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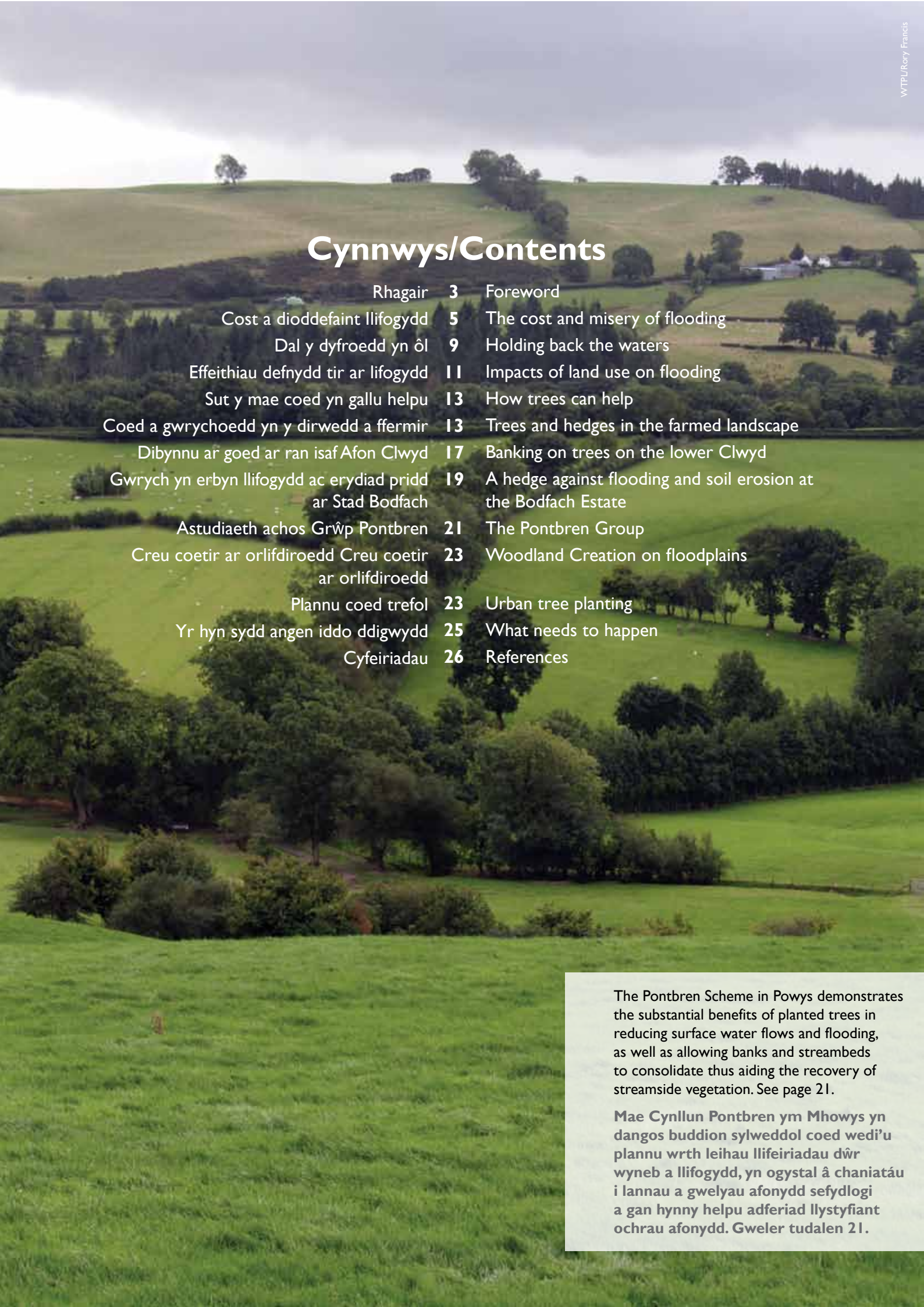
Holding back the waters

Woodland Creation and Flood Mitigation

Dal y dyfroedd yn ôl

Creu Coetir a Lliniaru Llifogydd



WTPL/Rory Francis

Cynnwys/Contents

The Pontbren Scheme in Powys demonstrates the substantial benefits of planted trees in reducing surface water flows and flooding, as well as allowing banks and streambeds to consolidate thus aiding the recovery of streamside vegetation. See page 21.

Mae Cynllun Pontbren ym Mhowys yn dangos buddion sylweddol coed wedi'u plannu wrth leihau llifeiriadau dŵr wyneb a llifogydd, yn ogystal â chaniatáu i lannau a gwelyau afonydd sefydlogi a gan hynny helpu adferiad llystyfiant ochrau afonydd. Gweler tudalen 21.

Foreword

All too often we switch on the news and see images of "untoward" weather incidents: cyclones and typhoons affecting millions of lives. The Midwest of the USA, Sardinia and the Philipines are struggling to recover from the devastation which has recently hit them all.

Not only do they have to cope with the massive damage enormous winds bring but with the sudden onset of devastating flooding.

The mass influx of huge quantities of water is not, however, restricted to extreme conditions but is being experienced here, more and more frequently.

Flash flooding is a dangerous and common phenomena caused not just by heavy rainfall but also the combination of waterlogged soil or land which is unable to absorb more water.

We tend to think of the destructive effects of flooding in relation to people, buildings and towns as those are the pictures of devastation we so often see.

However, flooding affects more and more of us on a regular basis, with hundreds of homes at risk in Wales alone. Add to that the flooding of the land, the additional need to house animals, to provide food that livestock can no longer obtain because it is underwater and we begin to understand the need to address flooding urgently.

My children and I are regularly isolated due to flooding. We are fortunate, we have a raised, storm built house but others are not so lucky. Losing your home and personal possessions is devastating. Carpets can be replaced, lives and old photographs cannot.

Mae Tamsin Dunwoody a'i phlant yn cael eu hynysu'n rheolaidd oherwydd llifogydd.

Tamsin Dunwoody and her children are regularly isolated due to flooding

We can build all the walls and flood defences possible but we will not prevent flooding occurring by this method alone. It is time policy reflected reality. Flood defences should be built in conjunction with other natural defences put in place at the same time.

Planting trees and hedgerows can reduce the impact of sudden heavy rainfall by slowing the path of the water through runoff. The loss of woodlands and hedges to create greater field size to accommodate larger equipment has reduced our ability to work with nature. We need to reinvest in our land and plan for our future. This report provides some very sound advice on how to do just that.

We need to take a harsh look at our behaviour and practices. And then change them. It is time to work with Nature, not against her.

And I shall keep the wellies handy.

Tamsin Dunwoody

Chair of the Woodland Trust's Wales Advisory Group

Rhagair

Yn llawer rhy aml rydym yn troi'r newyddion ymlaen ac yn gweld delweddau o ddigwyddiadau tywydd "anffafriol": seiclonau a chorwyntoedd sy'n effeithio ar filiynau o fywydau. Mae Gorllewin Canol UDA, Sardinia a'r Philipinau yn ymlafnio i ddod dros y dinistr sydd wedi'u taro nhw i gyd yn ddiweddar.

Nid yn unig y mae'n rhaid iddyn nhw ymdopi â'r difrod enfawr a ddaw yn sgil gwyntoedd anferthol ond hefyd gyda dyfodiad sydyn llifogydd dinistriol.

'Dyw dylifiad peth wmbredd o ddŵr ddim wedi'i gyfyngu i dywydd eithafol fodd bynnag, ond mae'n cael ei brofi yma, yn amlach ac yn amlach.

Mae fflachlifogydd yn ffenomena peryglus a chyffredin sy'n cael ei achosi nid yn unig gan lawiad trwm ond hefyd gan y cyfuniad o bridd neu dir dyfrlawn sy'n methu amsugno mwy o ddŵr.

Rydym yn tueddu i feddwl am effeithiau dinistriol llifogydd mewn perthynas â phobl, adeiladau a threfi gan mai'r rheini yw'r lluniau o ddistryw a welwn ni mor aml.

Fodd bynnag, mae llifogydd yn effeithio ar fwy a mwy ohonom yn rheolaidd, gyda channoedd o gartrefi mewn perygl yng Nghymru ei hun. Ychwanegwch at hynny dir yn cael ei foddi, yr angen ychwanegol i fynd ag anifeiliaid dan do, i ddarparu bwyd nad all da byw ei gael bellach am ei fod dan ddŵr ac rydym yn dechrau deall yr angen i fynd i'r afael â llifogydd, a hynny ar frys. Caiff fy mhlant a minnau ein hynysu'n rheolaidd oherwydd llifogydd. Rydym yn ffodus, mae gennym dŷ ar dir uwch, wedi'i adeiladu i wrthsefyll stormydd ond 'dyw eraill ddim mor lwcus. Mae colli eich cartref a'ch meddiannau personol yn beth ofnadwy. Mae modd cael carpedi newydd, ond nid felly fywydau a hen luniau. Gallwn adeiladu'r holl waliau ac amddiffynfeydd llifogydd sy'n bosib ond wnawn ni ddim rhwystro llifogydd rhag digwydd yn y modd yma yn unig. Mae hi'n bryd i bolisi adlewyrchu realiti. Dylai amddiffynfeydd llifogydd gael eu hadeiladu ynghyd ag amddiffynfeydd naturiol eraill a roddir yn eu lle ar yr un pryd. Mae plannu coed a gwrychoedd yn gallu lleihau effaith glawiad trwm sydyn trwy arafu llwybr y dŵr trwy ddŵr ffo.

Mae colli coetiroedd a gwrychoedd i greu caeau mwy o faint i gymryd peiriannau mwy wedi lleihau ein gallu i weithio gyda natur. Mae angen inni ailfuddsoddi yn ein tir a chynllunio ar gyfer ein dyfodol. Mae'r adroddiad hwn yn rhoi cyngor cadarn iawn ar sut i wneud union hynny.

Mae angen inni gymryd golwg caled ar ein hymddygiad a'n harferion. Ac yna eu newid. Mae hi'n bryd gweithio gyda Natur, nid yn ei herbyn.

Ac fe gadwaf y welis o fewn cyrraedd.

Tamsin Dunwoody

Cadeirydd Grwp Ymgynghorol Coed Cadw ar gyfer Cymru

Audrey Dyer

The River Tywi bursts its banks near Dryslwyn, Carmarthenshire.

Afon Tywi yn gorlifo ger Dryslwyn, Sir Gaerfyrddin.

Peter Brabham

A flood at Gelli in the Rhondda some years ago.

Llifogydd yng Ngelli, Y Rhondda, rai blynyddoedd yn ôl.

The cost and misery of flooding

Flooding can have dramatic and shocking effects. Last year was one of the wettest in living memory and had a devastating impact on homes, businesses and farmland in Wales. Climate projections suggest that we can expect a greater frequency of 'extreme' weather events, with more periods of heavy and prolonged rainfall and the deluge it creates[1].

According to research by Environment Agency Wales (now Natural Resources Wales) 1 in 6 properties in Wales – 357,000 domestic and business properties – are at risk of flooding. The economic cost of damage from flooding to residential and non-residential buildings alone is estimated to be around £200 million per annum[2,3]. This is before the costs of damage to crops and livestock, disruption to commerce and transport, and impacts on habitats. The 2004 Foresight Future Flooding report suggested that the annual economic damage in Wales from flooding will rise to £1,235 million in the 2080s under the most likely scenario. Taking actions now could reduce that cost by lowering the risk of floods[4].

The NFU calculated that the weather in 2012 cost farmers £600m in damage to crops and increased costs[5]. But there are also wider costs to farming. Flooding leads to erosion and loss of topsoil. Around 2.2 million tonnes of topsoil are eroded annually in the UK, reducing the long term fertility by removing nutrient rich top soil and organic matter. In the short term erosion leads to loss of seeds, fertilisers and pesticides and incurs costs associated with repeat operations[6].

Increased sedimentation can alter the shape of the water course, altering water flows. This can result in valuable agricultural land being permanently lost as rivers change shape and course. This can represent significant economic loss to the farms concerned.

Nutrients such as nitrogen and phosphorus, carried on soil particles, are washed away during flooding, which reduces water quality. Drains may become blocked, causing localised flooding and increased water turbidity affecting the plants and animals that live in the river.

Cost a dioddefaint llifogydd

Mae llifogydd yn gallu cael effaith ddramatig ac ysgytiol. Roedd y llynedd yn un o'r gwlypaf o fewn cof a chafodd effaith ddinistriol ar gartrefi, busnesau a thir ffermio yng Nghymru. Mae rhagolygon yr hinsawdd yn awgrymu y gallwn ddisgwyl digwyddiadau tywydd 'eithafol' yn amlach, gyda mwy o gyfnodau o lawiad trwm a hirfaith a'r dilyw y mae'n ei greu[1].

Yn ôl ymchwil gan Asiantaeth yr Amgylchedd Cymru (Cyfoeth Naturiol Cymru, bellach) mae 1 ym mhob 6 eiddo yng Nghymru – 357,000 eiddo domestig a busnes – mewn perygl gan lifogydd. Amcangyfrifir bod cost economaidd difrod gan lifogydd i adeiladau preswyl ac amhreswyliol yn unig yn tua £200 miliwn y flwyddyn[2,3]. Mae hyn cyn costau difrod i gnydau a da byw, amharu ar fasnach a thrafnidiaeth, ac effeithiau ar gynefinoedd. Roedd adroddiad Llifogydd y Dyfodol Foresight 2004 yn awgrymu y bydd y difrod economaidd blynyddol yng Nghymru gan lifogydd yn codi i £1,235 miliwn yn y 2080au dan y senario mwyaf tebygol. Gallai cymryd camau yn awr leihau'r gost honno trwy ostwng y perygl o lifogydd[4].

Cyfrifodd yr NFU fod y tywydd yn 2012 wedi costio £600m i ffermwyr o ran difrod i gnydau a chostau uwch[5]. Ond mae yna gostau ehangach i ffermio hefyd. Mae llifogydd yn arwain at erydu a cholli uwchbridd. Mae tua 2.2 miliwn tunnell o uwchbridd yn cael ei erydu bob blwyddyn yn y DU, gan leihau'r ffrwythlondeb tymor hir trwy fynd ag uwchbridd a deunydd organig maeth-gyfoethog ymaith. Yn y tymor byr mae erydiad yn arwain at golli hadau, gwrtaith a phlaleiddiaid ac yn golygu costau sy'n gysylltiedig ag ail-wneud pethau[6].

Mae cynnydd yn y gwaddodiad yn gallu newid siâp y cwrs dŵr, gan newid llifeiriadau dŵr. Gall hyn arwain at golli tir amaethyddol gwerthfawr yn barhaol wrth i afonydd newid eu siâp a'u cwrs. Gall hyn fod yn golled economaidd sylweddol i'r ffermydd dan sylw.

Mae maethynnau megis nitrogen a ffosfforws, a gludir ar ronynnau pridd, yn cael eu golchi ymaith yn ystod llifogydd, gan ostwng ansawdd y dŵr. Gall draeniau gael eu tagu, gan achosi llifogydd lleol a mwy o lwydni yn y dŵr, sy'n effeithio ar y planhigion a'r anifeiliaid sy'n byw yn yr afon.

Mike Richardson

Nutrients such as nitrogen and phosphorus, carried on soil particles, are washed away during flooding, which reduces water quality.

Mae maethynnau megis nitrogen a ffosfforws, a gludir ar ronynnau pridd, yn cael eu golchi ymaith yn ystod llifogydd, gan ostwng ansawdd y dŵr.

Sediment deposits can affect the gills of some fish, and their ability to feed. Deposition of sediment on gravel beds affect spawning of fish and impact on economically important fresh water fisheries. Many invertebrates are also adversely affected by sedimentation.

Decreases in water quality can also result in increased costs of water treatment for drinking water and for industries that rely on clean water.

The most obvious immediate impacts of flooding are the physical damage to land and property and the disruption to transport, business and people's work. This carries real and significant economic costs. However flooding also brings misery for thousands of people – stress and anxiety, homes and treasured possessions ruined, families relocated whilst damage is repaired, and sadly on occasions, lives lost. The emotional costs associated with flooding are incalculable.

Mae dyddodion gwaddod yn gallu effeithio ar dagellau rhai pysgod, a'u gallu i fwydo. Mae dyddodi gwaddodion ar welyau gro yn effeithio ar silio pysgod ac yn cael effaith ar bysgodfeydd dŵr croyw sy'n bwysig yn economaidd. Mae llawer o infertebratau'n cael eu heffeithio'n andwyol gan waddodiad hefyd.

Mae gostyngiad yn ansawdd dŵr yn gallu arwain at gostau trin dŵr uwch hefyd ar gyfer dŵr yfed ac i ddiwydiannau sy'n dibynnu ar ddŵr glân.

Effeithiau uniongyrchol mwyaf amlwg llifogydd yw'r difrod corfforol i dir ac eiddo a'r amhariad ar drafnidiaeth, busnes a gwaith pobl. Mae i hyn gostau economaidd real a sylweddol, ond mae llifogydd yn dod â dioddefaint i filoedd o bobl hefyd – straen a phryder, cartrefi a meddiannau hoff wedi'u difetha, teuluoedd yn cael eu hadleoli tra bod y difrod yn cael ei atgyweirio, a gwaetha'r modd ar adegau, bywydau'n cael eu colli. Mae'r costau emosiynol sy'n gysylltiedig â llifogydd yn anfesuradwy.

Types of flooding

There are a number of types of flooding. The most common causes of flooding in Wales are:

River flooding – when a river can't cope with the amount of water entering it and overflows its banks. 220,000 properties in Wales are at risk from river or coastal flooding.

Surface water flooding – heavy rainfall on to already saturated or compacted ground or hard surfaces runs across the surface and collects in lower areas – 234,000 properties in Wales are at risk from surface water flooding, although knowledge of flood risk from surface water is less developed than for river and coastal flooding.

Coastal flooding – when weather and tidal conditions combine to increase sea levels, inundating coastal areas. Conwy, Newport and Gwynedd are at particular risk of coastal flooding.

Drain and sewer flooding – following heavy rain when drains have become blocked.

Mathau o lifogydd

Mae nifer o fathau o lifogydd. Achosion mwyaf cyffredin llifogydd yng Nghymru yw:

Llifogydd afon – pan nad yw afon yn gallu ymdopi â'r maint o ddŵr sy'n dod i mewn iddi ac yn gorlifo ei glannau. Mae 220,000 eiddo yng Nghymru mewn perygl gan lifogydd afon neu lifogydd arfordirol.

Llifogydd dŵr wyneb – mae glawogydd trwm ar dir sydd eisoes yn ddwrlawn neu wedi'i gywasgu neu ar wyneb caled yn rhedeg ar draws yr wyneb ac yn cronni mewn ardaloedd yn is i lawr – mae 234,000 eiddo yng Nghymru mewn perygl gan lifogydd dŵr wyneb, er bod gwybodaeth am berygl llifogydd gan ddŵr wyneb yn llai datblygedig nag ar gyfer llifogydd afon a llifogydd arfordirol.

Llifogydd arfordirol – pan fydd y tywydd a chyflwr y llanw yn cyfuno i godi lefelau'r môr, gan foddi ardaloedd arfordirol. Mae Conwy, Casnewydd a Gwynedd mewn perygl arbennig gan lifogydd arfordirol.

Llifogydd draeniau a charthffosydd – yn dilyn glaw trwm pan fydd draeniau wedi'u tagu.

Coed Cymru

A shelter belt at at Pontbren Scheme.

Llain cysgodol yng Nghynllun Pontbren.

Gwynionydd

Flooding at Talybont, Ceredigion.

Llifogyd yn Nhalybont, Ceredigion.

Holding back the waters

Flooding is a natural event and cannot be completely eliminated. However, the economic cost of flooding coupled with the disruption and distress caused, demands that measures be put in place to reduce and mitigate the impacts.

Whilst avoiding building in areas of known high flood risk is an obvious step to take, increasing demand for housing and pressure on available land will mean that despite best intentions, many more people will be at risk of flooding, with all the attendant misery that brings. And for the many thousands of people already in high risk areas and for farmers with land prone to flooding, this problem is real and present.

Man-made flood defences are an essential part of the fight against flooding. These include engineered embankments, permanent fixed or removable flood walls and temporary structures. In addition better flood warning and, where flood defences are insufficient to prevent flooding, measures to protect individual properties, such as flood-proof doors and windows, are all part of the defence against flood water. Around £20 million a year is spent on improving and maintaining flood defences in Wales.

Management of flooding caused by excessive rainfall (river flooding and surface water flooding in particular) is most effective if the rainwater is managed where it falls, rather than where it floods. By slowing or holding up the water in the upper catchment the peak of river levels is lowered and the risk of flooding reduced.

Dal y dyfroedd yn ôl

Mae llifogydd yn ddigwyddiad naturiol ac ni ellir cael ymadael â nhw yn gyfan gwbl. Serch hynny, mae cost economaidd llifogydd ynghyd â'r amharu a'r gofid a achosant yn galw am roi camau yn eu lle i leihau a lliniaru'r effeithiau.

Tra bod osgoi adeiladu mewn ardaloedd ble mae'n hysbys fod y perygl o lifogydd yn uchel yn gam amlwg i'w gymryd, bydd y galw cynyddol am dai a'r pwysau ar y tir sydd ar gael yn golygu, er gwaethaf y bwriadau gorau, y bydd llawer mwy o bobl mewn perygl gan lifogydd, gyda'r holl ddioddefaint a ddaw yn sgil hynny. Ac i'r miloedd lawer o bobl sydd eisoes mewn ardaloedd o berygl uchel ac i ffermwyr gyda thir sy'n dueddol i gael llifogydd, mae'r broblem hon yno ac yn real.

Mae amddiffynfeydd llifogydd o waith dyn yn rhan hanfodol o'r frwydr yn erbyn llifogydd. Mae'r rhain yn cynnwys argloddiau a adeiladwyd, waliau llifogydd sefydlog parhaol neu symudadwy ac adeileddau dros dro. Ar ben hynny mae gwell rhybudd rhag llifogydd a, ble mae amddiffynfeydd llifogydd yn annigonol i atal llifogydd, camau i ddiogelu eiddo unigol, megis drysau a ffenestri sy'n ddiogel rhag llifogydd, i gyd yn rhan o'r amddiffynfeydd rhag dŵr llifogydd. Mae tua £20 miliwn y flwyddyn yn cael ei wario ar wella a chynnal amddiffynfeydd llifogydd yng Nghymru.

Mae rheoli llifogydd a achosir gan lawiad eithafol (llifogydd afon a llifogydd dŵr wyneb yn arbennig) yn fwyaf effeithiol os caiff y dŵr glaw ei reoli ble mae'n disgyn, yn hytrach na ble mae'n gorlifo. Trwy arafu neu ddal y dŵr yn ei ôl yn rhan uchaf y dalgylch caiff penllanw lefelau'r afon ei ostwng a'r perygl o lifogydd ei leihau.

Geograph/ Dr Richard Smith

Water erosion and associated nutrient loss can have a severe effect on farming businesses. Up to 2.2 million tonnes are eroded annually in the UK.

Fe all erydiad dwr a cholli maethynnau gael effaith niweidiol iawn ar fusnesau amaethyddol. Mae 2.2 miliwn tunnell yn cael ei erydi bob blwyddyn trwy Wledydd Prydain.

Impacts of land use on flooding

Changes in land use in both rural and urban areas over recent decades have contributed to an increased risk of flooding.

In rural areas changes in the farming landscape, including improved drainage, removal of hedges and changes in cropping, have led to increased runoff from fields. For instance, fields cropped with winter cereals or maize silage leave soils exposed and heavy winter rainfall runs quickly over surfaces, carrying with it valuable topsoil. The increased frequency of very heavy rainstorms has exacerbated the problem.

On farmland, encouraging water to infiltrate in to soils lessens the amount of overland flow, reducing flash flooding on the farm and the amount of sediment-bearing water entering drainage courses.

The growth of urban areas and the increase in hard surfaces – for instance through the paving over of front gardens to provide parking – has resulted in an increase in surface water runoff and the number of properties at risk from flash flooding. In urban areas, in addition to effective drains, absorbent surfaces help reduce the amount of surface water runoff and flooding.

Effeithiau defnydd tir ar lifogydd

Mae newidiadau yn nefnydd tir mewn ardaloedd gwledig ac mewn ardaloedd trefol dros y degawdau diwethaf wedi cyfrannu at fwy o berygl o lifogydd.

Mewn ardaloedd gwledig mae newidiadau yn y dirwedd ffermio, yn cynnwys gwell draeniad, cael gwared â gwrychoedd a newidiadau yn y cnydio, wedi arwain at fwy o ddŵr ffo o gaeau. Er enghraifft, mae caeau wedi'u cnydio ag ydau gaeaf neu silwair indrawn yn gadael priddoedd yn noeth ac mae glawiad trwm y gaeaf yn rhedeg yn gyflym dros yr wyneb, gan gario uwchbridd gwerthfawr gydag ef. Mae amlder cynyddol stormydd glaw trwm iawn wedi gwaethygu'r broblem.

Ar dir ffermio, mae annog dŵr i dreiddio i mewn i briddoedd yn lleihau maint y llif dros y tir, gan leihau fflachlifoedd ar y fferm a faint o ddŵr yn cario gwaddodion sy'n mynd i mewn i gyrsiau draenio.

Mae twf ardaloedd trefol a'r cynnydd mewn arwynebau caled – er enghraifft trwy balmantu gerddi ffrynt i roi lle parcio – wedi arwain at gynnydd yn nŵr ffo'r wyneb ac yn nifer yr adeiladau sydd mewn perygl gan fflachlifoedd. Mewn ardaloedd trefol mae arwynebau amsugnol, yn ychwanegol at ddraeniau effeithiol, yn helpu i leihau maint dŵr ffo'r wyneb a llifogydd.

Geograph/ Dr Richard Smith

Surface water run-off damages soils.

Mae dwr ffo'r wyneb yn niweidio priddoedd.

WTPL/Rory Francis

If there are trees to be planted, there's usually no shortage of volunteers. Here, local people get planting at Forden, Powys.

Os oes yna goed i'w plannu, fel arfer fydd yna ddigon o wirfoddolwyr sy'n barod i roi help llaw. Yma, mae pobl leol yn mynd ati i blannu coed yn Ffordun, Powys.

How trees can help

The importance of natural processes in flood defence was recognised in the Pitt Review[7] following the 2007 flooding, particularly in dealing with small scale events. Others have also pointed to the role of natural processes and to woodland creation in the upper water catchment in reducing the risk of flooding further downstream[8].

Trees can provide a sustainable and low maintenance solution to lessening the risk of flooding as well as delivering other environmental and economic benefits. Whilst trees can't help in coastal flooding, they can reduce the risk of surface water and river flooding, when combined with other flood defences.

The lack of soil disturbance and recycling of leaves and other dead material from trees in woodland leads to an increase in soil organic matter and development of soil structure with natural channels and pores which means that water infiltrates into the soil– the sponge effect[9].

The leaves, branches and trunks of trees also intercept rain before it reaches the ground, both slowing through-fall to the ground but also with some rain evaporating into the atmosphere[10]. For native deciduous trees interception is greatest during the summer, but even in winter trees can intercept up to 12 per cent of rainfall[11,12] .

Sut y mae coed yn gallu helpu

Cafodd pwysigrwydd prosesau naturiol wrth amddiffyn rhag llifogydd ei gydnabod yn Adolygiad Pitt[7] yn dilyn llifogydd 2007, yn arbennig wrth ymdrin â digwyddiadau ar raddfa fechan. Mae eraill hefyd wedi tynnu sylw at ran prosesau naturiol ac at greu coetir yn rhan uchaf y dalgylch dŵr wrth leihau'r perygl o lifogydd ymhellach i lawr yr afon[8].

Mae coed yn gallu cynnig ateb cynaliadwy ac isel ei gynhaliaeth i leihau'r perygl o lifogydd yn ogystal â darparu buddion amgylcheddol ac economaidd eraill. Er nad all coed helpu o ran llifogydd arfordirol, gallant leihau'r perygl o lifogydd dŵr wyneb a llifogydd afon, o'u cyfuno ag amddiffynfeydd llifogydd eraill.

Mae diffyg tarfu ar y pridd ac ailgylchu dail a deunydd marw arall o'r coed mewn coetir yn arwain at gynnydd yn neunydd organig y pridd a datblygiad adeiledd pridd gyda sianeli a mandyllau naturiol sy'n golygu bod dŵr yn treiddio i mewn i'r pridd– yr effaith sbwng[9].

Mae dail, canghennau a boncyffion coed yn dal y glaw hefyd cyn iddo gyrraedd y ddaear, yn arafu ei ddisgyniad i lawr i'r ddaear ond hefyd gyda rhywfaint o law yn anweddu i'r atmosffer[10]. Gyda choed llydanddail brodorol mae'r dal fwyaf yn ystod yr haf, ond hyd yn oed yn y gaeaf gall coed ddal hyd at 12 y cant o'r glawiad[11,12].

Trees and hedges in the farmed landscape

Targeted woodland creation on farmland can help to mitigate flood risk and reduce the risk of harm to water quality, while also helping to support agricultural production.

When floodwater runs over ground it picks up particles of soil and other pollutants, which will eventually end up in the neighbouring watercourses. Planting narrow bands of trees on mid-slope and down slope field edges can be effective in increasing water infiltration, reducing and slowing runoff and intercepting nutrient and sediment[13].

Coed a gwrychoedd yn y dirwedd a ffermir

Mae creu coetir wedi'i dargedu ar dir ffermio yn gallu helpu i liniaru perygl llifogydd a lleihau'r perygl o niwed i ansawdd y dŵr, tra bydd hefyd yn helpu i gynnal cynhyrchu amaethyddol.

Pan fydd llifddwr yn rhedeg dros y ddaear mae'n codi gronynnau o bridd a llygryddion eraill, a fydd yn mynd i'r cyrsiau dŵr cyfagos yn y diwedd. Gall plannu rhimynnau cul o goed ar ymylon caeau ar ganol llechwedd a thuag at waelod llechwedd fod yn effeithiol wrth ychwanegu at dreiddiad dŵr, lleihau ac arafu dŵr ffo a dal maethynnau a gwaddodion[13].

Pete Leeson

Riparian planting.

Plannu coed ar lan afon.

Studies at Pontbren in mid Wales found that water infiltration increased by 60 times within 5m of tree shelter belts after just 3 years of planting[14].

Modelling based on experience in mid Wales suggests that targeted tree planting in the upper catchment could lead to reductions in peak flood flows of up to 40%[15]. When combined, these local reductions can lead to lower flood risk further down the catchment.

Riparian planting – planting of river and stream sides – can be used to exclude livestock, stabilise river banks and intercept pollutants from neighbouring land. When livestock have access to stream sides they 'poach' the soil – puddling it with their feet – and this exposes the soil to erosion, particularly when flood waters are high.

Where they are present, existing hedgerows and shelter belts may already be helping to reduce flood risk. However planting trees and the creation of tree belts can be incorporated into farming systems to further reduce flood risk and improve water quality.

Native trees appropriate to the site are preferable in benefiting wildlife. Planting a wide variety of trees and shrubs will help to achieve varied structure, will benefit a wider range of wildlife, and will prevent heavy losses if one species is hit by disease.

To be effective tree planting for flooding needs to be based on the in-depth knowledge which farmers have of the land. The case study of Pontbren is an example of how this can work when farmers are able to take the lead in deciding where planting is needed. This makes the agreement earlier this year between the Welsh Farming Unions and Natural Resources Wales on how best to tackling flooding particularly welcome[16].

Fe wnaeth astudiaethau ym Mhontbren yng nghanolbarth Cymru ganfod bod treiddiad dŵr yn cynyddu o 60 gwaith o fewn 5m i leiniau cysgod coed ar ôl dim ond 3 blynedd o blannu[14].

Mae modelu wedi'i seilio ar y profiad yng nghanolbarth Cymru yn awgrymu y gallai plannu coed wedi'i dargedu yn rhan uchaf y dalgylch arwain at ostyngiadau ym mhenllanw llifeiriadau llifogydd o hyd at 40%[15]. Pan gânt eu cyfuno, gall y gostyngiadau lleol hyn arwain at lai o berygl llifogydd ymhellach i lawr y dalgylch.

Gellir defnyddio plannu glan afon – plannu ochrau afonydd a nentydd – i gau da byw allan, sefydlogi glannau'r afon a dal llygryddion o dir cyfagos. Pan fydd da byw yn gallu cael at ochrau nentydd maen nhw'n 'sathru' y pridd – ei stompio gyda'u traed – ac mae hyn yn dinoethi'r pridd i erydiad, yn arbennig pan fydd llifddyfroedd yn uchel.

Ble maent i'w cael, fe all y gwrychoedd a'r lleiniau cysgodi presennol fod yn helpu i leihau'r perygl o lifogydd yn barod. Sut bynnag gellir ymgorffori plannu coed a chreu lleiniau coed mewn systemau ffermio i leihau'r perygl o lifogydd ymhellach a gwella ansawdd y dŵr.

Coed brodorol sy'n briodol i'r safle sydd orau i sicrhau buddion bywyd gwyllt. Bydd plannu amrywiaeth eang o goed a llwyni yn helpu i sicrhau strwythur amrywiol, bydd o les i amrywiaeth ehangach o fywyd gwyllt, a bydd yn atal colledion trwm os caiff un rhywogaeth ei tharo gan glefyd.

I fod yn effeithiol mae gofyn i blannu coed at anghenion llifogydd fod wedi'i seilio ar yr wybodaeth fanwl sydd gan ffermwyr am y tir. Mae astudiaeth achos Pontbren yn enghraifft o sut y gall hyn weithio pan fydd ffermwyr yn gallu cymryd yr awenau wrth benderfynu ble mae angen plannu. Mae hyn yn gwneud y cytundeb yn gynharach eleni rhwng Undebau Amaethyddol Cymru a Cyfoeth Naturiol Cymru ar sut orau i fynd i'r afael â llifogydd yn arbennig o dderbyniol[16].

Steven Kind

On the River Clwyd at St Asaph, the steep soil banks of the river, so vulnerable to erosion, were reprofiled to reduce their gradient and protected using coir matting. Finally, the new bank was sown with grass seeds and planted with native trees. In all, 1,350 trees were planted, alder, ash (this was before ash dieback was discovered in the UK), downy birch, goat willow, grey willow, hawthorn and blackthorn. No protective sleeves were used as these would be washed away in a flood.

Ar Afon Clwyd ger Llanelwy, fe gafodd glannau pridd serth yr afon, a oedd mor agored i erydiad, eu hailbroffilio i leihau eu graddiant a'u diogelu gan ddefnyddio matin rhisgl coconyt. Yn olaf, fe gafodd y lan newydd ei hadu â hadau glaswellt a'i phlannu â choed brodorol. Plannwyd 1,350 o goed i gyd, yn goed gwern, ynn (roedd hyn cyn darganfod clefyd coed ynn yn y Deyrnas Unedig), bedw cyffredin, helyg, helyg llwydion, drain gwynion a drain duon. Ni ddefnyddiwyd llewys gwarchod ar y coed gan y byddai'r rhian yn cael eu hysgubo ymaith mewn llifogydd.

Banking on trees on the lower Clwyd

The section of the River Clwyd which flows gently past St Asaph, at Pont Dafydd, had been a cause for concern for the Conwy Clwyd and Gwynedd Rivers Trust, for Natural Resources Wales, formerly Environment Agency Wales and for local landowner, Mr Lloyd Williams.

When the river flooded, its steep soil banks would be eroded, leading to sedimentation. Under the Water Framework Directive, all surface waters in the UK and indeed the whole of the EU must achieve 'good status' by 2015. This section on the River Clwyd risked failing this test. Moreover, Mr Williams, the landowner was concerned that, with every flood, he was losing more valuable grazing land.

Working together with the Clwyd Conwy and Gwynedd Rivers Trust, Environment Agency Wales came up with a plan, see opposite. Though this has already made a real difference in terms of bank erosion, it was a low cost operation in river terms. £21,000 was provided by Environment Agency Wales and £3,000 by the Conwy Clwyd and Gwynedd Rivers Trust, while the Woodland Trust provided free trees. Much of the labour was provided by the BTCV, while Coed Cymru provided practical advice and supervised the volunteers.

This was a scheme carried out for the benefit of the river and flood management. But the trees played something of a starring role. Riparian trees can aid infiltration of surface water run-off nutrient, phosphates in this case, and thus reduce diffuse pollution and improve water quality. In this case, the trees also play a key role in binding the new river bank together and thus making it more stable.

Roger Thomas of the Rivers Trust hopes the scheme can be a model for future work and greater cooperation between the partners. "For me the important thing is that work like this can help flood control and in particular, bank erosion, and how the parties came together and collaborated in delivering this project at low cost. The Clwyd Conwy and Gwynedd Rivers Trust welcomes working with the Woodland Trust on future projects as it recognises that when it can persuade land owners to sacrifice a few metres of land to create riverine buffer strips, the planting of trees and bushes can help to stabilise banks, create better spawning and improved habitat for fish and invertebrates and help create corridors for other wildlife such as bats."

Dibynnu ar goed ar ran isaf Afon Clwyd

Mae'r rhan o Afon Clwyd sy'n llifo'n araf heibio Llanewly, wrth Bont Dafydd, wedi bod yn achos pryder i Ymddiriedolaeth Afonydd Conwy Clwyd a Gwynedd, i Gyfoeth Naturiol Cymru, Asiantaeth yr Amgylchedd Cymru gynt, ac i'r tirfeddiannwr lleol, Mr Lloyd Williams.

Pan fyddai'r afon yn gorlifo, byddai'r glannau pridd serth yn cael eu herydu, gan arwain at waddodiad. Dan Y Gyfarwyddeb Fframwaith Dŵr, rhaid i'r holl ddŵr wyneb yn y Deyrnas Unedig ac yn wir yn yr Undeb Ewropeaidd i gyd gyflawni 'statws da' erbyn 2015. Roedd y rhan yma o Afon Clwyd yn beryg o fethu'r prawf hwn. Ar ben hynny, roedd Mr Williams, y tirfeddiannwr yn bryderus ei fod yn colli mwy o dir pori gwerthfawr, bob tro yr oedd llifogydd.

Gan gydweithio ag Ymddiriedolaeth Afonydd Clwyd Conwy a Gwynedd, daeth Asiantaeth yr Amgylchedd Cymru o hyd i gynllun, fel y gwelir drosodd. Er bod hwn wedi gwneud gwahaniaeth gwirioneddol yn barod o ran erydiad y lan, roedd yn waith isel ei gost yn nhermau afon. Darparwyd £21,000 gan Asiantaeth yr Amgylchedd Cymru a £3,000 gan Ymddiriedolaeth Afonydd Conwy Clwyd a Gwynedd, tra bod Coed Cadw (the Woodland Trust) wedi darparu coed am ddim. Darparwyd llawer o'r llafur gan y BTCV, tra bu Coed Cymru yn darparu cyngor ymarferol a goruchwylio'r gwirfoddolwyr.

Cynllun oedd hwn a gyflawnwyd er lles yr afon a rheoli llifogydd. Ond y coed oedd yn chwarae'r brif ran. Mae coed glannau afon yn gallu helpu ymdreiddiad maethynnau, ffosffadau yn yr achos hwn, rhag iddynt gael eu golchi ymaith yn nŵr ffo'r wyneb, ac fel hyn yn lleihau llygredd gwasgaredig ac yn gwella ansawdd y dŵr. Yn yr achos hwn, mae'r coed yn chwarae rhan allweddol hefyd wrth rwymo glan newydd yr afon at ei gilydd ac felly'n ei gwneud yn fwy sefydlog.

Mae Roger Thomas o'r Ymddiriedolaeth Afonydd yn gobeithio y gall y cynllun fod yn fodel ar gyfer gwaith yn y dyfodol, a mwy o gydweithrediad rhwng y partneriaid. "I mi y peth pwysig yw bod gwaith fel hyn yn gallu helpu i reoli llifogydd ac yn arbennig, erydiad glannau, a sut y daeth y partïon at ei gilydd a chydweithredu wrth gyflawni'r prosiect hwn am gost isel. Mae Ymddiriedolaeth Afonydd Clwyd Conwy a Gwynedd yn croesawu gweithio gyda Choed Cadw ar brosiectau yn y dyfodol gan ei bod yn cydnabod pryd y mae'n gallu perswadio tirfeddianwyr i aberthu ychydig fetrau o dir i greu lleiniau clustogi afonol, y gall plannu coed a llwyni helpu i sefydlogi glannau, creu gwell silio a gwell cynefin i bysgod ac infertebratau a helpu i greu coridorau ar gyfer mathau eraill o fywyd gwyllt, megis ystlumod."

Volunteers get their hands dirty planting the new hedge.

Gwirfoddolwyr yn torchi llewys i plannu'r gwrych newydd.

A hedge against flooding and soil erosion at the Bodfach Estate

The benefits of trees, shrubs and hedgerows for water management have long been recognised.

Back in 2009 Richard Dearing of Environment Agency Wales (now Natural Resources Wales) witnessed some flood water flowing across agricultural land at the Bodfach Estate near Llanfyllin, now owned by Simon and Maggie Baynes.

Armed with the photographic evidence, he managed to secure funding for 225m of double-fenced hedging along an existing field boundary. In all, approximately 1,800 trees and shrubs were planted, including hawthorn, blackthorn, holly and dog rose with a few larger oaks.

The hedge provided a number of ecosystem services including food, breeding sites and shelter for wildlife, protection for soils, and the water quality of the nearby Afon Cain.

"Bodfach is a beautiful location", says Richard, "so we were keen to reinstate a field boundary that complimented the parkland. Hedges can help regulate the flow of water, reducing peak flows and the risk of flooding. They also help reduce the loss of soil and nutrients from fields by acting as a natural filter."

We invited the Cain Valley River Group to help us plant the trees. Getting the local community involved in the Catchment Initiative was key to its success."

Simon and Maggie Baynes, are also delighted with the new hedge. "If this hedge can help intercept and absorb what would otherwise be flood water on its way down the hillside, then that's good news for us, as it protects the topsoil, but also for everyone downstream, as it will help reduce flood risk. The hedge itself takes up very little space, but it does provide shelter and, in time, it will become a useful source of firewood."

Gwrych yn erbyn llifogydd ac erydiad pridd ar Stad Bodfach

Mae buddion coed, llwyni a gwrychoedd/perthi/sietynnau o ran rheoli dŵr wedi'u cydnabod ers tro byd.

Yn ôl yn 2009 bu Richard Dearing o Asiantaeth yr Amgylchedd (Cyfoeth Naturiol Cymru bellach) yn dyst i ddwr ffo'n llifo dros dir amaethyddol ar Stad Bodfach ger Llanfyllin, sy'n eiddo'n awr i Simon a Maggie Baynes.

Wedi'i arfogi â thystiolaeth ffotograffig, llwyddodd i sicrhau cyllid ar gyfer 225m o wrych â ffens ddwbl ar hyd terfyn cae presennol. Plannwyd tua 1,800 o goed a llwyni i gyd, yn cynnwys drain gwynion, drain duon, celyn a marchfieri gydag ychydig o goed derw mwy.

Fe ddarparodd y gwrych nifer o wasanaethau ecosystem gan gynnwys bwyd, safleoedd bridio a chysgod ar gyfer bywyd gwyllt, amddiffyniad ar gyfer priddoedd ac ansawdd y dwr yn Afon Cain gerllaw.

"Mae Bodfach yn lleoliad tlws", medd Richard, "felly roeddem yn awyddus i ailgreu gwrychoedd fyddai'n cydfynd â'r parcdir. Fe all gwrychoedd reoli llif dwr ffo, gan leihau'r llif brig a pherygl lifogydd. Fe allan nhw hefyd amddiffyn y pridd rhag cael ei erydu, gan gadw maethion trwy weithredu fel ffilter naturiol."

"Fe wnaethon ni wahodd Grwp Afon Cwm Cain i ddod i helpu plannu'r coed. Os oedd y prosiect yn mynd i fod yn llwyddiant, roedd yn bwysig iawn fod y gymuned leol yn cymryd rhan."

Mae Simon a Maggie Baynes, wrth eu bodd â'r gwrych newydd hefyd. "Os gall y gwrych hwn helpu i ddal ac amsugno beth fyddai fel arall yn llifddwr ar ei ffordd i lawr y llechwedd, yna mae hynny'n newyddion da inni, gan ei fod yn diogelu'r uwchbridd, ond hefyd i bawb i lawr yr afon, gan y bydd yn helpu i leihau'r perygl o lifogydd. Dim ond ychydig iawn o le y mae'r gwrych ei hun yn ei gymryd, ond mae'n darparu cysgod ac, mewn amser, bydd yn dod yn ffynhonnell coed tân ddefnyddiol."


Richard Dearing

Flooding at the Bodfach Estate in 2009. The hedge referred to in the text now runs along the lower edge of the large field you can see in this image, below the coniferous plantation.

Llifogydd ar Stad Bodfach yn 2009. Mae'r gwrych/perth y mae sôn amdano yn y testun bellach yn dilyn ochr isaf y cae islaw'r blanhigfa conwydd.

WTPL/Rory Francis

Scientific research has demonstrated the effectiveness of hedgerows and shelter belts at the Pontbren Scheme, Powys.

Mae ymchwil gwyddonol wedi dangos effeithiolrwydd gwrychoedd/ perthi a lleiniau cysgodol ar Gynllun Pontbren, Powys.

The Pontbren Group

The Pontbren Group comprises a group of ten farmers in the upper Severn valley who have worked together to develop a more sustainable way of farming. Restoration of woodland area and hedgerows by this group, supported by Coed Cymru, resulted in a reduction in surface flows after heavy rain. Collaborative investigations with a number of universities quantified the substantial benefits of planted trees in reducing surface water flows and flooding, as well as allowing banks and streambeds to consolidate thus aiding the recovery of streamside vegetation. Stream widths have narrowed significantly and pools and riffles have developed on stretches which were previously shallow and uniform.

Since 2001 members of the Pontbren Group have planted over 120,000 trees and shrubs, created or restored over ten miles of hedges and created numerous ponds. Now nearly 5% of the Pontbren land is woodland, pond and hedgerow.

Having planted many thousands of trees, the farmers observed that these had unexpected benefits in reducing water run-off from improved grassland. This led to a major hydrological research programme, which has provided important new evidence of the role of trees in flood control. The Pontbren results have shown conclusively that strategically planted, narrow, fenced shelterbelts of trees across slopes capture run-off from the pasture above and allow it to soak more rapidly into the soil.

Sub-catchments dominated by agriculturally improved land have higher flood peaks than those with more natural landscapes. However if tree shelter belts are located in the right places, reductions in peak flow of around 40% may be achievable

There is still a problem to overcome, however. Conventional agri-environment and woodland grant schemes do not have sufficient flexibility. As Roger Jukes, a founder member of the group, writes in the foreword: "We have had fun together and enjoyed bringing people to our farms to see what has been achieved. Our one abiding frustration is that we have not been able to make it easier for other farmers to follow our lead".

However, if the lessons of Pontbren are heeded there could be a transformation in the way the uplands of Wales are farmed.

Roger Jukes

Astudiaeth achos Grŵp Pontbren

Mae Grŵp Pontbren yn cynnwys grŵp o ddeg o ffermwyr yn rhan uchaf dyffryn Hafren sydd wedi gweithio gyda'i gilydd i ddatblygu ffordd fwy cynaliadwy o ffermio. Mae adfer coetiroedd a gwrychoedd gan y grŵp hwn wedi arwain, gyda chefnogaeth Coed Cymru, at ostyngiad yn llifeiriadau'r wyneb ar ôl glaw trwm. Mae ymchwiliadau cydweithredol gyda nifer o brifysgolion wedi mesur buddion sylweddol coed wedi'u plannu wrth leihau llifeiriadau dŵr wyneb a llifogydd, yn ogystal â chaniatáu i lannau a gwelyau afonydd sefydlogi a gan hynny helpu adferiad llystyfiant ochrau afonydd. Mae lled nentydd wedi culhau'n sylweddol ac mae pyllau a beisleoedd wedi datblygu ar ddarnau a oedd gynt yn fas ac unffurf.

Er 2001 mae aelodau Grŵp Pontbren wedi plannu dros 120,000 o goed a llwyni, wedi creu neu adfer dros ddeng milltir o wrychoedd ac wedi creu llawer o byllau. Bellach mae bron 5% o dir Pontbren yn goetir, pyllau a gwrychoedd.

Wedi plannu miloedd lawer o goed, sylwodd y ffermwyr fod iddynt fuddion annisgwyl wrth leihau dŵr ffo o dir glas wedi'i wella. Arweiniodd hyn at raglen ymchwil hydrolegol fawr, sydd wedi rhoi tystiolaeth newydd bwysig o'r rhan sydd gan goed wrth reoli llifogydd. Mae canlyniadau Pontbren wedi dangos yn bendant fod lleiniau cysgodi cul caeëdig o goed, wedi'u plannu'n strategol ar draws llechweddi yn dal dŵr ffo o'r tir pori uwchlaw ac yn caniatáu iddo socian i mewn i'r pridd yn gyflymach.

Mae gan is-dalgylchoedd sydd dan ddylanwad tir wedi'i wella'n amaethyddol benllanw llifogydd uwch na'r rheini gyda thirweddau mwy naturiol. Er hynny os caiff lleiniau cysgodi o goed eu lleoli yn y mannau iawn, fe all fod modd cyflawni gostyngiadau o tua 40% ym mhenllanw'r llif.

Mae yna broblem eto i'w goresgyn, fodd bynnag. Nid oes digon o hyblygrwydd mewn cynlluniau grant amaeth-amgylchedd a choetir confensiynol. Fel yr ysgrifenna Roger Jukes, aelod gwreiddiol o'r grŵp, yn y rhagair: "Rydym wedi cael hwyl gyda'n gilydd ac wedi mwynhau dod â phobl i'n ffermydd i weld yr hyn sydd wedi'i gyflawni. Ein hun siomedigaeth barhaus yw nad ydym wedi gallu ei gwneud hi'n haws i ffermwyr eraill ddilyn ein harweiniad".

Serch hynny, os rhoddir sylw i wersi Pontbren gallai fod newid llwyr yn y ffordd y caiff ucheldiroedd Cymru eu ffermio.

WTPL/Rory Francis

The area of new woodland created in Wales rose more than four fold between 2009/10 and 2012/13, from just 200 ha to 900.

Bu cynnydd pedair gwaith ym maint y coetir a greuwyd yng Nghymru rhwng 2009/10 a 2012/13, o ddim ond 200 ha i 900 ha.

Woodland creation on floodplains

Scientific models show that woodland located on floodplains can mitigate large flood events by absorbing and delaying their progress downstream. Research based on the River Cary in south-west England showed that a 2.2km reach of floodplain woodland could increase flood storage by 71 per cent delaying the flood peak progressing downstream. The impact of this is to reduce peak flooding and give longer to issue flood warnings[17].

This suggests creating strategically-placed floodplain woodland could help alleviate major floods downstream, anticipated to increase with climate change.

Creu coetir ar orlifdiroedd

Mae modelau gwyddonol yn dangos bod coetir wedi'i leoli ar orlifdiroedd yn gallu lliniaru llifogydd mawr trwy amsugno ac oedi eu hynt i lawr yr afon. Roedd ymchwil wedi'i seilio ar Afon Cary yn ne-orllewin Lloegr yn dangos y gallai hyd 2.2km o goetir gorlifdir fwyhau crynhoad y llifogydd o 71 y cant gan arafu penllanw'r llifogydd sy'n mynd ymlaen i lawr yr afon. Effaith hyn yw lleihau penllanw'r llifogydd a rhoi mwy o amser i roi rhybuddion llifogydd[17].

Mae hyn yn awgrymu y gallai creu coetir gorlifdir wedi'i leoli'n strategol helpu i liniaru llifogydd mawr i lawr yr afon, y disgwylir y byddant yn cynyddu gyda'r newid yn yr hinsawdd.

Urban tree planting

Interception by trees in urban areas can be critical in reducing the pressure on the drainage system[18] and lowering the risk of surface water flooding. Research has shown that trees can reduce surface water runoff by up to 80 per cent compared to asphalt[19]. The reduction in runoff, slowing the rate at which rainfall reaches the ground, increases the possibility of infiltration and the ability of drains to take away any excess water.

When combined with other measures as part of sustainable urban drainage schemes, trees have a major role to play in development of green infrastructure and flood risk relating to new development.

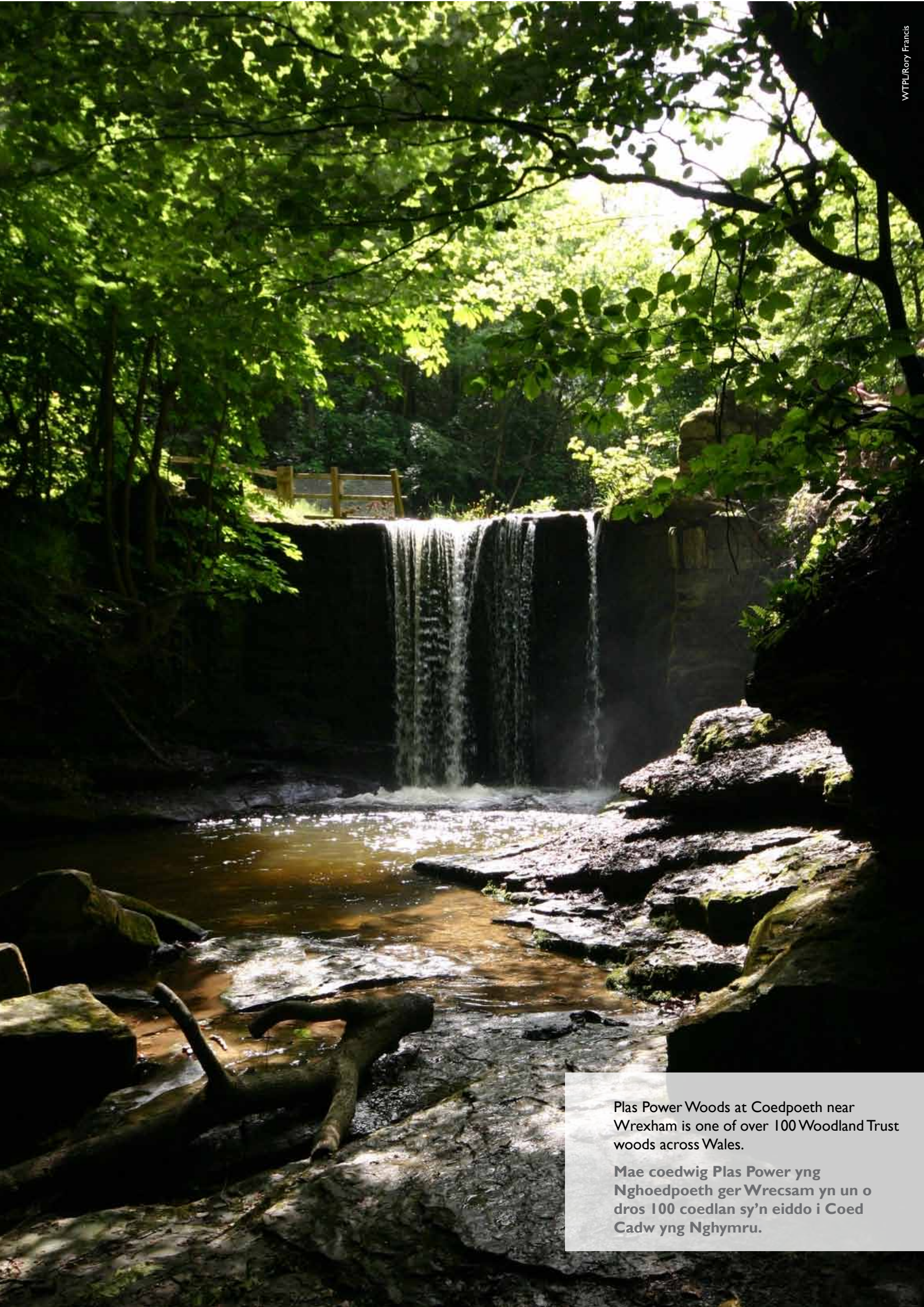
However, in many places although tree numbers have been maintained, there has been a decline in the numbers of older trees with large spreading crowns able to intercept more rain, replaced with smaller, alternatives[20]. These smaller crowned trees have a reduced capacity to intercept rain.

Plannu coed trefol

Mae dal dŵr gan goed mewn ardaloedd trefol yn gallu bod yn dyngedfennol wrth leihau'r pwysau ar y system ddraenio[18] ac wrth ostwng y perygl o lifogydd dŵr wyneb. Mae ymchwil wedi dangos y gall coed leihau dŵr ffo ar yr wyneb o hyd at 80 y cant o gymharu ag asffalt[19]. Mae'r gostyngiad yn y dŵr ffo, arafu'r gyfradd y mae glawiad yn cyrraedd y ddaear, yn cynyddu'r posibilrwydd o dreiddiad a gallu draeniau i fynd ag unrhyw ormodedd dŵr ymaith.

O'u cyfuno â chamau eraill fel rhan o gynlluniau draenio trefol cynaliadwy, mae gan goed ran bwysig i'w chwarae yn natblygiad isadeiledd gwyrdd a pherygl llifogydd mewn perthynas â datblygu newydd.

Fodd bynnag, mewn llawer o lefydd er bod niferoedd y coed wedi'u cynnal, bu lleihad yn niferoedd y coed hŷn gyda chorunau mawr ymledol sy'n gallu dal mwy o law, gyda rhai eraill, llai, yn cymryd eu lle[20]. Mae gan y coed hyn â'u corun llai lai o allu i ddal glaw.



WTPL/Rory Francis

Plas Power Woods at Coedpoeth near Wrexham is one of over 100 Woodland Trust woods across Wales.

Mae coedwig Plas Power yng Nghoedpoeth ger Wrecsam yn un o dros 100 coedlan sy'n eiddo i Coed Cadw yng Nghymru.

What needs to happen

Flooding costs Wales millions of pounds annually and untold misery for thousands of people. Increased risk of flooding as a result of changing land use and climate has worsened the problem. The Environment Agency Wales currently spends two thirds of its flood risk management budget on building and maintaining flood defences and they predict that this figure will continue to increase year on year.

Creation of strategically placed new woodland has been shown to mitigate the impacts of flooding as well as reducing the amount of pollution of watercourses.

If tree planting is to be effective a detailed understanding of the landscape is required. This comes through cooperation with farmers and land managers. The Pontbren Project is an excellent example of how local knowledge combined with environmental expertise can result in positive outcomes.

Earlier this year Coed Cadw (the Woodland Trust) launched a major petition to the Welsh Assembly, calling on the Welsh Government to reduce this risk by supporting the planting of at least 10 million trees over the next 5 years, creating hedges, tree belts and wooded areas targeted where they will best help soak up rainfall and slow down water runoff. This tree planting would count towards the 100,000 hectare tree planting target the Welsh Government has already set, to soak up CO_2 from the atmosphere.

Tree planting figures for Wales are still falling massively short of the 5,000 ha that is needed annually to meet the Welsh Government's target of creating 100,000 ha of new woodland over a twenty year period. The area of new planting in Wales during the last planting season was just 900 ha, up from 800 ha the previous year.

During 2013 Coed Cadw volunteers collected signatures at shows and events throughout the summer and autumn, such as the Royal Welsh Show and the National Eisteddfod. Thousands signed up.

It is clear that the people of Wales recognise the need for tree planting to help tackle the risk of flooding, and for the many other benefits it will provide.

It is time for the Welsh Government to match up to the task.

Yr hyn sydd angen iddo ddigwydd

Mae llifogydd yn costio miliynau o bunnoedd i Gymru bob blwyddyn a dioddefaint ofnadwy i filoedd o bobl. Mae mwy o berygl llifogydd o ganlyniad i ddefnydd tir a hinsawdd sy'n newid wedi gwaethygu'r broblem. Ar hyn o bryd mae Asiantaeth yr Amgylchedd Cymru yn gwario dwy ran o dair o'u cyllideb rheoli perygl llifogydd ar adeiladu a chynnal amddiffynfeydd llifogydd ac maent yn rhagweld y bydd y ffigwr hwn yn dal i godi blwyddyn ar ôl blwyddyn.

Dangoswyd bod creu coetir newydd wedi'i leoli'n strategol yn lliniaru effeithiau llifogydd yn ogystal â lleihau faint y mae cyrsiau dŵr yn cael eu llygru.

Os yw plannu coed i fod yn effeithiol mae angen dealltwriaeth fanwl o'r dirwedd. Daw hyn trwy gydweithrediad â ffermwyr a rheolwyr tir. Mae Prosiect Pontbren yn enghraifft ragorol o sut y gall gwybodaeth leol wedi'i chyfuno ag arbenigedd amgylcheddol arwain at ganlyniadau cadarnhaol.

Yn gynharach eleni lansiodd Coed Cadw (the Woodland Trust) ddeiseb fawr i Gynulliad Cymru, yn galw ar Lywodraeth Cymru i leihau'r perygl hwn trwy gefnogi plannu o leiaf 10 miliwn o goed dros y 5 mlynedd nesaf, creu gwrychoedd, lleiniau coed ac ardaloedd coediog wedi'u targedu ble byddant yn helpu i amsugno glawiad ac arafu dŵr ffo orau. Byddai'r plannu coed yma'n cyfrif tuag at y targed o blannu 100,000 hectar o goed y mae Llywodraeth Cymru wedi'i osod yn barod, i amsugno CO_2 o'r atmosffer.

Mae ffigurau plannu coed yng Nghymru yn dal i fethu o bell â chyrraedd y 5,000 hectar sydd ei angen bob blwyddyn i gwrdd â tharged Llywodraeth Cymru o greu 100,000 hectar o goetir newydd dros gyfnod o ugain mlynedd. Dim ond 900 hectar oedd yr arwynebedd o blannu newydd yng Nghymru yn ystod y tymor plannu diwethaf, i fyny o 800 hectar y flwyddyn flaenorol.

Bu gwirfoddolwyr Coed Cadw yn casglu llofnodion mewn sioeau a digwyddiadau gydol yr haf a'r hydref, megis Sioe Frenhinol Cymru a'r Eisteddfod Genedlaethol. Mae miloedd wedi arwyddo.

Mae hi'n amlwg fod pobl Cymru yn cydnabod yr angen i blannu coed i helpu i fynd i'r afael â'r perygl o lifogydd, ac er mwyn llawer o fuddion eraill y bydd yn ei ddarparu.

Mae hi'n amser i Lywodraeth Cymru fod cystal â'r gorchwyl.

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The Woodland Trust is calling on the Welsh Government and Natural Resources Wales to make woodland and trees their natural ally in protecting and enhancing the Welsh environment

Mae Coed Cadw yn galw ar Lywodraeth Cymru a Chyfoeth Naturiol Cymru i wneud y defnydd llawnaf posibl o goedwigoedd a choed wrth ddiogelu a gwella amgylchedd Cymru

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