



Sussex Flow Initiative Powdermill Catchment Natural Flood Management Project



**End of Year Report
2019/20**

Summary

Sussex Flow Initiative (SFI) – Powdermill is a Natural Flood Management (NFM) project formed in 2017, as a partnership between Sussex Wildlife Trust and the Environment Agency. SFI Powdermill works with landowners, local Flood Action Groups and others to create natural features designed to slow and store water in the landscape, creating drought resilience and helping to reduce flood peaks.

Our project aims to deliver multiple benefits for people and wildlife with everything we do, as well as showing how NFM can be used to support traditional flood management methods to help reduce flooding. We help to train people in how to install Natural Flood Management measures and to implement a range of NFM measures across the Powdermill Catchment, covering around 1,770 hectares; including 6.3km of main river, 4.2 km of secondary stream and 26.5 km of tertiary (head)stream in East Sussex.

The Powdermill stream runs between historic Battle to the north and Crowhurst village to the south. Undulating hills, wild flower meadows, ancient and ghyll woodlands are familiar characteristics of this landscape. The catchment is naturally steep and fast flowing and localized flooding to properties in Crowhurst has occurred regularly in recent years. Flooding is caused by storm and surface water run-off from the road network and urban surfaces, flooding from rivers and streams, and water backing up behind high tides at Combe haven. During times of high rainfall, too much water flows down the river too quickly, and creates flood surges which cause risks to people and property.

This year, Sussex Flow Initiative's NFM delivery has taken place upstream of 15 properties considered by the Environment Agency to be at 'very significant risk' of flooding. By working closely with landowners, local communities, and local authorities, SFI has influenced and delivered NFM throughout the Powdermill Stream catchment. This report highlights the project's achievements. This year we have :-

- Created additional washland storage of up to 2,000 tonnes / m³ (2,000,000 Litres!) per flood event. If there are 30 flood events then that could be 60,000,000L of water stored per year.
- Created an additional 15 tonnes / m³ (15,000L)¹ of flood water storage per flood event with our leaky dams. If there are 30 flash flood events a year, this could be 450,000 L (450 tonnes) of water a year.
- Potentially reached audiences of > 20,000 people with our NFM advocacy
- Trained at least 10 people directly in the installation of leaky dams.
- Advised and influenced at least 6 ha / 14.8 acres of land
- Had at least £7,749.14 of volunteer and in kind time dedicated to the project.

In addition to the delivery of NFM, SFI helps others to use and understand the approach, by sharing case studies, and our knowledge and experience with other organisations and individuals considering using NFM. By demonstrating best practice and disseminating our findings using a wide range of media, we help to positively influence the uptake of NFM throughout England and further afield. We do this through a combination of print (e.g. 'Wildlife' Sussex Wildlife Trust's magazine) and digital (websites, blogs, Twitter, YouTube, Facebook) media, as well as producing Case Studies of our major projects.

This year, the EA announced that they have been awarded funding for a 6 year, full time project officer to deliver NFM across the whole of the Cuckmere and Combe haven catchments (including the Powdermill catchment). We look forward to helping local communities to reduce flooding naturally through this project.

¹This is a conservative figure based on each leaky dam storing 1m³ of water. Many of the leaky dams we create are much larger however, and are holding water back across larger floodplains - so the true figure is likely to be a lot higher than this.



Farewell and thanks to our project officer Rina

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Introduction and project background

The Sussex Flow Initiative is an innovative project which shows how catchment-wide natural flood management interventions can help to reduce flooding for local communities, whilst increasing biodiversity and providing multiple societal benefits at a landscape scale. SFI works with the Cuckmere and Pevensey Catchment Partnership and others to install natural flood management (NFM) measures, and to recommend how and where to target them. Our NFM measures help to create resilience to drought, as well as to flooding.

Tree planting and other low cost NFM measures can greatly help to reduce flood risk in rural and urban lowland catchments, particularly when working alongside traditional engineered flood risk management. Although the effects of NFM such as tree planting can take time to show their benefits, multiple actions taken now provide cumulative positive benefits far into the future.

We use a range of NFM techniques to reduce landscape and community scale flood risk including: -

- Re-wooding and re-hedging hill slopes, and planting floodplain woodlands
- Restoring / re-activating river channels, meanders and floodplain washlands
- Providing advice on land use and controlling excessive run-off and erosion
- De-gripping (reversing drainage) of heathland, woodland and other land
- Increasing surface water storage i.e. in ponds and seasonal scrapes
- Using natural leaky dams and walls to slow down peak floods
- Using swales, permeable surfaces & rain gardens to capture & store run off

Different NFM techniques can be applied in different parts of the catchment, and by training up local people, we can create a legacy of more communities who are more resilient to flooding. With climate change, we are seeing weather which is stormier, more unpredictable and has increasingly intense rainfall, falling over shorter periods of time. Our NFM measures can help to adapt and buffer our river catchments to climate change, whilst providing multiple benefits to people and wildlife including flood regulation, carbon storage, pollination services, water purification, benefits to health and wellbeing, and local climate regulation.

Flooding in Crowhurst

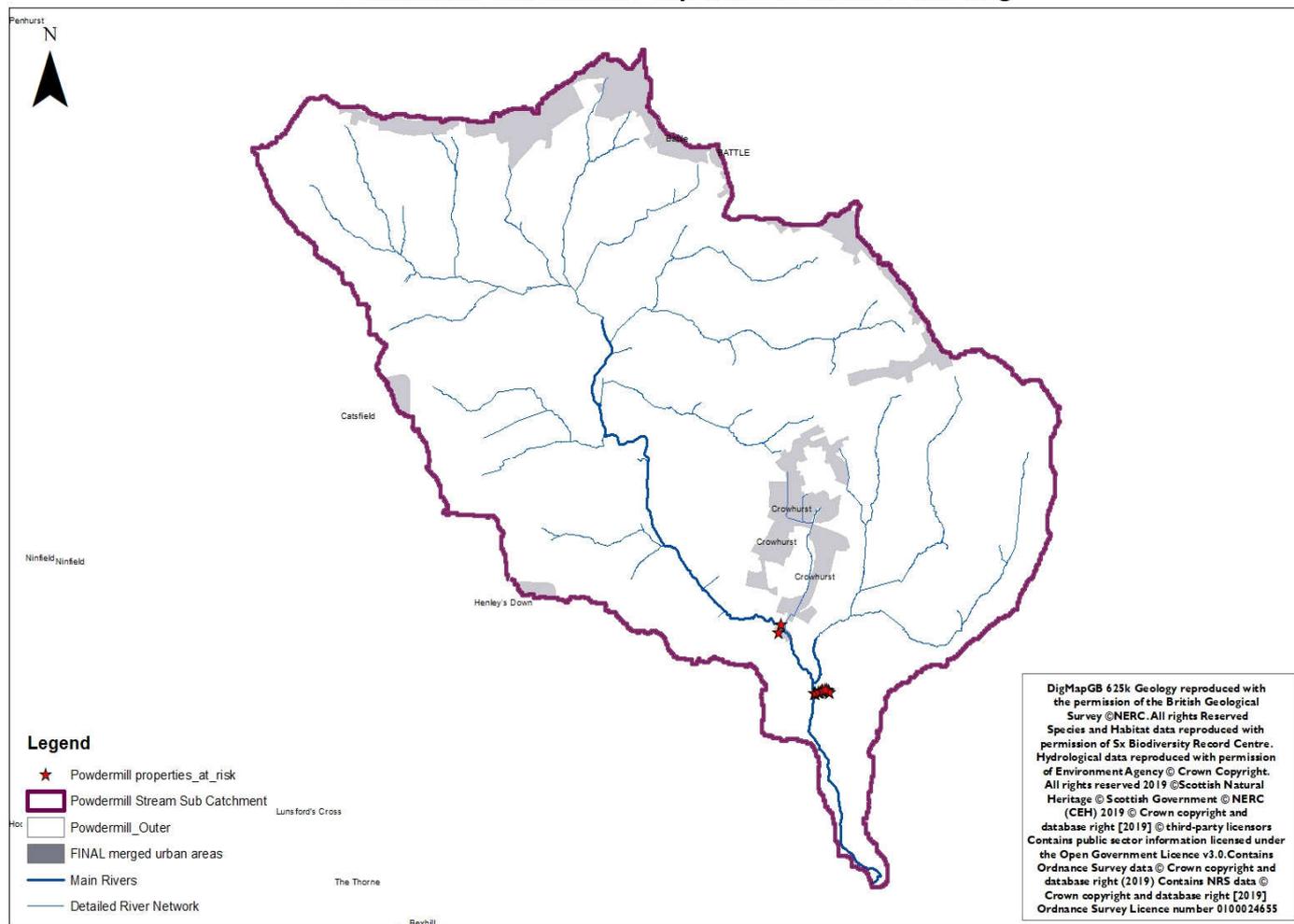
This year, the Powdermill catchment, along with much of the UK experienced some of the wettest weather on record, which left much of the countryside overflowing with water. Three consecutive storms (Ciara, Dennis and Jorge) brought with them the highest February rainfall since MET office records began - the previous record from 1990 being smashed.

Nine properties in Crowhurst flooded on March 5th, and came very close to flooding on a number of other occasions. There are 15 properties in the catchment noted as being at high flood risk. Flooding is distressing for all those whose houses and businesses are involved. With the frequency, intensity and unpredictability of rainfall and storms likely to increase, we are doing what we can to help the residents of Crowhurst and other villages to limit the scale and damage that each flood causes.



© John Feltwell 6 March 2020 Recreation Ground, Crowhurst

Powdermill Catchment Properties at Risk of Flooding



Powdermill SFI project achievements 2019 – 2020

Our project provides examples of best practice Natural Flood Management. Each year we carry out practical NFM works, with measurable benefits to reducing local flooding and increasing environmental and societal welfare. This year, we achieved the following :-

Washland restoration

Just below Powdermill lake in Powdermill wood, there is a highly canalised stream, piped under a footpath and through a weir. Below the weir, the stream takes a very man made right angle bend into a canalized leat. A bund along the leat, used to confine surplus flood water to the edge of the floodplain, keeping it within the wide and straightened leat, through which it flowed very quickly. The leat vastly limited the area in which floodwater could be naturally stored by preventing the water from flowing into a 1 ha + area of floodplain woodland.

At the same time as being counterproductive to flooding downstream, the leat was also funnelling precious seasonal water away from an area of rare tussock sedge wet woodland, subsequently drying out the woodland and damaging its wildlife interest.



Having checked that the bund wasn't historically significant, it took a few volunteers, a couple of hours to cut a hole through the bund. The overall cost of the work was a few biscuits, some fuel, some elbow grease and a Kelly kettle of tea. This is one of the cheapest NFM measures we have probably installed so far, with some of the greatest benefits. A small leaky dam was constructed in the leat channel, to help slow the flow and to encourage flood water over a certain level to flow through the open hole in the bund, and into the wet woodland (image above shows partially built leaky dam). Enough water was allowed to flow under the leaky dam to sustain this part of the stream and the habitats within it.

Now the water takes the line of least resistance, backing up behind the leaky dam and flowing through the new cut, into a natural washland storage area of over 1 ha in size. The results of just a few dedicated volunteers grafting to create natural flood storage in their local woodland were more spectacular than we could have hoped for. If only half a litre of water per second flows through the gap in the picture below (we estimate more), then about 43,000 litres of extra flood storage and slowing the flow is happening every day during a flood. The woodland can freely drain, so it is a natural sink, filling and emptying as floods arrive and abate.

If only 8" of extra water is stored across this 1 ha+ wet woodland site (we think it's a lot deeper), it is providing 2 million litres of additional natural flood water storage (or around 2,000 tonnes of water). Slower floodwater is less damaging, cleaner, and better for wildlife, as well as being better for people whose houses flood downstream in Crowhurst town. The image below was taken in December, before all the storms and major floods happened, proving that this simple and cheap NFM measure has already made a huge difference to flooding in Crowhurst.



This image shows the cut through the old bund in Powdermill wood (centre left), with the old leat (bottom right) still flowing, A simple leaky dam (bottom centre) backs flood water up so it flows through the cut in the bund. It is clear from the amount of water flowing through the gap into the woodland, how much water is being stored.

Leaky dams

By using strategically placed natural wood in streams, ditches and across flow paths, floodwater can be temporarily stored and slowed down during heavy rainfall events. Leaky dams fill and empty regularly, as floods come and go. Natural woody dams can be used to back water up and encourage it into small floodplains, where much more water can be stored, and greater surface roughness results in slower flows. Leaky dams can also help to remove sediment and other debris and pollution transported in water during floods.

In 2019/20 we installed 15 natural leaky dams, estimated to be storing around 1 m³ (1,000 litres) of water per structure during each rainfall event – or at least 15,000 litres of water.



Two of our leaky dams installed by Volunteers at Powdermill Woods this year.

Hedgerow & tree planting

Woodland and hedgerow planting forms a key part of our NFM delivery. We use trees and hedgerows to slow and intercept the flow of water across hill sides and floodplains, and to encourage greater infiltration and percolation of water into soils and groundwater. This year we didn't do much planting, but we finished off a couple of fencing jobs.



Advocacy

A core role of the Sussex Flow Initiative is to advise others on the best ways to use Natural Flood Management techniques. We provide support on flooding to the local community, and try to upskill and educate as many people as possible about NFM techniques and delivery. Our advocacy involves engaging with a wide range of stakeholders including landowners, local district, parish and county councils, the Environment Agency, eNGO's and many more.

Volunteers & local communities

It is important for us to empower communities to actively increase their resilience to flooding and climate change. Without the support of these local communities, landowners and volunteers, our ability to deliver NFM measures across the Powdermill catchment would be significantly reduced. In 2019/20 we received support from a dedicated team of enthusiastic volunteers from the local Powdermill Trust and Crowhurst Environment Group. This included :-

- More than 100 volunteer hours from at least 10 volunteers and staff of local organisations, including some highly skilled staff. Their time has a value to the project of £2,192¹
- Support from the local Crowhurst Flood Action Officer, of approximately 9 hours with an approximate value of £450¹
- Support from local Crowhurst Environment Group, of approximately 5 hours with an approximate value of £107.14¹



Total volunteer time - £2,749.14

Landowners

This year our landowner work was limited, but we still advised and influenced 6 hectares (14.8 acres) of land at the Powdermill wood. We also provided support to the Crowhurst Environment Group on their Parish Biodiversity Audit for Climate Change.

¹ Based on £150 per day for skilled volunteers and £350 for those with professional qualifications such as chainsaw licences. Unskilled volunteer hours are calculated at £50 per day. One day equates to 7 hours of working/travelling to site.

Working in partnership

Over the last year we have worked with a range of local and national groups and stakeholders including :-

- Charities (RSPB, Woodland Trust, Powdermill Trust)
- Local Crowhurst Environment and Flood Action Groups
- Statutory agencies including Natural England and the Environment Agency
- Landowners and land managers
- Lead Local Flood Authorities (Local Councils such as East Sussex County Council & Rother District Council)
- Water Level Management Board (Pevensey and Cuckmere)
- Catchment Partnerships
- High Weald Area of Outstanding Natural Beauty
- Universities and academic institutions

Total 'in kind' value provided by other organisations = minimum £5,000.

Leaky dam / River Habitat Workshops

Through leaky dam and 'behave like a beaver' days, we support, inform and upskill as many people as possible in the techniques and technicalities of how to install and implement Natural Flood Management measures. This year, our volunteer work parties and Leaky dam days have helped to upskill at least 10 people in NFM techniques.

Total – Minimum 10 people upskilled in NFM techniques

Events

To tell others about NFM and the SFI project, we lead and present at local and regional events including :-

- Cuckmere and Pevensey Catchment Partnership update – 20



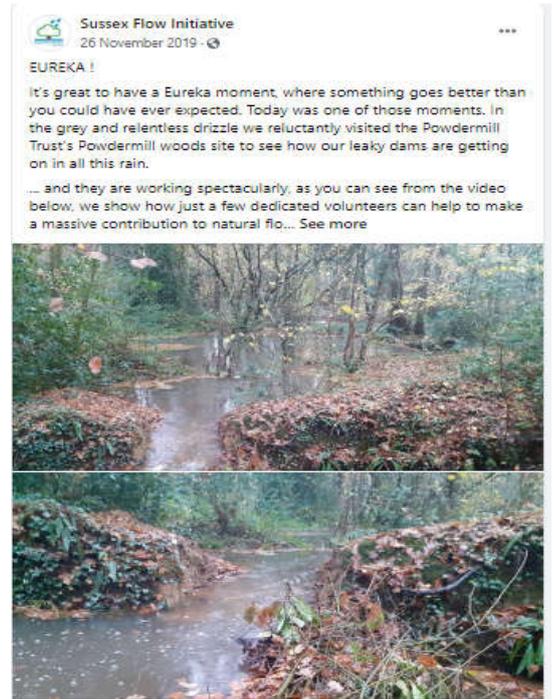
Total audience reached by events = 20 people.

Websites and social media

The Sussex Flow Initiative continues has an informative website, and a Sussex Wildlife Trust SFI page. We also contribute to a number of social media and social networking accounts. Our Sussex Wildlife Trust pages attracted over many views throughout the year, and the [SFI twitter](#) account and tweets resulted in many more impressions and views.

Our [Facebook page](#) has been growing in popularity, with some fantastic videos and examples of Natural Flood Management posted this year – for example this post on the [Powdermill dam busters](#). This post alone reached 371 people and had 108 engagements. Our video showing the dam working during a rainstorm, reached 61 people with 21 engagements.

Our project is also mentioned on the National Wildlife Trusts website : [Freshwater examples of our work](#).



Print Media



Every year we publish articles and blog posts about the work that we do. This year we have published the following :-

- [Something to Crow about](#) blog (SWT website)
- Article in Crowhurst News (see below)
- Crowhurst parish magazine



Sussex Flow Initiative: a year on the Powdermill Stream

Sussex Flow Initiative (SFI) is a community-based Natural Flood Management (NFM) project, which started working in the Powdermill Stream catchment in April 2018 (CN September 2018). That year we reached out to dozens of landowners and community residents to investigate how Natural Flood Management (NFM) can contribute to increasing the area's flood resilience, whilst also enhancing local wildlife and helping to drought-proof the landscape.

Our work in Fore Wood, supported by the RSPB, is now largely complete, with over 40 leaky dams helping to slow the flow of water and improve the microhabitat of the beautiful ghyll streams that run down the steep slopes into the Powdermill Stream below. Further leaky dams have been placed, with great support from the landowner, in an old quarry-turned-woodland at Sampsons Farm. We have also planted 1.5 km of native hedgerow across the catchment, which encourages greater percolation of water into soils and which helps to slow and intercept the flow of water across hill slopes and lower floodplains.

We estimate so far that our NFM measures will help to slow down and store at least 100,000 litres (around 100 tonnes) of water on every major rainfall event. More leaky dams and other NFM measures will take place across the catchment in Autumn 2019 to allow a break for bird nesting and other wildlife breeding seasons.

Two of the leaky dams constructed in an old quarry-turned-woodland at Sampsons Farm in the Powdermill Catchment

SFI Powdermill is a partnership between the Environment Agency and Sussex Wildlife Trust. If you would like to know more about this project, seek advice for your land or get involved as a volunteer, please contact sussexflowinitiativepm@gmail.com or visit our web page: sussexflowinitiative.org

Rina Quinlan
Sussex Flow Initiative

Sussex Flow Initiative case study:
Leaky dams & Washlands at Powdermill Wood
 Fran Southgate

Project summary



Powdermill woods Nature Reserve has been drying out in recent years, with negative impacts on its ecology. Significant opportunities were available to hold back flood water in the wet woodlands above and below a fishing lake, with further opportunities to open up floodplain washlands, so they can fill with floodwater during high rainfall. This would also help to reverse the ecological decline associated with the site drying out.

At least 50 opportunities to install NFM measures were identified in Powdermill wood. These include >

- 'Leaky dams' in ditches and streams, including gully stuffing and ditch top diverters
- Blocking surface water flow paths with brush bundles and other natural woody material
- Improving flood flow into washland storage areas

Background information

Powdermill wood is located 1 mile south-west of Battle, East Sussex, off the E2055, and a few kilometres north of Crowhurst. It is a privately owned woodland, made accessible to the public. This 61 hectare Nature Reserve is managed by the Powdermill Trust: a group of naturalists wishing to safeguard natural landscapes. As its name suggests, the site has a history linked to local charcoal and gunpowder manufacture. Because of historic land use, drainage channels divert scarce water around the edges of the site, so that the central site has limited water for much of the year.

Powdermill wood NR is designated as rare ghyll woodland, and includes patches of Ancient Semi-Natural Woodland. It is a good local example of tussock sedge, alder carr boggy woodland, with open fen and open pools, and is home to many different fern and sedge species. It is part of the larger Powdermill wood and lakes, which is a Local Wildlife Site (LWS), which has semi natural ancient woodland dominated by sweet chestnut coppice surrounding fishing lakes with areas of marginal alder carr habitat.

The site is within the High Weald Area of Outstanding Natural Beauty (HWN AONB).

Case studies

As part of our work to share best practice, we publish case studies on our SFI web pages. These case studies help to document the costs, benefits, partnerships and methods used to help reduce flood risk in local communities.

Each case study is tailored to an individual site, giving those who use them an opportunity to evaluate the implementation of NFM in a range of different scenarios. This year we published a case study on our washland and leaky dam work at Powdermill wood. Our case studies can be downloaded [here](#).

The Natural Capital of Natural Flood Management Report

This year, our partner project on the Ouse commissioned a report on the social and natural capital benefits of our Natural Flood Management projects. The report concluded that for every £1 invested in our NFM work, we deliver at least £2 multiple benefits in return. These benefits include Provisioning, Cultural and Regulating services, and include natural services such as pollination, flood water storage, water quality enhancements, green education and health and wellbeing benefits. Further information on the Natural Capital of Floodplains can be found [here](#), and our report from the New Economics Foundation can be found [here](#).

'Working with Natural Processes'

You can find out more about natural flood management measures and how they contribute to wider benefits for society in the Working with Natural Processes [evidence base](#), and [one page summaries](#).

Beavers are coming back to Sussex

The [ultimate natural flood engineers are returning](#) after over 400 years.

We are hugely please to announce that for the first time in over 400 years, beavers will be returning to the County. Under a 5 year trial licence from Defra, the beavers will be coming back to the Mole and the Adur catchments. The picture below us talking to the local TV channel at the release site.



Work by Exeter University shows that beavers have huge benefits for flooding, water quality and biodiversity – read more in their Science and Evidence report [here](#). In a 2.8 hectare plot in Devon, over 7 years beavers :-

- Created 650 m² of open water and increased water storage from 50 m³ to 1000 m³
- Reduced the flood peak by 30%, and increased the time it takes for floods to flow through the site from 15 mins to 1 hr
- Enhanced the summer baseflow (buffering against drought)
- There is 3 x less sediment leaving the site than entering it. They trapped 70 kg per m² of sediment - of which 70% entered the site as run off from just a 20 ha piece of land upstream.
- Reduced pollution – with 5x less Phosphate pollution leaving the site
- Increased frogspawn clumps from <20 to >600
- Stored around 15 tonnes of carbon in 13 ponds

In time we hope that these natural ecosystem engineers will be able to help us to prevent flooding issues in other catchments such as the Powdermill.

What's next?

We are pleased to announce this year, that the Environment Agency secured funding to pay for the Powdermill NFM project to be expanded to a full time post, across the whole of the Cuckmere and Combe Haven catchments. We have been working closely with the EA, High Weald AONB and Catchment Sensitive Farming Officers through South East Water, to set the project up which will go live in 2020, and will be funded for 6 years. It's a huge leap forward for the project, with additional staff time and money enabling us to deliver much more for natural flood management across a much wider landscape.

We look forward to starting and supporting this new partnership project soon.



Floodplain in the Coombe Haven

Appendix A.

UK NEA natural capital services supported by 3 main strands of SFI work

Ecosystem service	ES from SFI Semi Nat Grasslands / Washlands	ES from SFI Woodland	ES from SFI Fresh & Openwaters, Wetlands & Floodplains
Food	•	•	•
Water	•	•	•
Timber		•	•
Woodfuel		•	
Biofuel (incl Peat)			
Bioenergy			
Health Products			
Fibre			•
Species Diversity	•	•	•
Genetic Reserves	•	•	•
Disease and Pest Control			
Climate Regulation	•	•	•
Erosion Control	•	•	•
Water Regulation	•	•	•
Flood Regulation	•	•	•
Fire Hazard Regulation			
Air Quality Regulation	•	•	
Water Quality Regulation	•	•	•
Soil Quality Regulation	•	•	•
Noise Regulation		•	
Recreation	•	•	•
Tourism	•		
Aesthetic Values	•	•	•
Cultural Heritage	•	•	•
Employment	•	•	•
Spiritual Values	•		
Education	•	•	•
Sense of Place	•	•	•
Health Benefits	•	•	
Navigation			
	20	21	18