

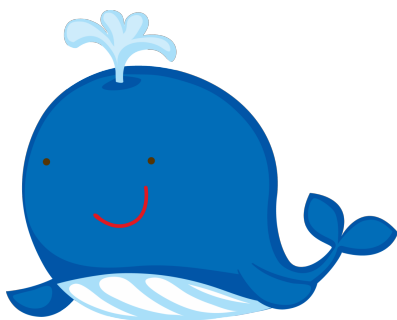
## Introduction

Without thriving Bio-diverse ecosystems humans do not have a sustainable future. How we see diversity, in all its forms, fundamentally reflects how we humans see ourselves and our home – the Earth. Biological or bio-diversity is defined by the *World Wildlife Fund* as the term given to the variety of life on Earth. It is the variety within and between all species of plants, animals and micro-organisms and the ecosystems within which they live and interact. Here is a link to a short clip which explains the issue of biodiversity very well - [https://www.youtube.com/watch?v=GK\\_vRtHJZu4](https://www.youtube.com/watch?v=GK_vRtHJZu4)

**The Physical Earth and all Living Organisms form a single self regulating system**



The Convention on Biological Diversity defines biodiversity as: "the variability among living organisms from all sources including, among others, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part; this includes diversity within species, between species and of ecosystems".



### How Whales Change Climate

Watch this clip of how interactive nature can be and how we need to consider our actions more carefully.

<https://www.youtube.com/watch?v=M18HxXve3CM>

## Genetic, species and ecosystem diversity

Generally, we speak of biodiversity as consisting of three levels – genetic, species and ecosystem.

1. An ecosystem is a part of the living planet such as a forest or a lake that functions on its own and as part of the overall system. A good rule of thumb is that the higher the number of species within an ecosystem the healthier and more stable the system is. When an ecosystem is polluted or degraded in any way (by logging, for instance) we say that it is 'stressed'.

2. The next level of diversity concerns the species level and this refers to the number of species that are supported by the ecosystem and which are in turn interacting to support the functioning of the overall system. An example would be the number of different insect species which exist in an oak forest in Ireland. Again, the higher the number of species and the relative abundance of each species is a reflection of the health of the ecosystem.
3. The genetic level of diversity refers to the variety of genes and inheritable characteristics within a given species population. This is important because it gives a species a greater chance of survival in the event of an environmental change or a disease outbreak.

We can see the reduction of the diversity within species for example in the food we buy in supermarkets – not all bananas or corn look the same!



Modern agriculture is based on very few varieties of food and nearly all of them have been developed to suit commercial needs of growers and supermarkets.

## Action!






When next shopping, take a look at the range of foods on offer and support biodiversity by purchasing different types of food. This is easier to do in a farmer's market where you can buy local produce that is often not very different looking but is from harvested seeds that have genetically adapted to local conditions over many years. In this way you are supporting biodiversity in a very active manner.

**The Living Planet Index (LPI)** is a population biodiversity indicator. It tracks the state of global biodiversity by measuring the population abundance of thousands of vertebrate species globally. Living Planet Indices show the average rate of change, over time, across a set of species populations. These populations are taken from the Living Planet Database, which now contains information on more than 22,000 populations. The latest index shows an overall decline of 60% in population sizes of mammals, birds, fish, reptiles and amphibians between 1970 and 2014. A 60% decline in the human population would be like emptying North and South America, Africa, Europe, China and Oceania.

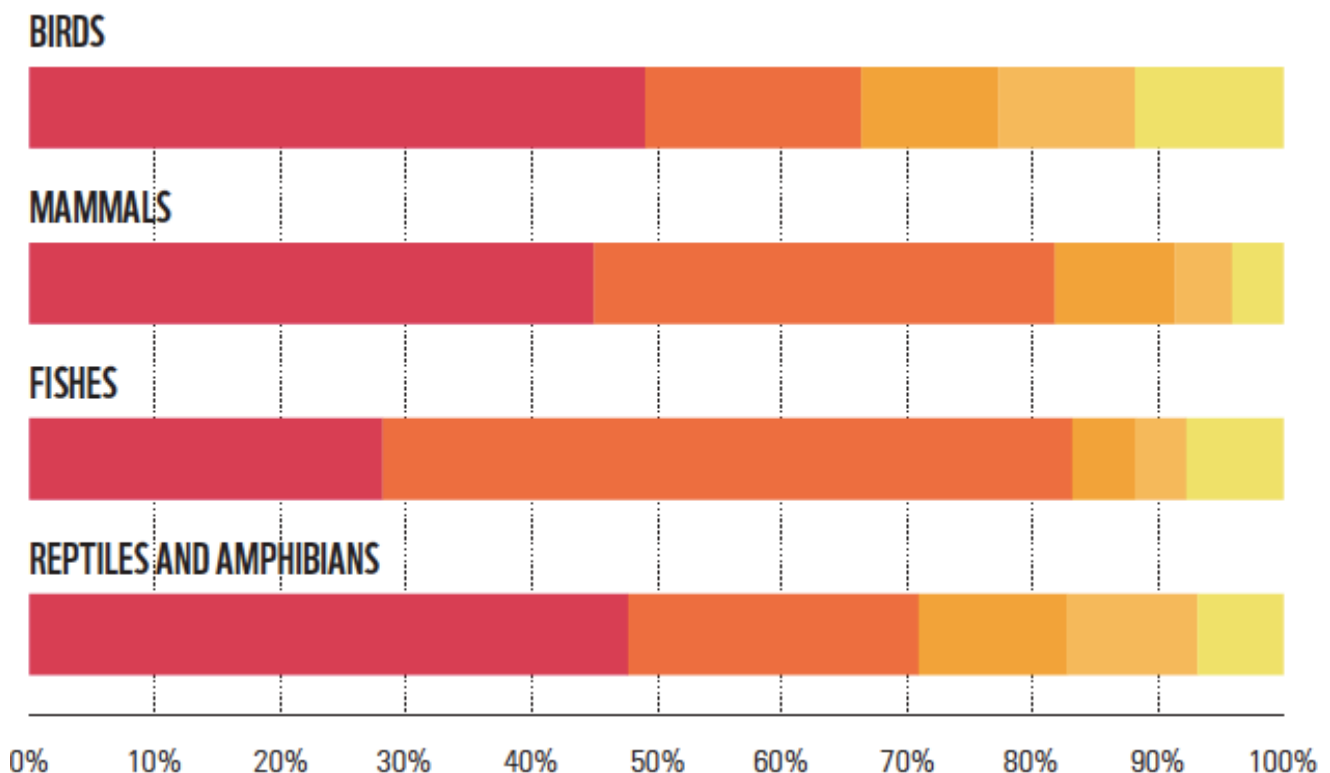
## What are the Threats and Underlying Drivers of Biodiversity Loss for Vertebrates?

In a recent paper, researchers writing in the journal *Nature* analysed the most prevalent threats facing more than 8,500 threatened or near-threatened species on the International Union for Conservation of Nature (IUCN) Red List. They found that the key drivers of biodiversity decline remain agriculture and overexploitation. Indeed, of all the plant, amphibian, reptile, bird and mammal species that have gone extinct since AD 1500, 75% were harmed by agricultural activity or overexploitation or both. According to the IUCN Red List data, whatever the threat category or the species, agriculture and overexploitation (fishing and hunting) are the 'big killers' with the greatest impact on biodiversity. Information about threats is available for just over a quarter of all species records in the global World Wide Fund for Nature (WWF) Living Planet Index – 3,789 populations. These threats are grouped

under five categories: habitat degradation and loss (agriculture, logging, and fishing), overexploitation (fishing, hunting, species trade), invasive species and disease, pollution, and climate change.

Key	Underlying Driver/Cause
 Habitat degradation/loss	Agriculture, Fishing and logging
 Exploitation	Fishing & Hunting
 Invasive species and disease	Trade, Zoonotic disease, pesticides, opportunistic diseases.
 Pollution	Agr, Energy, Industry, Transport
 Climate change	Ag, Energy, Industry, Transport

The below diagram shows how the threats impact different species.



In summary **the current food system drives 65 – 80% of Biodiversity Loss on Land and in the Ocean.** By Habitat Loss and Degradation from Agriculture and Fishing, and by Exploitation caused by Fishing, Hunting and the legal and illegal Trade in Wildlife. These also contribute to the other threats to biodiversity.

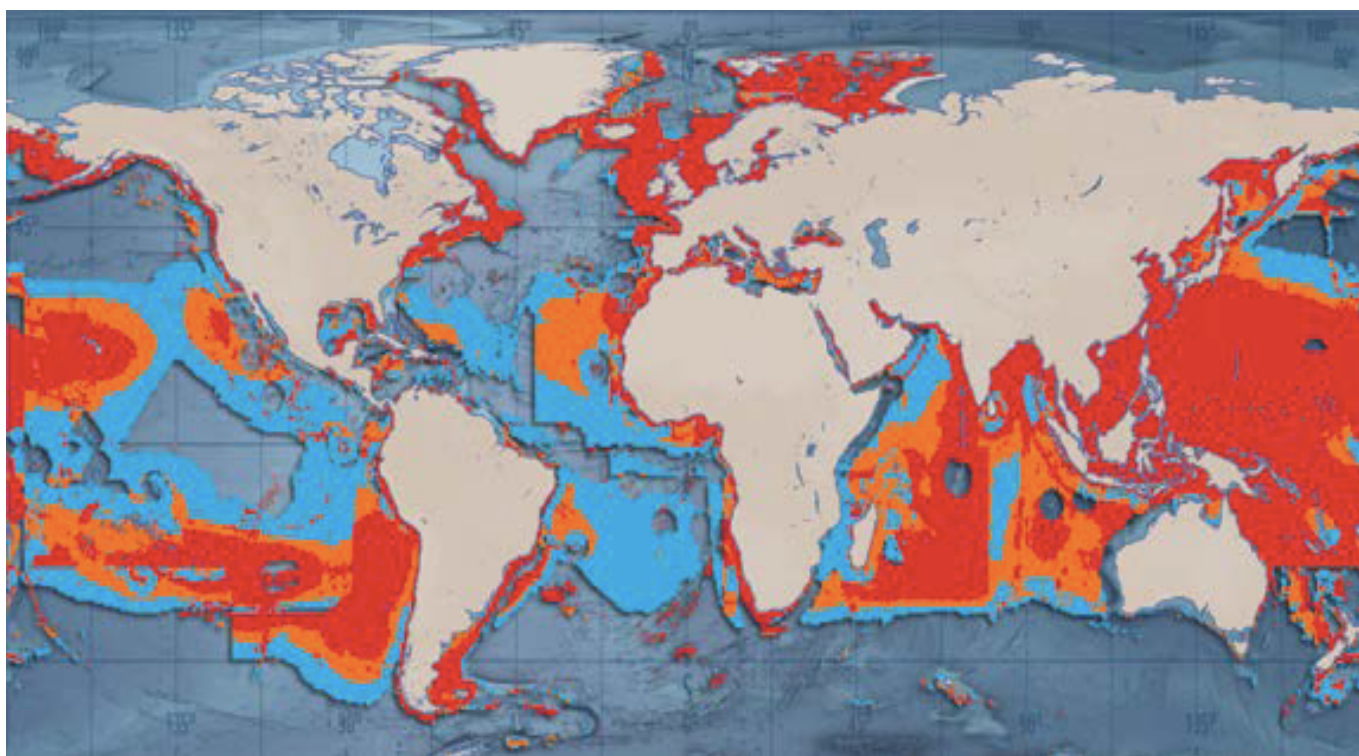
## Ocean Use and Biodiversity

In 2016, 91 Million tonnes (Mt) of wild caught species and 80 Mt of farmed fish were caught. 20 Mt of wild caught fish like mackerel, sardines and anchovies were converted to fish meal and fed to carnivorous farmed fish species ilke salmon. (FAO State of the Worlds Fisheries, 2018). According to



the WWF Living Blue Planet Report 2015 **Illegal Unregulated and Unreported** fishing is estimated to take 11-26 million tonnes of fish each year which is not counted in FAO estimates. **Bycatch** is estimated at 35% of the total catch but the actual level is completely unknown as all monitoring of fishing boats is voluntary. According to the FAO fish make up just 1% of the world's calorie intake.

The total area of the world's oceans that are fished has increased from **60 to 90 percent**. According to a The Location and Protection Status of Earth's Diminishing Marine Wilderness, 2018 today, "Earth's marine wilderness has been eroded by humanity, with 13.2% now remaining across the oceans." The result of all this is staggering. A recent study estimated that 90% of the large fish in the sea have now been killed. The global seabird population declined overall by a 69.7% between 1950 and 2010. Population trends of the world's monitored Seabirds 1950 to 2010, Published in 2015



Pauly et Al, 2011

Despite the huge negative impact of the fishing industry governments continue to subsidize the fishing industry by US\$35 billion per year, equivalent to around a fifth of the industry's overall revenue (Sumaila et al., 2013)

### Marine Plastics

Although fishing causes more than a million times more harm than plastic somehow it is the plastics that people are focusing on in the media. It turns out most of the plastic in the ocean comes from the fishing industry. In the only large scale ocean study to assess the types of plastic in the ocean it was found that abandoned fishing nets (called Ghost Gear because they continue to fish without people present) account for 46% of the ocean's plastics, "with the majority of the rest composed of other fishing industry gear, including ropes, oyster spacers, eel traps, crates, and baskets". (National Geographic Magazine).

## End Fishing Subsidies and Establish at least 50% of the Ocean as Marine Protected Areas

### Action!

We need to demand our politicians end subsidies for the fishing industry. Every December the Fisheries Ministers meet in Brussels to decide the fishing quotas for the following year. We need to campaign instead to completely end these damaging subsidies. At the same time we need to establish a coherent connected network of no-take Marine Protected Areas in 50% of the ocean. Watch these three excellent TED talks outline how we can get started;

### Action!

Sylvia Earle My Wish Protect [Our Oceans](#)

### Action!

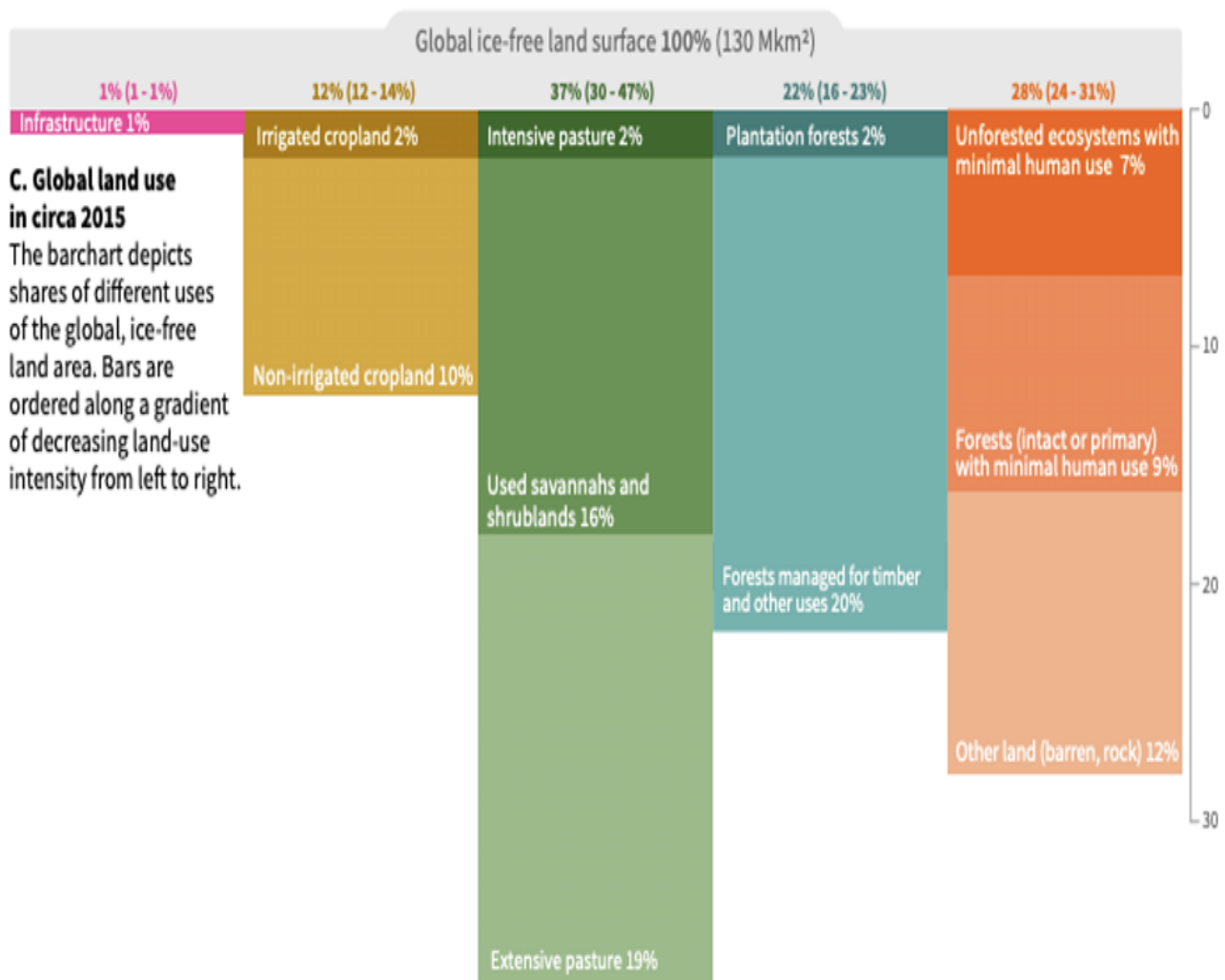
Enric Sala Glimpses of a [Pristine Ocean](#)

### Action!

Enric Sala Let's turn the high seas into the world's largest [nature reserve](#)

## Land Use & Bio-diversity

The food system occupies 42 – 61% of the land surface of the planet. A further 22% is used for logging. Only 16% of the planet's land is without human impact. Interestingly although indigenous people only make up 5% of the planet's population, they occupy and have some rights over 25% of its land. Within this land area 85% of the remaining biodiversity are surviving.



## Climate Change & Bio-diversity

Climate Change is also having a significant on Biodiversity. Climate and diversity in nature have been in a balancing act over the past 3,500 million years and on both a global and a local scale there is a balance that has been achieved. Life is very adaptive and handles change very well on the global level. Though local disasters happen and individual species become extinct, life itself continues. Biodiversity increases the stability of the ecosystems and thus is essential for the overall health of the living planet or 'bio-sphere'.

What is of major concern about the current changes is that the effect is being caused by human activity over an extremely short time frame of about 100 years. This does not allow for the systems to adapt without the risk of collapse. Make no mistake, life on the planet will survive – it just not might suit our individual and societal human needs very well.

## Conservation strategies



Conservation strategy on a global and national level is a complex science with multi-level stakeholders involved in drawing up agreements for maximum impact. So far they have failed to limit biodiversity loss though there has been some local successes. The issues involved are beyond the level of this course and we will concentrate on what we can do individually to restore biodiversity locally.

### Six minute Activity

With a partner, we will speak about some living being or plant that has an emotional resonance for you, that for some reason you feel connected to. This may be an animal, a habitat, a particular memory or even an unrealised dream of a place yet to be visited. Talk about why this is important to you and what you would miss about it if it was no longer available to you. When one of you is speaking the other is just listening – not asking questions but just paying attention. You have three minutes each.

## Citizen Science

*Citizen Science is the collection and analysis of data relating to the natural world by members of the general public, typically as part of a collaborative project with professional scientists*



There are a number of international, national and local citizen science biodiversity campaigns taking place around the country that you can get involved with.

### Coastwatch Autumn Survey

The **Coastwatch Survey** is designed to give an overview of the state of the coast. It involves volunteers from all walks of life checking their chosen 500m stretch of coast (survey unit) once around low tide, and jotting observations down on the survey questionnaire while on the shore. This citizen science work can be augmented with water tests. Data is then collected and pooled to provide a snapshot of the areas surveyed at that time – see examples from Ireland N and S below.

The Coastwatch survey was born in 1987 and has adapted over time with updates from paper maps to modern GIS and alignment to EU water law like the Marine Strategy Framework Directive, Water Framework Directive, Waste and Nature law. It takes in several countries all around Europe, with some common base questions that are identical and can be pooled for an European report. You can sign up to participate by following this [link](http://www.coastwatch.org) ([www.coastwatch.org](http://www.coastwatch.org))

### BirdWatch Ireland

The **Irish Garden Bird Survey** is BirdWatch Ireland's most popular citizen science survey, with over a thousand gardens taking part each year.

The **Countryside Bird Survey (CBS)**, coordinated by BirdWatch Ireland and funded by the National Parks and Wildlife Service, is one of our most important long-term surveys. Each summer hundreds of skilled volunteers, NPWS Rangers and BirdWatch Ireland staff survey breeding birds across the Irish countryside, allowing us to assess the fortunes of these birds and their habitats. You can find more information on these surveys on the Birdwatch Ireland Website <https://birdwatch.ie>

## Be part of Ireland's Pollinator Plan

A third of Ireland's bees are going extinct. The *All-Ireland Pollinator Plan* is about all of us, from farmers to local authorities, to schools, gardeners and businesses, coming together to try to create an *Ireland* where *pollinators* can survive and thrive. The first *Plan* covers the period 2015-2020 and a new version will be developed to cover 2021-2025.



### Tips for making your garden pollinator-friendly:

- ✓ Leave a section of grass uncut
- ✓ Grow some plants which flower in spring/autumn
- ✓ Allow some weeds to flourish
- ✓ Plant some fruit trees
- ✓ Encourage some pollinator friendly plants such as lavender, comfrey, buddleia
- ✓ Install some simple boxes for single pollinators

## Action!

Join a local project or initiative – these days there are a great many people who share our concerns with environmental degradation and this often means that there are projects that you can become involved with at a local level. Whilst the work of such projects is important there is also great support and motivation to be found when involved with these. Seek out such projects locally and become involved. There are loads of NGOs involved in many different initiatives. See <http://www.noticenature.ie/links.html> for some ideas. Join your local Tidy Towns group and encourage them to plant native species.



### Future Orchard Cork – Nurture the future

This is a project based near Glanmire and involves the shared ownership of one hectare of marginal land and the development of a heritage orchard and a small native woodland. The site also contains a cabin used for educational purposes. The project was started by a local woman who wanted to see the land preserved for the benefit of all. Shareholders agree to paying €100 per year for 10 years and this gives the project the development funding needed without resorting to loans or grants.

See [www.futureorchardcork.com](http://www.futureorchardcork.com) for more details.

## Action!

Tend your own garden – there is so much learning and understanding of nature to be had from becoming a gardener. Even if we live in an apartment we can do amazing work on balconies and also join an allotment scheme locally or support a local gardener who needs an extra pair of hands. This is a sure fire way of getting a better understanding of soil, plants, wildlife and climate. You might prefer to grow flowers – great - this will support the pollinators such as the bees and insects. Put a water feature in your garden to encourage diversity – even a small pond will harbour an amazing amount of wildlife.

⇒ See [www.allotments.ie](http://www.allotments.ie) for details in your area

The ‘grow it yourself’ movement has got branches in many localities around Ireland and is a great source of local information when you are starting a garden. See [www.facebook.com/GIYIreland](https://www.facebook.com/GIYIreland) for more information and help.

## Action!

Take care at home – there are many initiatives at home which can help give a focus to action for the environment, be that composting, waste reduction and recycling, repairing and mending products. The main thing is that you take action in whatever way you can and in a way that meets your interests and needs – don’t do nothing just because you can’t do everything, do something!

### Activity – feeling biodiversity!

Let’s take a final couple of minutes to ‘feel’ biodiversity. Sit comfortable in your chair and close your eyes. Imagine you are an aspect of the natural world you treasure. Inhabit that living being or plant or whatever it was you spoke about. Become it. Move in its world. Feel the flow of its energy. Visit its home – up in a tree, down in a burrow, wherever. Picture yourself now observing it going about its daily or nocturnal routine. Say hi, wink, smile. You are its guardian. Think about some representation of this which you have or would like – a drawing, a poem, a sculpture – and how you will place it somewhere at home as a daily reminder of your connection to this wonderful diverse world we live in.



## Ecological Restoration – A Case Study

The key to reversing biodiversity loss from agriculture is Ecological Restoration. In 2001 the owners of Knepp Castle Estate, just 45 miles from Central London decided to give up intensive farming on their 3,500 acres. It was a difficult, but unavoidable, decision; on desperately poor soil – heavy clay – they rarely made a profit and had worked up an eye-watering overdraft. Gradually nature started to return to the fields. One very important point in this project is pointed out here by the author: “The key to Knepp’s extraordinary success? It’s about surrendering all preconceptions, and simply observing what happens. By contrast, conventional conservation tends to be about targets and control, and often involves micro-managing a habitat for the perceived benefit of several chosen species.”



Before the transition showing what farmland looks like in Ireland and across Europe. (Isabella Tree)

They were also no longer willing to use the pesticides, fungicides and artificial fertilisers that had once seemed so essential. Thorny scrub – hawthorn, blackthorn, dog rose and bramble appeared in fields which, only a few years earlier, were blanketed with maize and barley. “Miles of hedgerows, previously cut back every autumn – thereby depriving birds of winter berries – have exploded into the welcoming earth, billowing out like a dowager liberated from her stays.”

“The first thing that strikes visitors is the noise: the low-level surround-sound thrumming of insects. Then the countless different bird songs: We walk knee-deep through ox-eye daisies, bird’s-foot trefoil, ragged robin, knapweed, red clover, lady’s bedstraw, crested dog’s tail and sweet vernal grass, kicking up grasshoppers, hoverflies and all sorts of bumblebees. On a good July day, I can count ten species of butterfly — we have 34 altogether, including the rare purple emperor — without moving from my



desk. At night, Knepp hosts an incredible 441 different species of moth. Meanwhile, more and more endangered species turn up every year — such as turtle doves, which are on the brink of extinction, and nightingales, whose numbers fell by 91 per cent between 1967 and 2007. Cuckoos, spotted flycatchers, fieldfares, hobbies, woodlarks, skylarks, lapwings, house sparrows, lesser spotted woodpeckers, yellowhammers, woodcock, red kites, sparrowhawks, peregrine falcons, all five types of British owl, the first ravens at Knepp in the past 100 years — the list goes on and on. The speed at which all these species — and many more — have appeared has astonished observers, particularly as our intensively farmed land was, biologically speaking, in dire condition at the start of the project.” – Extracts from *Wilding: The Return of Nature to a British Farm*, by Isabella Tree.



Photo of the same patch of land ten years into the project. (Isabella Tree)

### Websites and Further Information

The [National Biodiversity Data Centre](https://www.nature.com/naturedata) for information on Ireland’s biological diversity.

The [National Parks and Wildlife Service](https://www.npws.ie/) manages Ireland’s National parks and reports on the state of Ireland’s Biodiversity and Ecosystems. <https://www.npws.ie/>

Cork Nature Network <https://corknaturenetwork.ie/>

Irish Wildlife Trust, [www.iwt.ie](http://www.iwt.ie) Whittled Away, Padraig Fogarty, 2018

<https://www.facebook.com/greenspacescork/>

[www.wildwork.ie](http://www.wildwork.ie)

[www.biodiversityireland.ie](http://www.biodiversityireland.ie)

<http://www.biology.ie/>

[www.woodlandleague.org](http://www.woodlandleague.org)

[www.birdwatchireland.ie](http://www.birdwatchireland.ie)

## Action!

Check which of these actions you can engage with and commit to doing some of them this week.

ACTION	I WILL TAKE THIS ACTION BEFORE THE NEXT MEETING	ACTION TAKEN
Join a National or Local Environmental Group		
Lobby your politicians to end subsidies for industrial fishing.		
Lobby your politicians to convert subsidies for animal agriculture to plant based agriculture or payment for ecosystem services.		
Work to establish a network of no-take Marine Protected Areas in Ireland		
Make myself and household aware of projects in my area that foster biodiversity		
Decide on which project I will get involved with in some manner for my own enjoyment		
Re-imagine any growing space I have access to with biodiversity in mind – What is the plan/idea?		
Consider biodiversity in my buying habits – particularly around my food purchases		
Decide on one favourite aspect of biodiversity and commit to learning more about it – for example, owls, bees, ponds, heritage varieties, etc.		
Reduce the number of toxic substances I use in my household		
Explore short nature walks and projects close to home and visit them regularly		
Write a poem, journal piece or create an art piece that reflects your understanding of biodiversity		
Have fun with others – design a commercial which is to protect an insect/reptile/fish from exploitation! Explain why.		
If you have grass to be cut, raise the blade on the mower a little, this allows smaller creatures to survive the cutting process and for the grass to have stronger roots.		
Find a representation of the living nature you spoke about – a photo, a sculpture, your own drawing, a poem – and place it somewhere at home where you will notice it every day.		
<b>Thank you for participating in this course. You can find links to other resources and further information from each session at <a href="http://www.cef.ie/projects/greenerliving/">www.cef.ie/projects/greenerliving/</a></b>		