and Wales. We provide advice and information on all aspects of environmental protection of air, land and water.
www.environment-agency.gov.uk
Agricultural information:
www.environment-agency.gov.uk/business/444304/1224648
08708 506506

Farming Connect
Offers a wide range of help and advice to farmers in Wales. Areas covered include business management support and mentoring; training opportunities; cross compliance; technical advice; diversification and innovation.
http://new.wales.gov.uk/topics/environmentcountryside/farmingconnect/?lang=en
08456 000813
Forestry Commission
Agency responsible for protecting forests and promoting sustainable woodland management in England, Scotland and Wales. Supports woodland owners through the English Woodland Grant Scheme and Better Woodlands for Wales.

www.forestry.gov.uk; www.forestry.gov.uk/wales
01223 314546 (England);
0845 6040845 (Wales)

FWAG – Farming and Wildlife Advisory Group
Assists farmers by providing specialist advice on environmental management.

www.fwag.org.uk
02476 696699

Game Conservancy Trust
Encourages conservation through research, courses and conferences. Issues publications on game and environmental management.

www.gct.org.uk
01425 652381

LEAF – Linking Environment and Farming
Organisation that helps its farmer members to improve their environmental and business performance. Website includes environmental auditing tool and details of demonstration farm network.

www.leafuk.org
0247 6413 911

Maize Growers Association
Commissions research on maize agronomy, nutrition and environmental issues.

www.maizegrowersassociation.co.uk
01363-775040

Moorland Association
Provides practical and legal advice to owners and managers of heather moorland.

www.moorlandassociation.org.uk
01524 846846

National Trust
Membership organisation that conserves the coastline, countryside and historic buildings. Website includes information on environmental best practice.

www.nationaltrust.org.uk
01793 817400

Natural England

www.naturalengland.org.uk
Agricultural information:
www.naturalengland.org.uk/farmers/default.htm
08456 003078

NetRegs
Website that provides online guidance to help small businesses comply with environmental legislation.

www.netregs.gov.uk
08708 506 506

NFU – National Farmers Union
Represents a significant proportion of farmers and growers in England and Wales. Website includes guidance on environmentally responsible agriculture.

www.nfuonline.com
024 7685 8500

NIAB – National Institute of Agricultural Botany
Independent organisation specialising in crop improvement research and testing.

www.niab.com
01223 342200

NSTS – National Sprayer Testing Scheme
Postcode search facility to help you find the location of your nearest sprayer test centre.

www.aea.uk.com/sprayer
Organic Farmers and Growers
Certification body whose website includes technical advice leaflets for organic producers.

www.organicfarmers.org.uk
0845 330 5122

Pesticides Safety Directorate (PSD)
Agency of the Health and Safety Executive that provides advice and information on the correct use of pesticides.

www.pesticides.gov.uk
01904 455775

Planet Nutrient Management
Online nutrient planning and management tool.

www.planet4farmers.co.uk

Potash Development Association
Independent organisation that advises on soil fertility, plant nutrition and fertiliser use.

www.pda.org.uk
01904 492009

RSPB – Royal Society for the Protection of Birds
Charity that protects and restores bird habitats. Website includes advice on wildlife management.

www.rspb.org.uk
01767 680 551

SMI – Soil Management Initiative
Independent organisation established to promote systems designed to protect and improve soil quality.

www.smi.org.uk
01572 717220

Soil Association
Charity that promotes organic food and farming and supports producers. Website includes organic standards, demonstration farm network and technical guidance.

www.soilassociation.org
0117 314 5000

Tenant Farmers Association
Membership organisation that represents tenant farmers. Advisory service gives advice on agricultural diversification and environmental schemes.

www.tfa.org.uk
0118 9306130

TIBRE – Targeted Inputs for a Better Rural Environment
Website developed by Scottish Natural Heritage that explores how technology can be used in farming to benefit the environment.


UKIA – UK Irrigation Association
Provides information and support to its members on irrigation and agricultural water management.

www.ukia.org
01427 717627

Voluntary Initiative
Website that contains guidance on best practice in pesticide use.

www.voluntaryinitiative.org.uk

WAG – Welsh Assembly Government
Source of detailed information and guidance on agricultural and environmental management in Wales.

www.wales.gov.uk
Agricultural information:
http://new.wales.gov.uk/topics/environmentcountrywide/?lang=en
08450 103300

Waste Directory
Website established to help agricultural and horticultural businesses find ways of managing their waste when new regulations came into force in 2006. Contains postcode search facility for waste/recycling centres.

www.wastedirectory.org.uk
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