

streamscapes | x-stream

# DIY Catchment Guidebook

a DIY-guide to assessing & conserving your local waters, for Farmers & landowners,  
Tidy Towns & other community groups, schools, scouts, individuals

[www.streamscapes.ie/x-stream](http://www.streamscapes.ie/x-stream)



streamscapes  
the waters & the wilds



**"Never doubt that a small group of thoughtful, committed citizens can change the world...indeed, it's the only thing that ever has."**  
– Cultural Anthropologist Margaret Mead

### SAFETY FIRST!!!

The 'StreamScapes' programme involves a hands-on survey of your local landscape and waterways...safety must always be the underlying concern. If you are undertaking aquatic survey, remember that all bodies of water are potentially dangerous places. Slippery stones and banks, broken glass and other rubbish, polluted water courses which may host disease, poisonous plants, barbed wire in riparian zones, fast moving currents, misjudging the depth of water, cold temperatures...all of these are hazards to be minded! If you and your group are planning a visit to a stream, river, canal, or lake for purposes of assessment, ensure that you have a good ratio of experienced and water-friendly adults to students, keep clear of danger, and insist on discipline and caution!

Welcome to StreamScapes, a dynamic environmental education programme for schools, community groups, and individual citizens. Undertaking a StreamScapes project will give you a deeper understanding of:

- How your local (rural or urban) catchment environment functions
- How human activities impact upon natural habitats
- How high quality freshwater environments reflect wise landscape management
- How to achieve best practice in pursuit of livelihood and recreation, and,
- How your informed and active participation in environmental stewardship can improve the quality of life now and for those who will follow

This book, 'StreamScapes X-Stream', provides information in support of theoretical and practical Environmental Studies. It is intended for the use of Farmers and landowners and anyone interested in conserving their local waters, including Schools, Scouts or Adult Groups, such as Angling Clubs or Tidy Towns Committees. The website [www.streamscapes.ie](http://www.streamscapes.ie) offers further resources in support of your studies.



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Front Cover Photo: The Cooleenlemane Stream flows down from the Cork & Kerry Mountains

Back Cover Photo: Detail of fenced riparian buffer zone from front cover photo along the Cooleenlemane Stream

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## Intro

What is the 'X-Stream'? It is *your* stream; the stream or river or even drain or ditch which flows nearest to your home. Our landscape is covered and defined by all of these flows of water...and all of them have the capacity to support:

- Human Health (strong link between water & health!)
- Rich Biodiversity; birds, fish, mammals, amphibians, reptiles, trees, plants, invertebrates...
- Lower water treatment costs
- Higher value farm produce
- Amenity & aesthetics
- Commercial Fishing
- Angling & other tourism
- Carbon dynamics
- Climate amelioration
- Culture & Heritage
- Education & Learning
- Grassland habitats
- Erosion control
- Flood Risk alleviation

**Together with additional information on Biodiversity, this book is organised into 3 main parts:**

• **Awareness** • **Assessment** • **Action**

So first we'll look at the Water-Cycle and moments within it, like pollution and biodiversity and what makes for a healthy stream, then we'll go out and examine our own Stream & Catchment, and finally we'll get some ideas about WHAT WE CAN DO to conserve and enhance our own 'X-Stream'!

Though we can support you with a StreamScapes project, the beauty of it is that you can also do your own thing, and this booklet can assist you with that.

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# Catchments: Source & Mouth

"To protect your rivers, protect your mountains" - Emperor Yu, 1600BC

When you think of it, we all live in valleys, no matter how steep or broad, and all of our valleys have streams and rivers. From the hills above us to the sea below, these water courses make their way across our landscape and define the Catchment in which we live. Here a mountain stream runs swiftly and tumbles over waterfalls, there a wide river flows easily past green fields, through our towns, villages and communities and down to the sea.

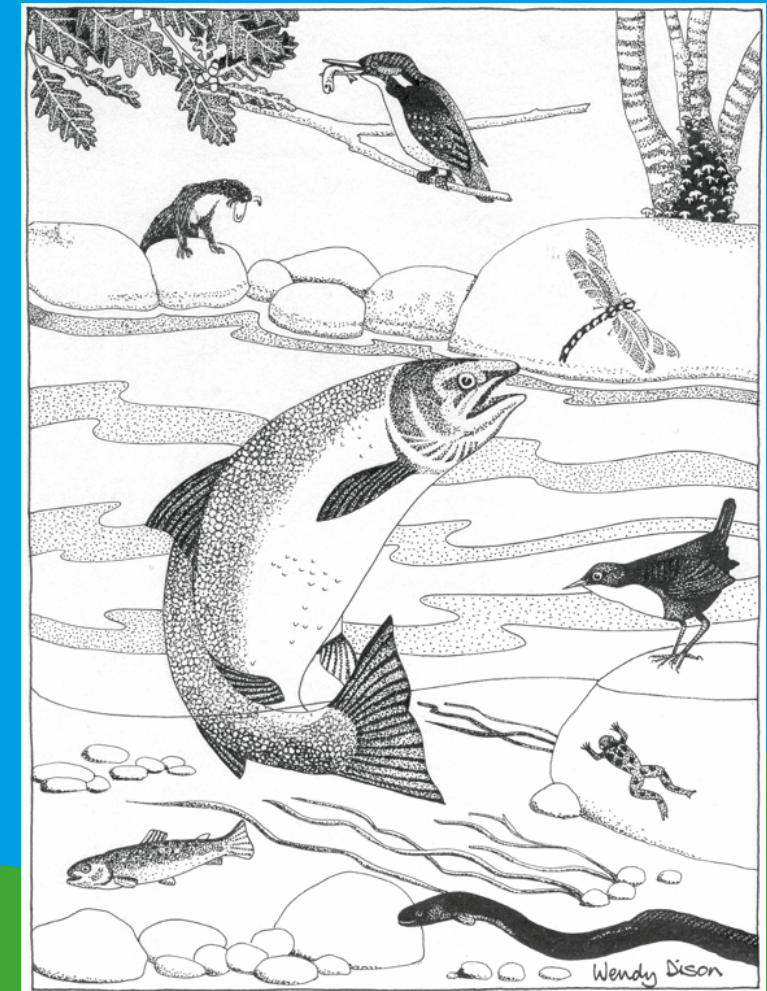
In that river, along its banks and into the surrounding landscapes may be found a wealth of biodiversity: fish, birds, insects, animals, trees, wild flowers, and people, but only if our waters run pure and clean. For our Catchment also contains our farms and factories, towns and toilets. We need all of these, but we must also come to understand how, as we work and play, or cook, clean and garden at home, we have a huge impact on water quality around us.

Our own Catchment is an appropriate scale on which to base our own environmental studies and participation. It's important to know about the Amazon and other BIG global environments, but the ecological processes of our own locality are what we are most connected with, and what we can have the most immediate impact upon. This is the rationale behind both 'Catchment Management' and the trend to localise the informed participation in the governance of our Catchments.

*"(Authorities)...suggested that local communities throughout the world may in many cases be able to successfully manage their own resources without the need for centralised authorities to take local decisions." - Von Korff, 2012*

While ensuring that our urban and rural communities achieve socio-economic sustainability, we also look at how we may achieve high-status waters and wilds; that is the aim of this book; to grow the awareness of our environment, our impacts, and our Catchment. So, for starters, what is the source of our river? Some say it is the spring that rises up near the county bounds, or maybe the lough in the valley over? But our river has many sources. Its sources include you and me, our showers and our sinks and even our selves, all contributing tributaries to the greater flow. If we can be aware of our impacts, and learn to minimise them, our rivers will remain pristine and support not alone that wealth of biodiversity but also healthy human communities. And what is the mouth of our river? Is it in the bay? Where it meets the sea? Maybe. Or maybe, as it cannot speak, we are the mouths of our river, singing its praises and sharing the wonders of what our stream, our river, is, and what it may be. So take the plunge here;  
Awareness, Assessment, Action.

It's *your* Catchment!



## Part 1: Awareness

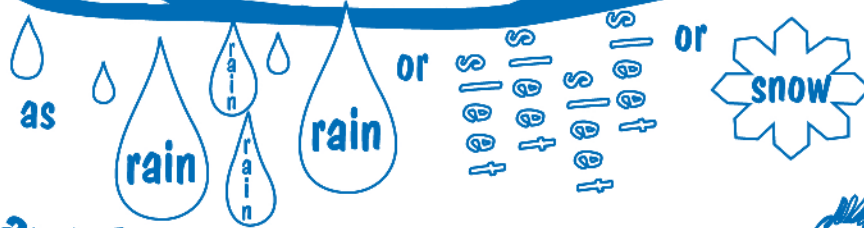
*Awareness is the beginning...in this chapter we take a tour of the Water Cycle and the elements within our Catchment which influence water & wildlife quality as well as our Community's health and well-being. This will help prepare us for the 'Assessment' and 'Action' chapters which follow...*



# WATER



falls from the clouds



and then begins its journey  
through streams and drains  
and lakes  
and rivers

to

the sea



Water begins its life perfectly clean  
but on its way it collects things



# But

that's only half  
the story - how  
does it get up  
there in the  
first place?



# And

what about  
people????

The water that's on the earth  
today is exactly the same  
water that was always here  
- no more and no less!

All these things need water -



(well ok, maybe not  
ginger bread people) (or dinosaurs)  
(but everything  
else)



Most animals  
need to drink every day  
(adult humans 2-3 litres)  
and die within a few days  
if they don't.

Some animals  
don't usually  
drink but get  
the water  
they need  
in their food



In the summer a big tree  
needs about 200 buckets-full  
of water EVERY DAY!

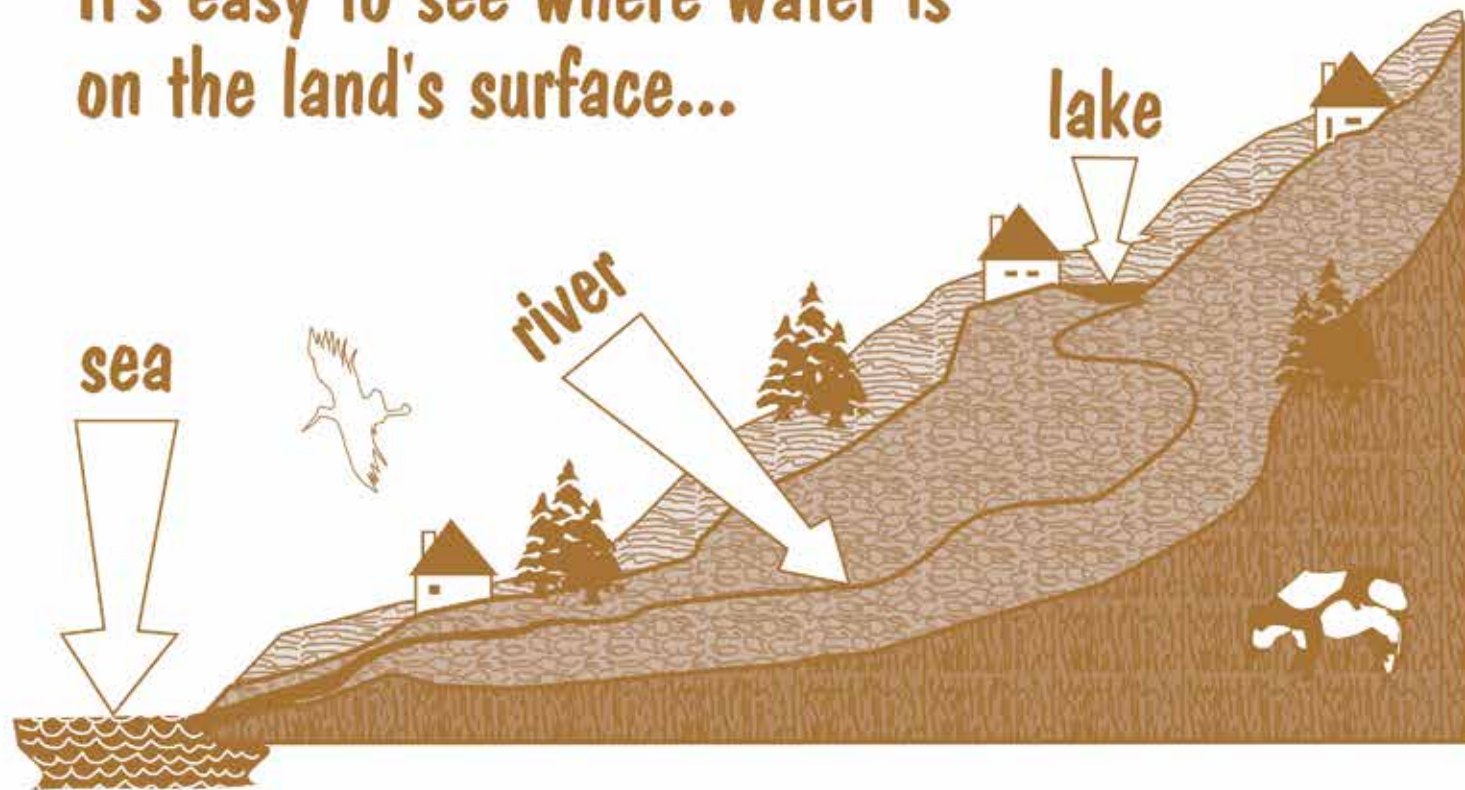
WATER OUT through tiny holes in the leaves.



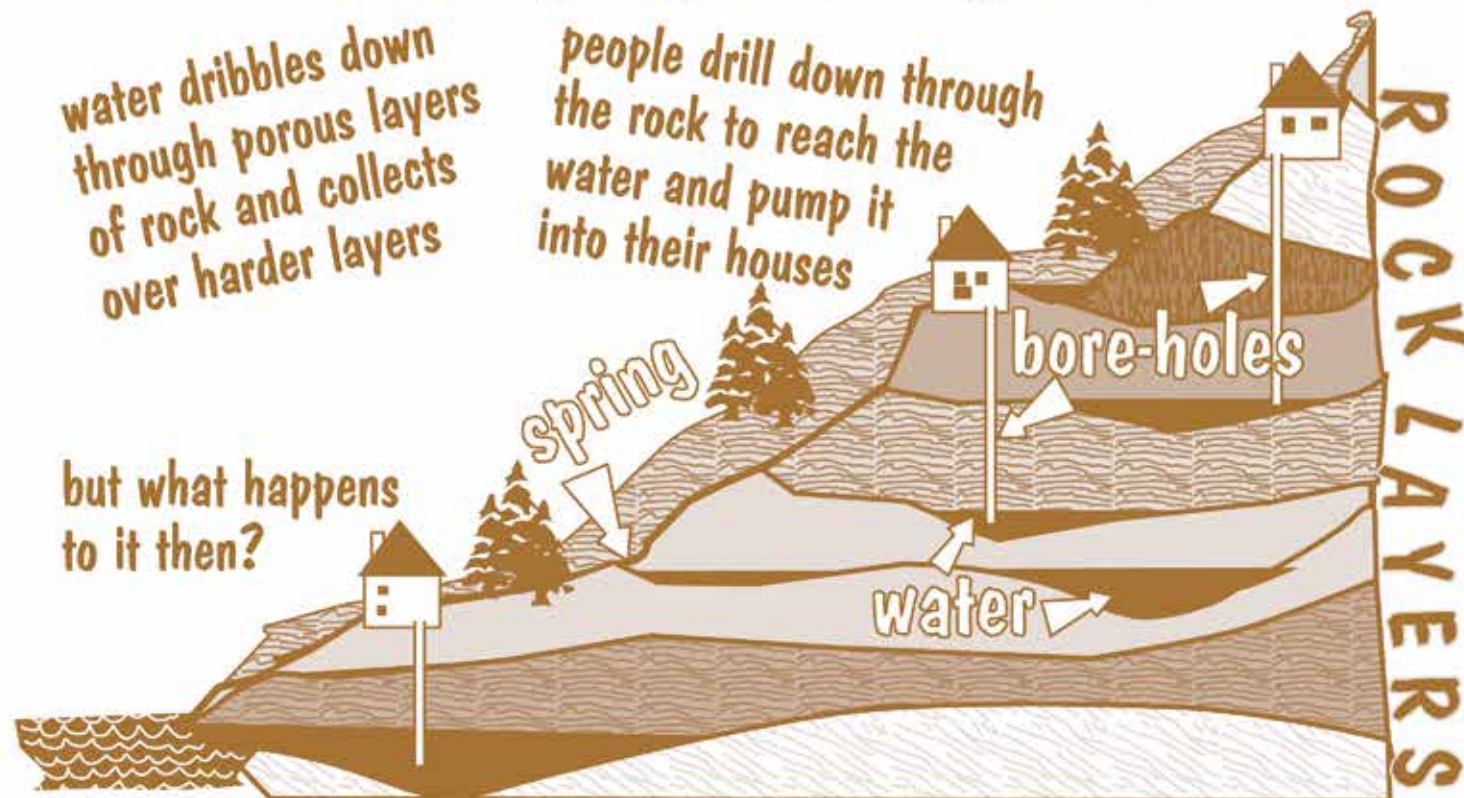
WATER IN  
through the roots



It's easy to see where water is on the land's surface...

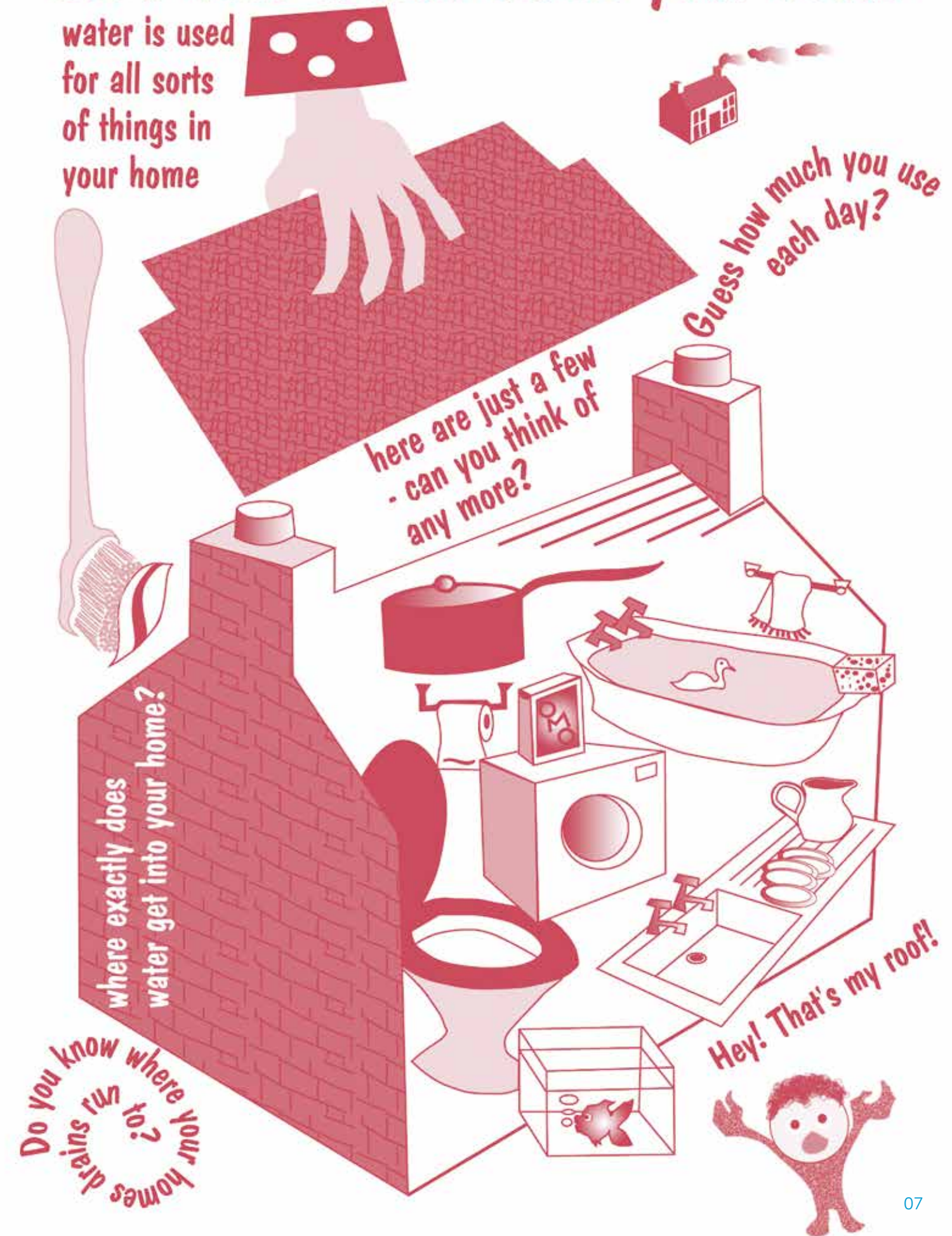


But there's a lot going on underground too...



Let's have a look inside your house

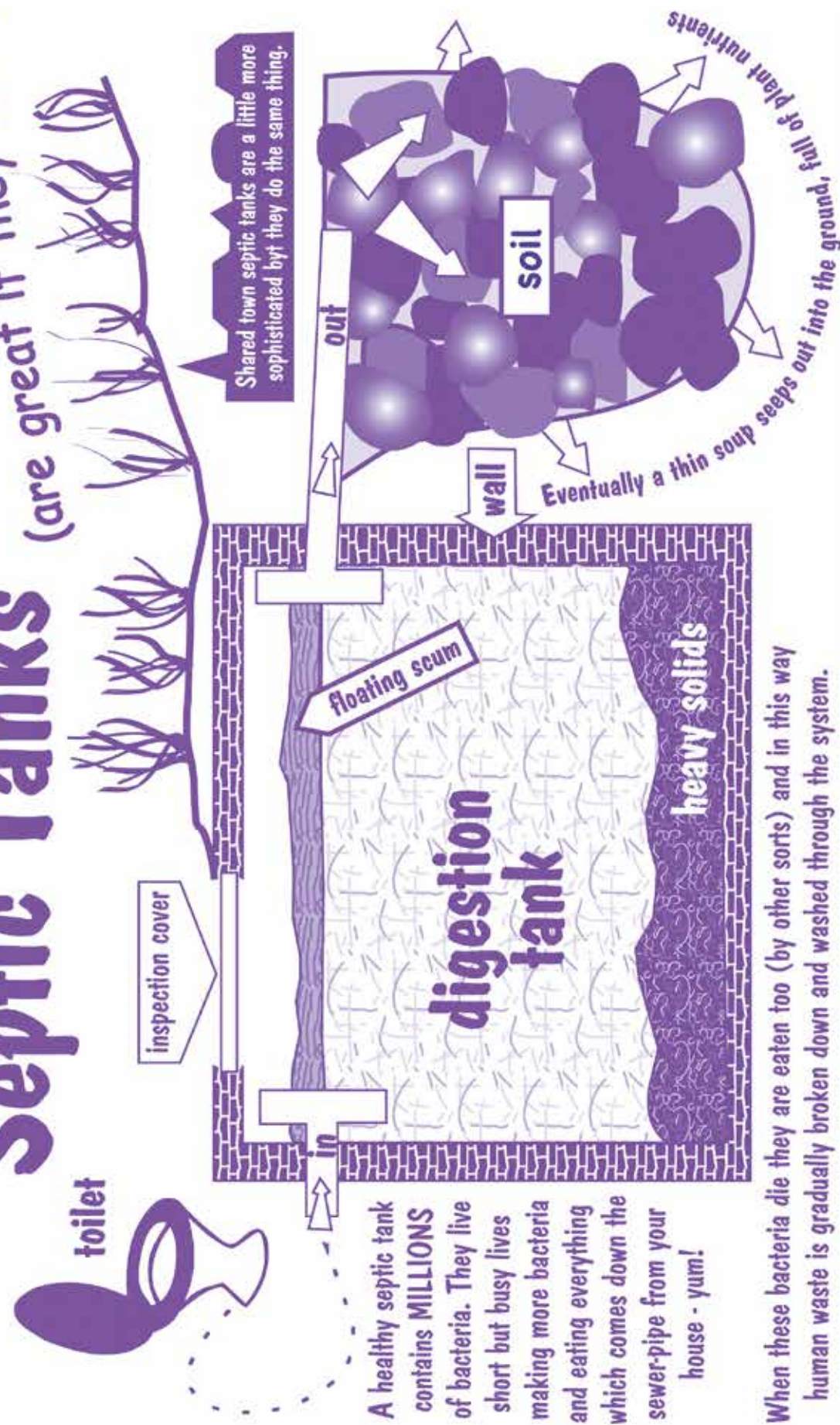
water is used for all sorts of things in your home





# Septic Tanks

(are great if they work!)



A healthy septic tank contains **MILLIONS** of bacteria. They live short but busy lives making more bacteria and eating everything which comes down the sewer-pipe from your house - yum!

When these bacteria die they are eaten too (by other sorts) and in this way human waste is gradually broken down and washed through the system.

**BUT** - the bacteria in your septic tank are sensitive little things and are killed by Bleaches, Toilet cleaners, Disinfectants etc.

# POLLUTION

In the past, people have used rivers and streams to dump their rubbish in.

They have cut down the trees on the river banks,

taken gravel from the river-bed,

piped streams through long, dark tunnels,

allowed fertilisers to wash in from the fields,

poured poisonous chemicals into the water

and taken out too many fish.

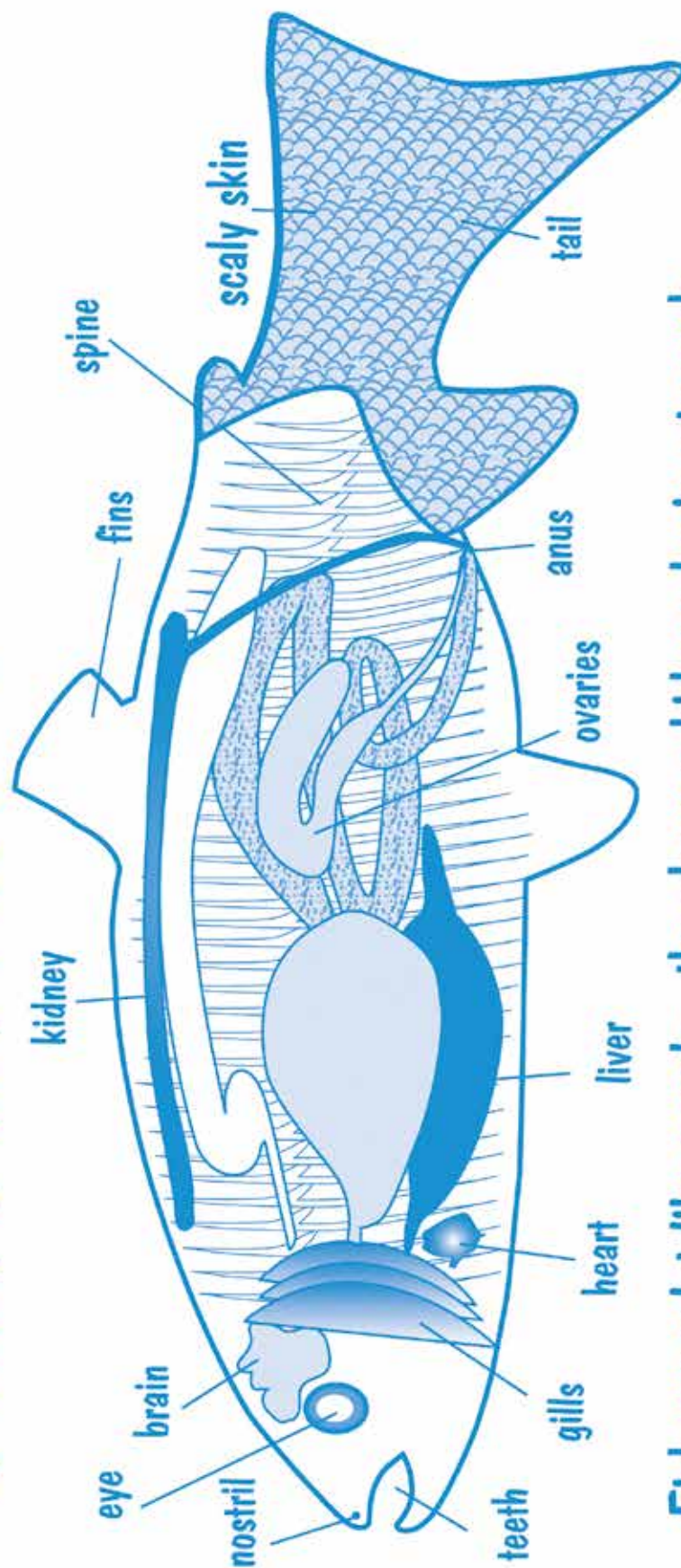
Not surprisingly, this has left lots of miserable smelly horrible-looking rivers!

**BUT** these days

everybody realises how important water is to all of us. If we respect our water systems then we can all have a happy healthy life in an interesting and exciting environment.



# FISH ANATOMY

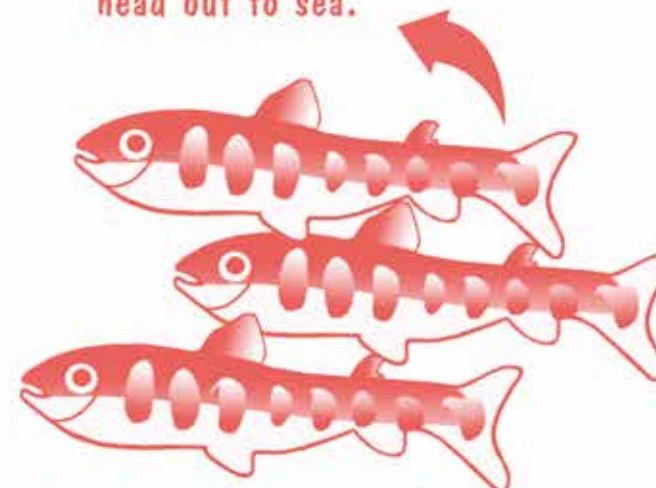


Fish are a lot like people - they have a kidney, brain, stomach, heart, liver, spine, intestines, ovaries (or testes), skin, teeth and eyes - even nostrils! Just like us!

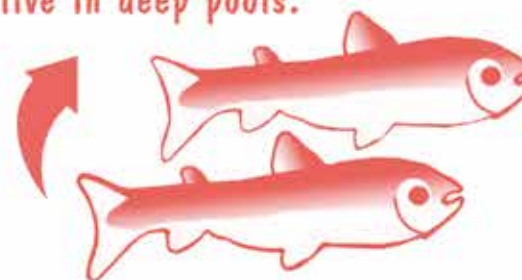


Smolts turn silvery, leave the river and head out to sea.

Adult salmon swim thousands of miles to spawn in the river where they were born



Parr have dark stripes down their sides. They swim in shoals and live in deep pools.



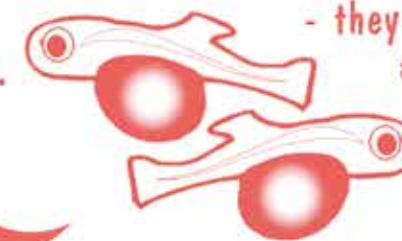
Fry have to find their own food. They have camouflaged, scaled bodies and large eyes.

The eggs are orange and the size of a small pea



If they are fertilised with sperm from the male, then the embryo inside develops.

Alevins have a yolk-sac - they are transparent and live amongst the pebbles on the stream-bed.



We are interested in Salmon and Trout (the salmonids) because they are the proof of clean water and a healthy habitat (- and they taste delicious too!).



# Salmon

## ALL LIVING CREATURES NEED

oxygen

good food

(and a lot need love and affection too!)

clean water

shelter

use their gills to take the oxygen they need from the water

but it has to be in the water first!

eat worms and insects and smaller fish

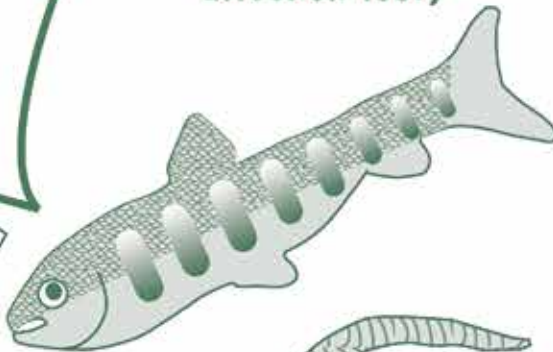
but what do these creatures eat?

need protection from the sun and from predators

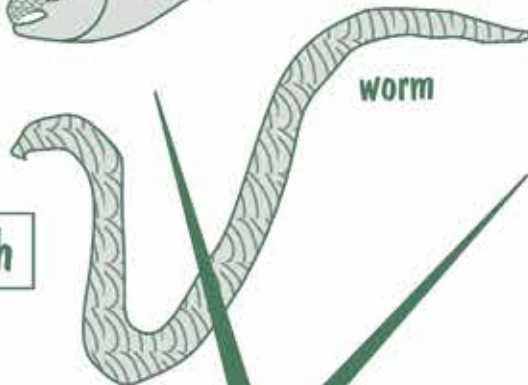
overhanging banks and vegetation, fallen trees

die as soon as the water they're in becomes polluted

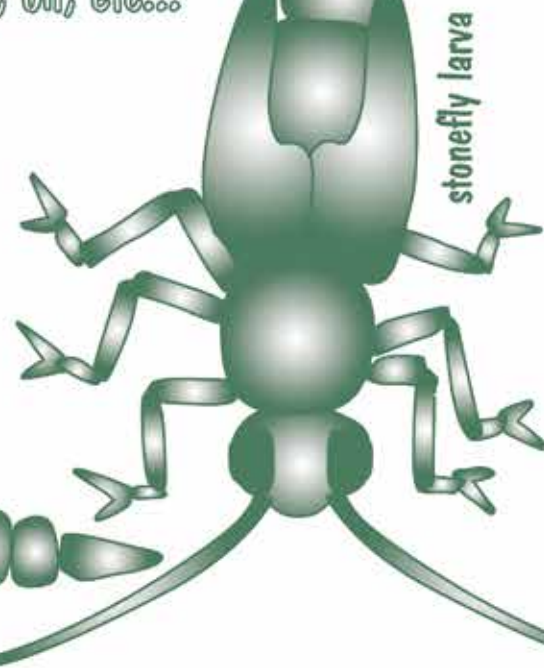
sludge effluent, rubbish, paint, oil, etc...



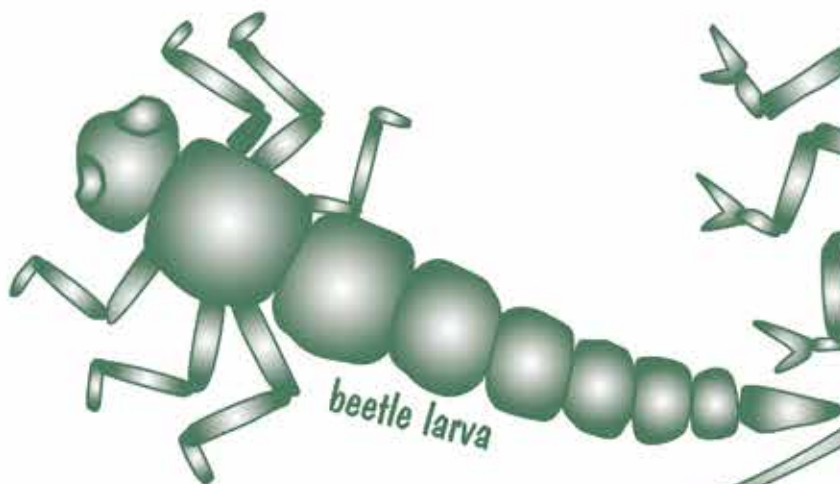
worm



stonefly larva

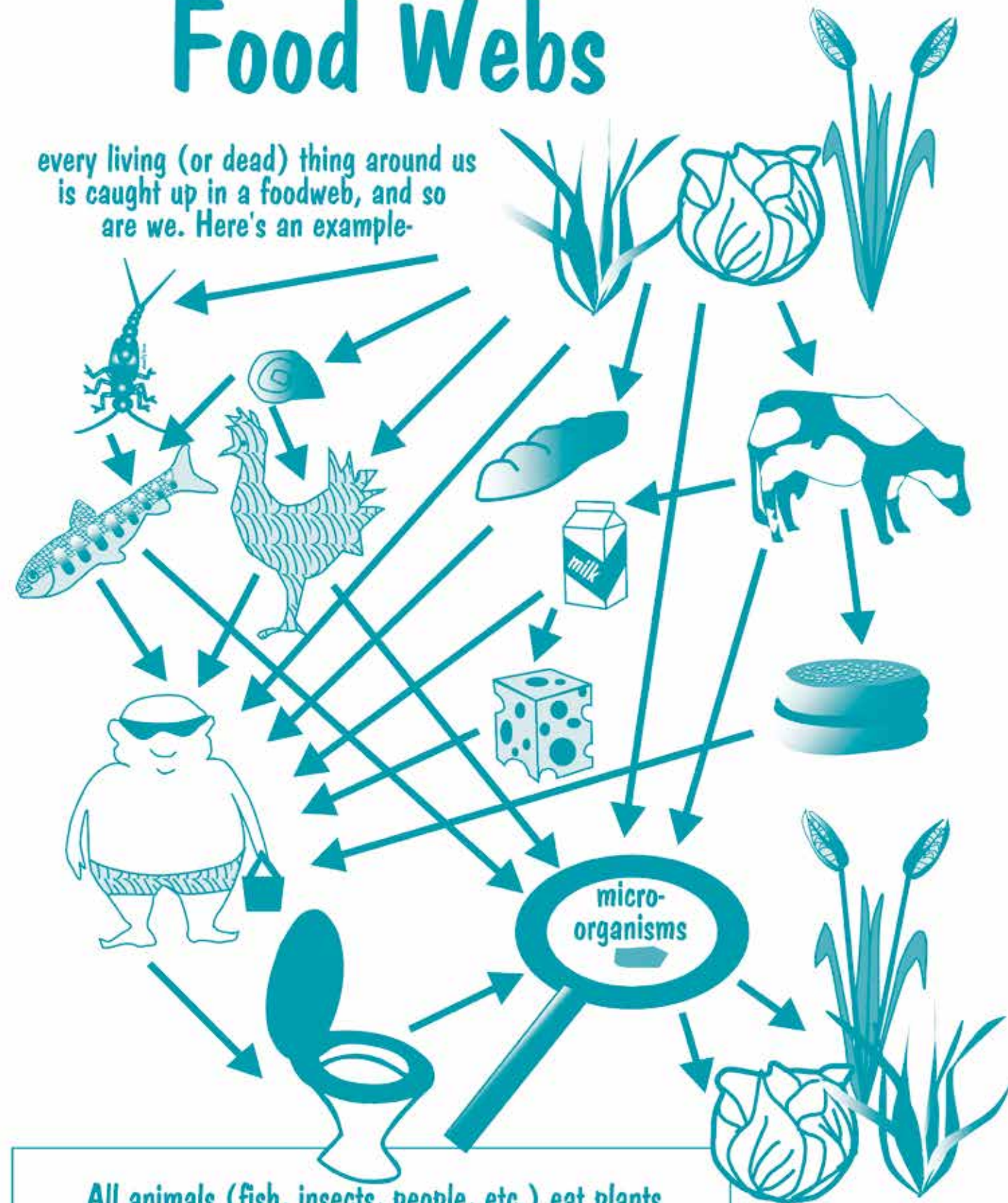


beetle larva



## Food Webs

every living (or dead) thing around us is caught up in a foodweb, and so are we. Here's an example-



All animals (fish, insects, people, etc.) eat plants - either directly (like cows, who eat grass), or indirectly (like lions, who eat antelopes who eat grass), or both (like people, who eat just about anything!).



# Healthy STREAMS and RIVERS have a huge range of plants and animals living in and around them.

They need deep sheltered pools for fish to hide in, but they also need shallow fast-flowing areas where air can mix with water.

Overhanging plants provide shelter and food for insects and birds.

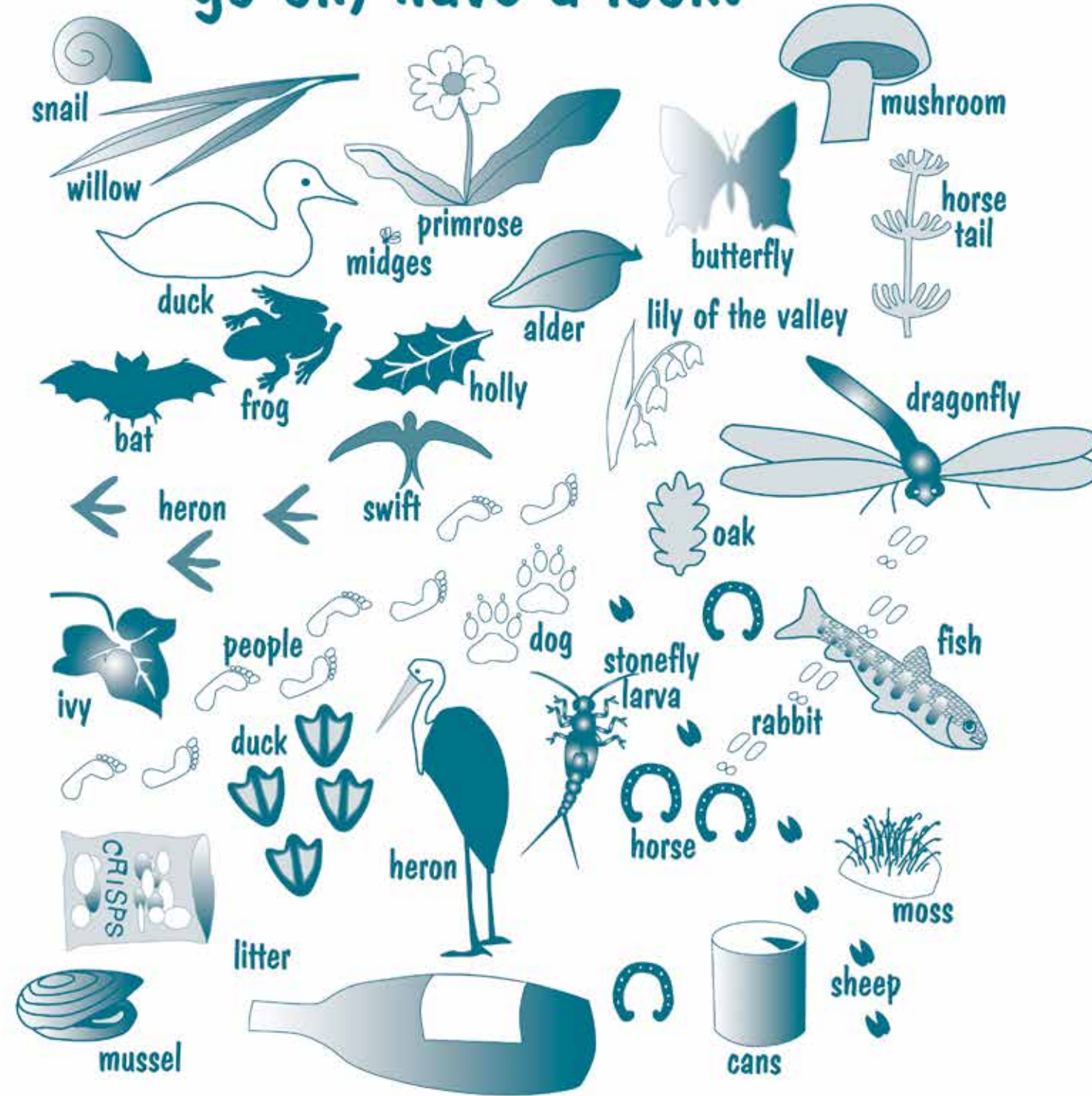
The stream-bed will be scattered with stones of different sizes, as well as dead leaves - food for micro-organisms and bigger animals.

Algae and mosses grow on the stones - food for snails and insects.

Large destructive animals like cows will be kept away.

It's ok to go fishing in a healthy river - as long as plenty of fish are left to breed.

## So, how's your stream? go on, have a look!

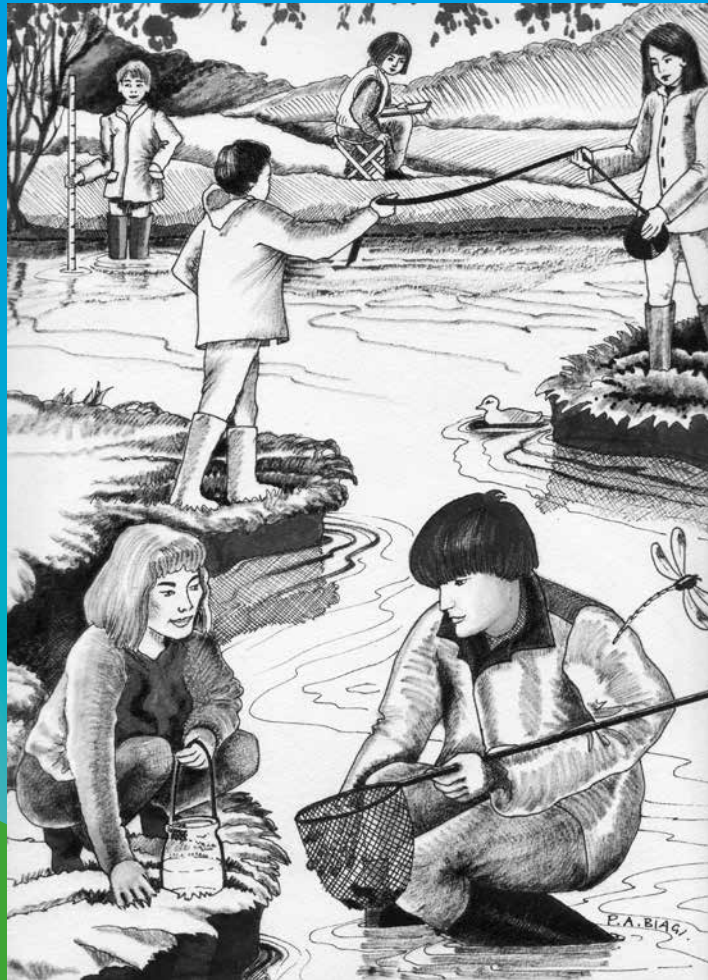


## here are a few things you might find - what else can you see?



# Introduction to Assessment

You have read Part 1: Awareness. Though you may already have been aware of a lot of this information, hopefully it has refreshed your knowledge of the Water Cycle as well as the wonder of Food Webs and Salmon Life-cycle. Thus informed, you are now ready to commence the Assessment Section. Catchment Assessment is divided up into four areas, with accompanying Worksheets. There is no reason to be intimidated by any one area of assessment... go as shallow or as deep as you wish. The range of assessment exercises and activities portrayed in this book is intended as a Menu from which to choose. Ignore areas which you find to be beyond your competence. The aim is to acquaint yourself (and others, if you are working with a group) with a basic knowledge of the workings of your local catchment; geology, topography, demographics, industry, land-usage, vegetation, wildlife; and how these elements shape the status of your local freshwater resource and its inhabitants. You may be surprised at how much you already know, individually and as a group. Acquire relevant maps (as detailed as possible). Seek permission for access to your survey sites. To help you assemble a portrait of your local Catchment, invite local expertise in to address your group; representatives of local authorities, farming organisations, forestry, industry, Fisheries Officers, environmental groups, historians...anyone who you believe would assist you in enlarging your understanding of relevant issues. When you reach a point in your assessment that you are satisfied with, then you may wish to publish your project, both in hard copy form as with a report, which could be lodged in the local library or a press release for a local paper, and send it to us at [streamscapes@eircom.net](mailto:streamscapes@eircom.net).



## Part 2: Assessment

*What are the elements that influence human health, water quality, biodiversity, and economics of our Catchment? By examining a number of key parameters, in this chapter we will 'get a feel' for our Catchment's capacity to support all of these functions, and this will assist us in determining what Actions we can take...*

### So, the main points:

- The aim is to get a basic working knowledge of your catchment
- If you are working with a group, allow people to work to their strengths (aptitude)
  - Obtain relevant maps and permission(s)
  - Enlist local expertise in your assessment activities
- Use the responses in your Worksheets to produce a Project Report
  - Publish your report (and send us a copy...we'd love to see it!)





# 2a: Catchment Earth, Water, Air & People

(Geography, Geology, Land- and Water-use Patterns, Demographics, History, and Mythology)

Here we set the scene by looking at our wider catchment; geography, geology, present and historical human activities... We shall assemble a picture of how these elements come to influence the state of our freshwater resource, our wildlife habitats, and ultimately, our own quality of life.

**Geography** (What is the nature of the landscape around us? What are the names? Where are these places)?

- 1) River/Stream Name: \_\_\_\_\_
- 2) Wider Catchment: \_\_\_\_\_
- 3) Catchment Area (km2): \_\_\_\_\_
- 4) Describe the nature of the catchment (hilly, flat, lakes, fast- or slow- moving river...): \_\_\_\_\_

- 5) Source of River/Stream: \_\_\_\_\_
- 6) Highest Peak: \_\_\_\_\_ Height in Metres: \_\_\_\_\_
- 7) Where does the Catchment meet the Sea? \_\_\_\_\_

**Geology** (How does underlying bedrock type affect vegetation? water chemistry)?

What is the dominant Type of Rock found in the Catchment?

Igneous \_\_\_\_\_ Sedimentary \_\_\_\_\_ Metamorphic \_\_\_\_\_

**Land Use Patterns** (The undisturbed landscape tends to a stable dynamic; once we drain, plough, plant, pave, or shelter, things get stirred up. How do we use our land and what are the influences to be minded)?

Tick the appropriate box for the Catchment:

Land uses	Dominant	Well represented	Some	Little/none
Agriculture: (crops)				
Agriculture: (grazing)				
Forestry				
Industrial				
Urban: (Commercial)				
Urban: (Residential)				

Is there any wilderness, or Special Areas of Conservation, etc? Describe:

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## Water Use Patterns

What uses are made of catchment water resources?

Uses	Large extent	Some	Occasional	None
Drinking water supply				
Industrial water supply				
Angling: coarse				
Angling: Game				
Watering animals				
Amenity: Riverside walks				
Amenity: Watersports				
Amenity: Swimming				
Other eg electricity generation				

**Catchment Air Quality** (The quality of local air may have a profound influence upon people's health, wildlife habitats, and water quality).

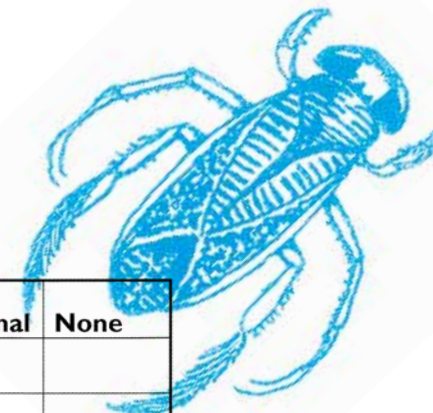
Source information on local air quality. If pollutants are present, what is their source? What effect might air chemistry have on the catchment...on water quality (does it influence lake pH, does it affect sensitive life-forms like certain lichens,etc?) Comment: \_\_\_\_\_

**Demographics** (Population densities have their own impacts upon water quality. By knowing age spreads and employment trends, we can understand the socio-economic needs of our catchment. We can also anticipate potential impacts upon habitat quality, and work with our community to ensure that "best-practice principles" are employed in the development and management of these various fields).

- 1) What is the population of the wider Catchment? \_\_\_\_\_
- 2) What is the population of your local Catchment? \_\_\_\_\_
- 3) Profile local population by Age and Sectoral Employment: \_\_\_\_\_

**History & Mythology** (Who are the people...what are their stories)?

- 1) From records and local knowledge, how do land-use, demographics, and fish catches thirty years ago compare with that which pertains today?
- 2) Profile local townland and bridge names, together with their origins: \_\_\_\_\_
- 3) List local river pool names, and any associated stories: \_\_\_\_\_
- 4) Describe local megalithic or other archaeological remains: \_\_\_\_\_
- 5) Profile any locally associated myth or legend: \_\_\_\_\_





# 2b: Riparian Zone

(Bank Structure, Vegetation, Birds, and Mammals)

For the studies in this section on Riparian Zone and the next section on Instream Habitats, select a representative stream reach within your locality for the purposes of your survey. 100 metres of stream should be adequate, but depending on your resources and local conditions, it may be shorter or longer than this. Ensure that you have necessary permissions for access and sampling. In this worksheet you will look at the quality of the Riparian Zone along your stream reach...how its well-being influences its ability to act as a buffer to our activities, what quality of wildlife habitats it supports, and how it acts in support of our touchstone...the salmon!

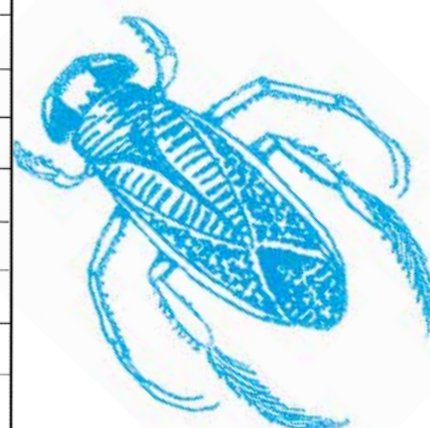
**Bank Structure** (Has many implications for water quality and the capacity of our stream to support wide bio-diversity).

- 1) Are the banks stable along your stream reach? Why or why not? \_\_\_\_\_
- 2) Does the riparian area function as a buffer zone against catchment land-use activities? Why or why not? \_\_\_\_\_
- 3) Is there evidence of dredging? If so, how has this affected banks? Hydrology? Pool/Riffle ratios? \_\_\_\_\_

**Riparian Vegetation** (Riparian vegetation: is the primary energy source for the instream food-web [leaves feed aquatic insects which feed other insects which feed fish which feed heron and otters]; is able to modulate summer water temperatures; creates shelter/habitat for bird/mammal visitation, and etc.).

- 1) Along your Stream Reach, profile riparian vegetation by percentage:

Type	%
Tall trees deciduous	
Medium trees deciduous	
Tall trees coniferous	
Medium trees coniferous	
Shrubs	
Grasses and herbs	
Grazing ground	
Barren ground	



- 2) Is the vegetation helping to stabilise the bank? Why or why not? \_\_\_\_\_
- 3) Estimate the % of your stream reach in noon shadow on a sunny day: \_\_\_\_\_
- 4) Is the canopy closed over the stream? \_\_\_\_\_
- 5) Profile human use of your stream (walking path, angling, dumping, animal watering, etc.): \_\_\_\_\_

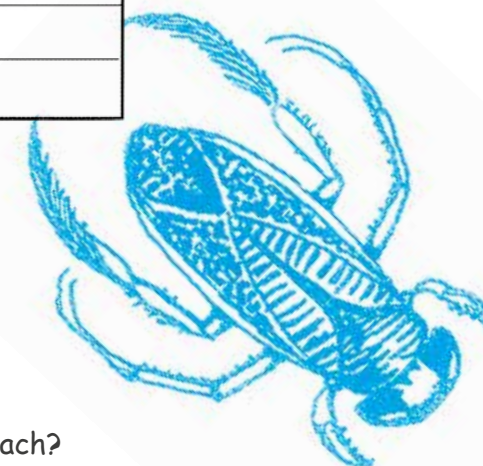
## Birds & Mammals

Wild creatures generally don't stay around people; if you are visiting a stream with your group, they will usually scatter before you arrive. Beyond observation, however, you may learn about their presence by looking for their tracks and signs. In the riparian zone, look for the following:

	Present	Absent
Bird tracks		
Mammal tracks		
Old nests		
Hairs & feathers		
Faeces		

Along your stream reach, are there:

- 1) Large trees for herons? \_\_\_\_\_
- 2) Sandy banks and instream perches for kingfishers? \_\_\_\_\_
- 3) Stone bridges and/or rock faces for dippers? \_\_\_\_\_
- 4) Reed beds for ducks, swans, and coots? \_\_\_\_\_
- 5) Holes in the bank for otters? \_\_\_\_\_



What other birds and mammals are associated with your stream reach?

(Other species that your group may see, or reliably hear about, along your stream reach, include songbirds, migrating birds (like thrushes in Autumn), birds of prey, finches, swallows and martins, members of the crow family, brown rat, foxes, bats, etc. Note all of these in your report).

Species	Seen on visit	Seen at other time	Local knowledge	Comments
Ducks				
Heron				
Dipper				
Swan				
Kingfisher				
Gulls				
Cormorant				
Wading birds				
Wagtails				
Otter				
Mink				
Other				

(Other species that your group may see, or reliably hear about, along your stream reach, include songbirds, migrating birds (like thrushes in Autumn), birds of prey, finches, swallows and martins, members of the crow family, brown rat, foxes, bats, etc. Note all of these in your report).



# 2c: Instream Habitat

(Substrate, H2O Chemistry, Macro-invertebrates, and Fish)

A local stream provides a fair reflection of the state of your local environment. Here your group takes a good close look at various Instream parameters, seeking to establish if our stream is capable of supporting salmonids.

**Water Chemistry & Hydrology** (Water Chemistry parameters indicate short- and long-term trends in water, and Catchment, quality...sample several points in your stream reach; for example, up- and down-stream from an incoming tributary to spot inputs. Enlist the support of local 3rd level institution, County Council, or Fisheries Board Environmental Officer for technical support).

Indicators of Good Water Quality (Q4-Q5)	Many	Some	Rare	None
Stonefly larvae				
Mayfly larvae				
Cased Caddis fly larvae				
Indicators of Moderate Water Quality (Q3)				
Beetles				
Uncased caddis				
Freshwater shrimp				
Indicators of Poor Water Quality (Q1-Q2)				
Water louse				
Worms particularly bloodworms				
Fly larvae				

**Substrate & Habitat Types** (A healthy stream has good diversity of substrate and habitats such as pools, riffles and glides, all of which are inhabited by various age-groups of different aquatic species).

Substrate/habitat type:	Percentage at:	% Site 1	% Site 2	% Site 3
Bedrock				
Boulders >100 cm				
Cobbles 12-100 cm				
Gravel 2-12 cm				
Sand <2 cm				
Silt, mud				
Pools, current slow				
Glides, current moderate				
Riffles, current fast and turbulent				
Shaded by overhanging vegetation				

**Macro-Invertebrates** (Insect diversity and abundance is used to determine water quality - "Q values

Indicators of Good Water Quality (Q4-Q5)	Many	Some	Rare	None
Stonefly larvae				
Mayfly larvae				
Cased Caddis fly larvae				
Indicators of Moderate Water Quality (Q3)				
Beetles				
Uncased caddis				
Freshwater shrimp				
Indicators of Poor Water Quality (Q1-Q2)				
Water louse				
Worms particularly bloodworms				
Fly larvae				

**Fish** (Is your stream reach blessed with fish? What kinds? Can you see any fish? Have you heard locally about the presence of fish?).

- Are there any angling clubs associated with your stream? catchment?
- From local knowledge, are fishing levels declining/stable/improving?
- Has there been stream pollution or fish kills along your stream? If yes, what was the source? None \_\_\_ Industrial \_\_\_ Agricultural \_\_\_ Sewage \_\_\_
- Note any knowledge of fish in the following box:

	Date	Time	Feeding activity e.g. rises	Breeding Activity e.g. redds	Fish observed	Local Knowledge
Coarse fish						
Game fish						
Eels						
Stickleback						
Minnow						
Other:						

- If you are able, try catching a few local fish (in season, with relevant permission). Complete the following information, as well as noting fish health (by inspecting condition of scales, fungus infection, parasites, etc.).

	Species	Number	Method of capture	Weight	Length	Age from scales
Fish caught:						

- Assess the advantages and disadvantages for fish in your watercourse:

	Present/absent	Advantage/disadvantage
River with variety of habitats e.g. depths, substrate, current etc		
Flow of water all year including summer		
Deep pools with over hanging trees		
Riffle gravel with little sediment		
Lots of nutrients from farms.		
Stable banks and bottom		
Large numbers of aquatic insects		
No shade in summer months		
Silt-laden watercourse		
Canalized stream reach		





## 2d: Information Technology

(Data Management/Report Production, Imaging, Public Relations)

Our project is gathering a lot of information about our Catchment...how do we manage this data and what are we going to do with it?

### Data Management/Report Production

It is all very well to gather the data we have identified as being relevant to our studies, but it will be useless unless we "throw a shape on it", and enable it to be accessible to ourselves, let alone anyone else. Ensure that files (real and virtual) are organised in advance to be ready to receive the research that is being undertaken by the group. As the project proceeds, and when it is completed, a Report of the Project should be produced. This requires organisation and order. You have a wealth of information...make it clear and easily accessible.

### Imaging

Make sure your group is equipped with good camera (ideally waterproof). Keep a log of your shots, as you may not remember later. Record the important visual features of your Project, including:

- Group Photograph
- Panoramic Overviews of Catchment
- Overviews from various aspects of the group's stream reach
- Close-ups of stream details, shot in varying weather and water conditions
- Assessment Activities, and any interesting features (bugs, fish, banks...)
- "Before and After" Enhancement Activity shots: community tree planting, stream-cleaning activities, etc.

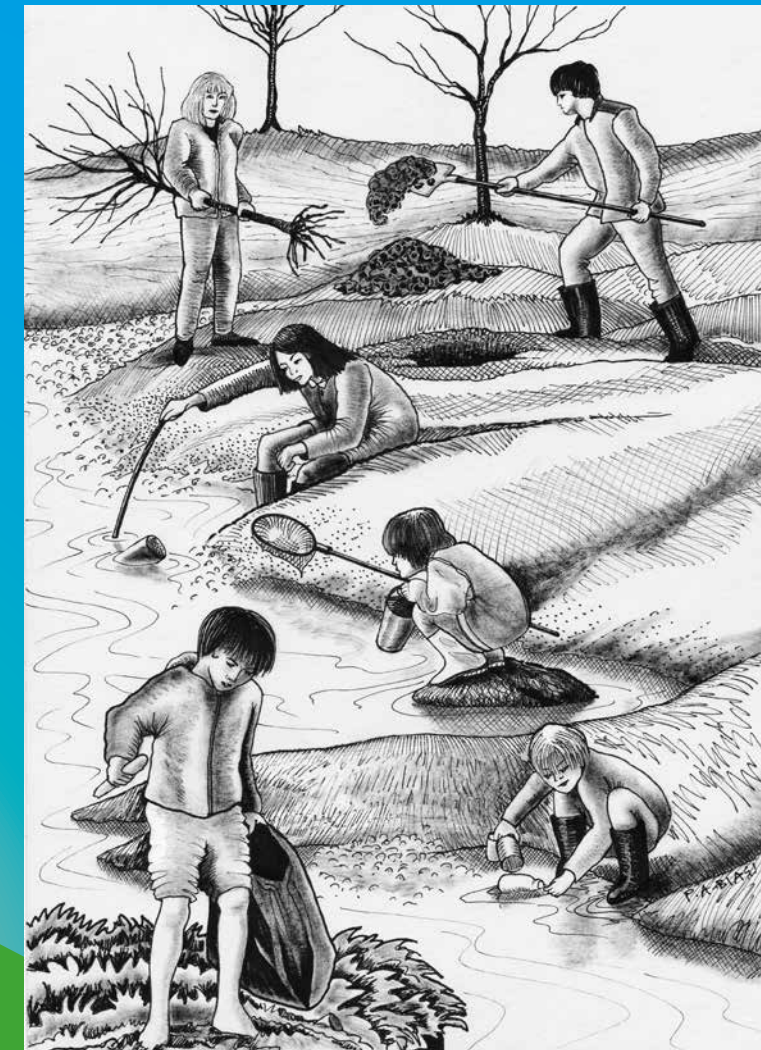
Organise images (including other scanned images) so they are available for:

- Illustrating the Group's Project Report
- Public Exhibition of the Project (in Library or School)
- Inclusion with Press Release on Project
- Submission to **StreamScapes Database**

### Public Relations

You may wish to communicate with your community or a wider area about what you're up to. It is up to your public relations team to:

- Liase with and form Project partnerships with local authorities, community groups, farming organisations, angling clubs, industry, etc.
- Prepare a public exhibition of your Project
- Draft a leaflet about freshwater issues for community distribution
- Frame and distribute a press release about your Catchment status
- Organise Community Activities, such as a Stream Clean, or perhaps declaring your locality as a "Phosphate-Free Zone"!



## Part 3: Action

Once you have grown the Awareness (Part 1), and have undertaken Assessment of your local Catchment (Part 2), you are then ready to do something with this knowledge. Part 3: Action is separated into three spheres of potential activity for your group: Community, Riparian, and Instream. Again, this is to be viewed as a Menu of suggestions...it is not exhaustive and you (or your group) may come up with other activities which you consider relevant to your local catchment.



## 3a: Community Awareness Actions

Streams and rivers are not separate from the land through which they flow, nor can they be considered apart from the people who live in the surrounding catchment. Therefore, Community Awareness Actions must be considered to be amongst the most important of enhancement actions which your group may undertake. Through your **StreamScapes** project you have become more aware of the issues involved in **Catchment Management**, and of some of the principles and practices which would help reverse the decline in our freshwater resource and wildlife habitats. It is now your job to communicate your findings to your community. Following are some suggestions as to how you might achieve this:

- Produce and publish a report of your **StreamScapes** Project:

The importance of producing a project report has been previously referred to. But don't let it "sit on a shelf"; get it out there into the public domain by:

- Organising a formal launch of your report; ask a Minister or a TD, or other local leader to perform the launch. Ensure that you invite the widest possible local representation to attend the launch.
- Frame and distribute a press release about the publication of your report; cover national and local newspapers, magazines, radio and television. Ensure that you have copies of your report to supply to any interested parties.
- Lodge a copy of your report in local public libraries; accompany with a poster calling attention to its availability
- Prepare a public exhibition of your Project's findings:

A colourful exhibition of your work can be a very effective means of communicating what you have done. Concentrate on graphics...local photos, maps, charts. Communicate the wonders and problems which are going on, locally, under people's noses. Assemble your exhibition so that it is mobile and can be moved from Community Hall to Library to schools in the area and anywhere else relevant.

- Draft and print a leaflet for local distribution:

This could be as simple as a folded A4 piece of paper, which could contain a brief summary about the local catchment, and an encouragement for all endeavours to abide by best-practice principles to achieve higher water quality and wildlife diversity. Use your imagination...make it attractive. If there are costs involved in its production, approach local groups and ask them to sponsor you.

- Organise Community Events and Activities around the Catchment Theme:

Again, use your imagination...organise a "Stream Clean Meitheal", or a celebration of your local environment with exhibitions, music, theatre; or declare your Catchment a "Phosphate-Free Zone"(!). You may even wish to organise your own local "Catchment Management" conference...invite representatives of all sectors; inaugurate a local sense of holistic, sustainable planning for your future.

## 3b: Riparian Zone Enhancement Actions

The integrity of the Riparian Zone of your stream is vital. A healthy Riparian Zone fulfils the following functions:

- Riparian vegetation is the primary "energy source" for streams/rivers...it provides food source for the lower orders of the stream food chain, without which higher orders cannot exist.
- Riparian vegetation furthermore knits bank-sides together, preventing erosion and, when undercut by river currents, provides shelter and resting places for fish.
- Riparian area provides a "buffer zone" against the input of harmful nutrients, chemicals, and silts which may be generated within the catchment.
- Riparian zone provides habitat for many other forms of wildlife, which all act in support of Instream species.

If your group is looking for a meaningful activity, the riparian zone is a worthy place to concentrate your energies and resources. Following are some suggested activities where there has been despoilment:

- Tree Planting: whether your site is rural or urban, appropriate planting of trees serves several functions, including the provision of shelter and biomass, and the conservation of eroding banks. Make sure that you get good advice before you finalise your plan. The last thing you want is a completely tunnelised stream channel, where no light penetrates through to the streambed. Where stream banks have little tree cover or are barren, and if the banks are not stable, this is where trees will be of great service. Prefer native deciduous trees to anything else. Alder, oak, ash, rowan, and holly will do the most good for habitat. If you are trying to arrest erosion of a collapsed bank, salix (willow) will root fast and grow copiously to help stabilise the situation.
- Fencing: if livestock have access to a riverbank, try to persuade the landowner to agree to fence off riparian zone. The more area the better, but even a narrow zone will initiate recovery. Remember however that a farmer's land is his/her livelihood; be understanding of these needs; make it clear why you are seeking a "buffer zone". And fencing is expensive...though current agricultural supports sometimes require and subsidise riparian fencing, a farmer may not be able to afford the exercise. Spell out the benefits to other local interests (tourism, Chamber of Commerce, Angling Clubs) and see if they will share the cost burden. Be creative about means and be willing to work.
- Streamside Path: Streams that are accessible for community enjoyment can often help bring about wider awareness (and appreciation) of the resource. If there is a disused or neglected existing path, organise efforts to put it right. If no path exists, assess the feasibility of the group initiating a community effort to make a path along the river. But don't overdo it by destroying trees and other habitat elements which you are attempting to preserve.
- "Bird Works": there are many means to encourage greater bird diversity and abundance in riparian areas, including tree planting, owl boxes, and kingfisher perches. Source plans for these, build and install them.



## 3c: Instream Enhancement Actions

### ~ Notes on Instream Works ~

Before you survey your stream-reach to determine the relevance of remedial options remember the main points: The importance of Instream habitat diversity for supporting salmonids, particularly the need for shallow gravelly riffle areas for nursery and juvenile habitat, and deep pools with abundant cover for adult habitat. Nature generally provides for this; action should only be taken where man's activities have destroyed these habitats. The key to determining problems and solutions for a given stream reach, is to first be aware of what continuum of Instream habitats "should" exist; then assess which are present and which are under-represented or absent. Then and only then may you proceed with developing a plan of action. Finally, remember that Nature tends to look after herself quite well until we interfere; natural hydrology creates the necessary habitats. Sometimes a situation may be healed by just eliminating the source of the problem. Rule of thumb: Do as little as possible!

### ~ INSTREAM PROBLEM & SOLUTION IDENTIFICATION ~

- Channelisation: this involves the artificial straightening of streams to facilitate urban or rural boundaries, sometimes or as part of a drainage scheme, etc. This action results in the elimination of the original riparian vegetation and natural riparian meander and pool/riffle diversity.

*Solution: recreate meander, pool and riffle areas.*

- Dredging: is usually undertaken to assist flood alleviation efforts; it often results in an even depth developing in the dredged zone, with loss of habitat diversity. If stream-widening has been part of the effort, slower current velocities may occur, with resultant silt deposition spoiling habitat (see Siltation below).

*Solution: If dredging is considered essential, see if the dredger's instructions can be modified... try to leave one (alternating) bank undisturbed to try to preserve at least some continuity of riparian habitat; restore pool/riffle sequences, strengthen banks, contain erosion.*

- Siltation: has many sources. Road-building (and any earth-works), agriculture, quarrying and gravel-washing operations, forestry-related works (including drainage and harvesting), construction and demolition, and eroded riverbanks, all contribute unnatural silt loadings into watercourses. The varying substrates which naturally occur along the bottom of streams provide important habitat for macro-invertebrate life (salmonid food source) and for spawning. Silts plug up these important interstitial spaces midst the gravels, eliminating macro-invertebrate habitat and making salmonid spawning impossible.

*Solution: Ensure that all local trades are aware of best practices for containing the silt production associated with each. Contain them at source. Buffer, buffer, buffer!*

- Erosion: Erosion is mentioned separately and beyond Siltation, as unstable soils and clays, whether streamside or anywhere in the catchment, are a major factor in silt contribution and must be addressed to minimise their impact.

*Solution: In the course of your catchment survey, watch for sites subject to erosion. If they are streamside, strengthen and integrate banks with structures or tree and grass planting. Even if they are well away from watercourses, silts from these sources will find their way down...ensure bare sloping ground is planted and stabilised.*

- Overgrazing: where livestock have access to riverbanks, they may strip bank-stabilising vegetation and physically destroy bank integrity, causing stream widening, silt deposition, and loss of habitat diversity.

*Solution: Fence a good buffer area to keep livestock out of riparian zone. If damage is already substantial, kick-start recovery by strengthening alternating banks.*

- Over-shading / Under-shading: Too little daylight reaching a stream's surface inhibits all of the biology which together acts to sustain salmonids. Too much light may cause over-warming of small streams in summer, and can be stressful on salmonids, which are shelter seeking.

*Solution: The optimum light to fall upon a stream is dappled light. Riparian vegetation may require some management to optimise a stream's capacity to produce trout and salmon. Where there is tunnelling, thin trees out of some places. Where there is unprotected water, plant trees, always preferring native deciduous trees (alder, ash, rowan, holly, salix, etc.).*

- Weirs, dams, and other Instream structures: formerly there was much interference with streams and rivers by the construction of weirs and etc. to divert water to power mills and other hydro-powered machines. Though sometimes they added to habitat, usually they interfered with stream-flows and with fish migration.

*Solution: If a disused structure exists in your stream-reach which is harmful, look into how it may be removed or modified to improve stream conditions.*

### ~ REMEDIAL STREAM STRUCTURES ~

Where bankside erosion, channelling, or dredging has interfered with a stream's natural pool/riffle habitat sequence, properly designed and installed instream structures may assist recovery. Constructed from securely keyed logs or large stones, they "steer" the current, either by concentrating flow in midstream or encouraging meander off alternating strengthened banks, thus scouring out pools, redistributing substrates, and helping to restore habitat diversity.

*(See illustrations on following page).*

### ~ Important! Before commencing Instream Works ~

- You must collaborate with Inland Fisheries Ireland to assess feasibility, for permission and development of Plans
- Depending on the nature of works, they may require Planning Permission
  - In some cases the OPW must be consulted & they may contribute
  - Works will require permission of relevant Land Owner(s)
- Consult with local Angling Club, Tidy Towns and/or Farming Groups
- See what grants or supports might be available to finance the works



## Miracles in Our Midst

### Salmonids (Trout & Salmon)

Salmonids are good 'bio-indicators' or proof of high quality environment as they are very fussy about their homes (habitats)...they favour sparkling water tumbling over crisp gravels in the dappled light of a diverse riparian zone. For nutrition, they depend upon a suite of organisms that share their requirement for pristine conditions. But, without knowing it, many of our activities alter these habitats beyond recognition, and our salmonids disappear.

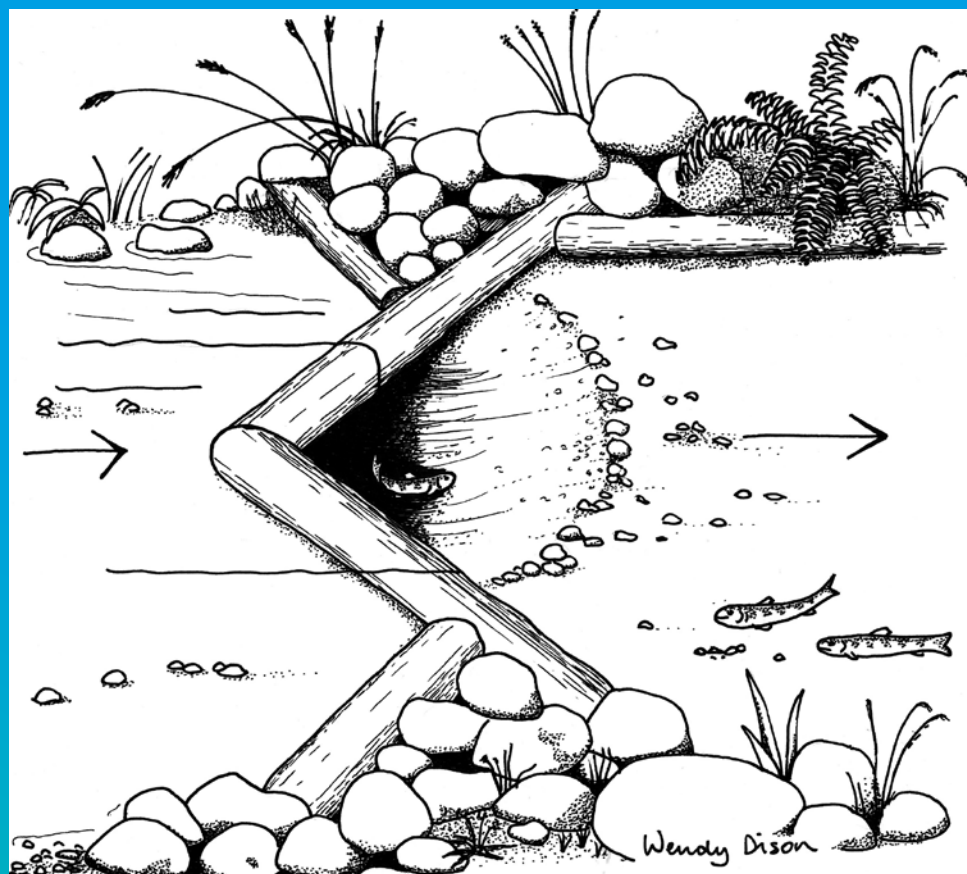


Figure 1: An "Upstream V"- Weir or Groyne", used to promote new pool habitat.

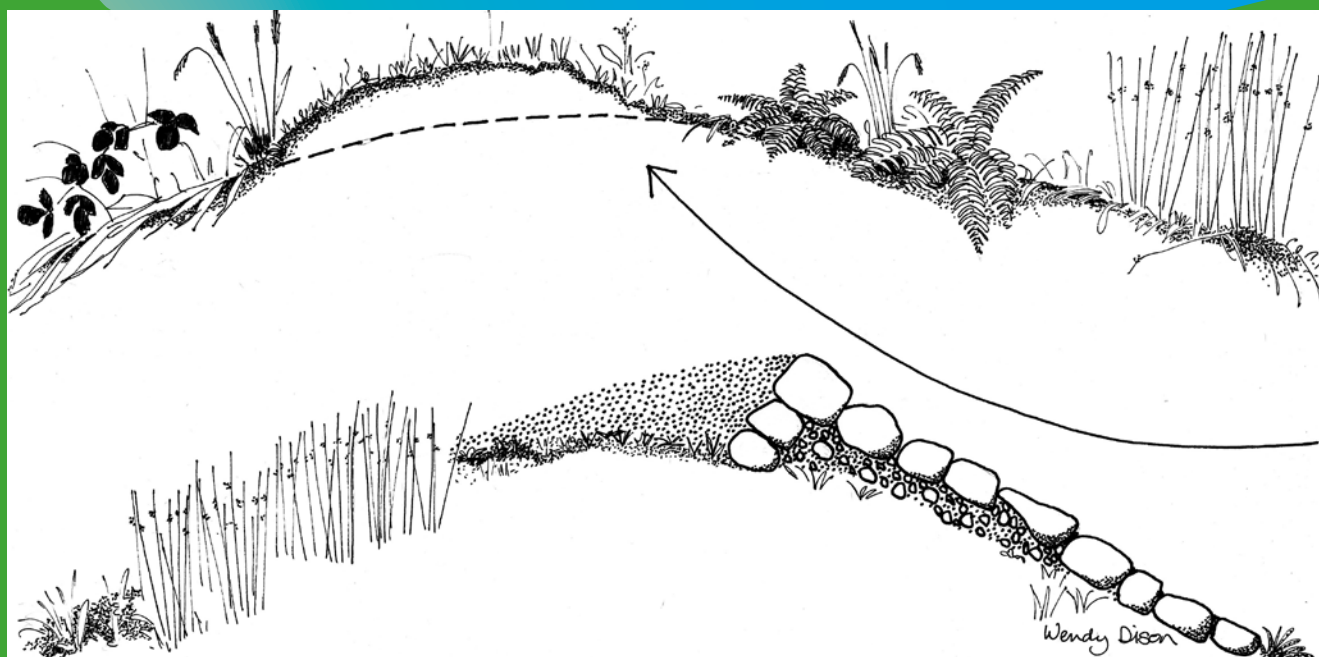
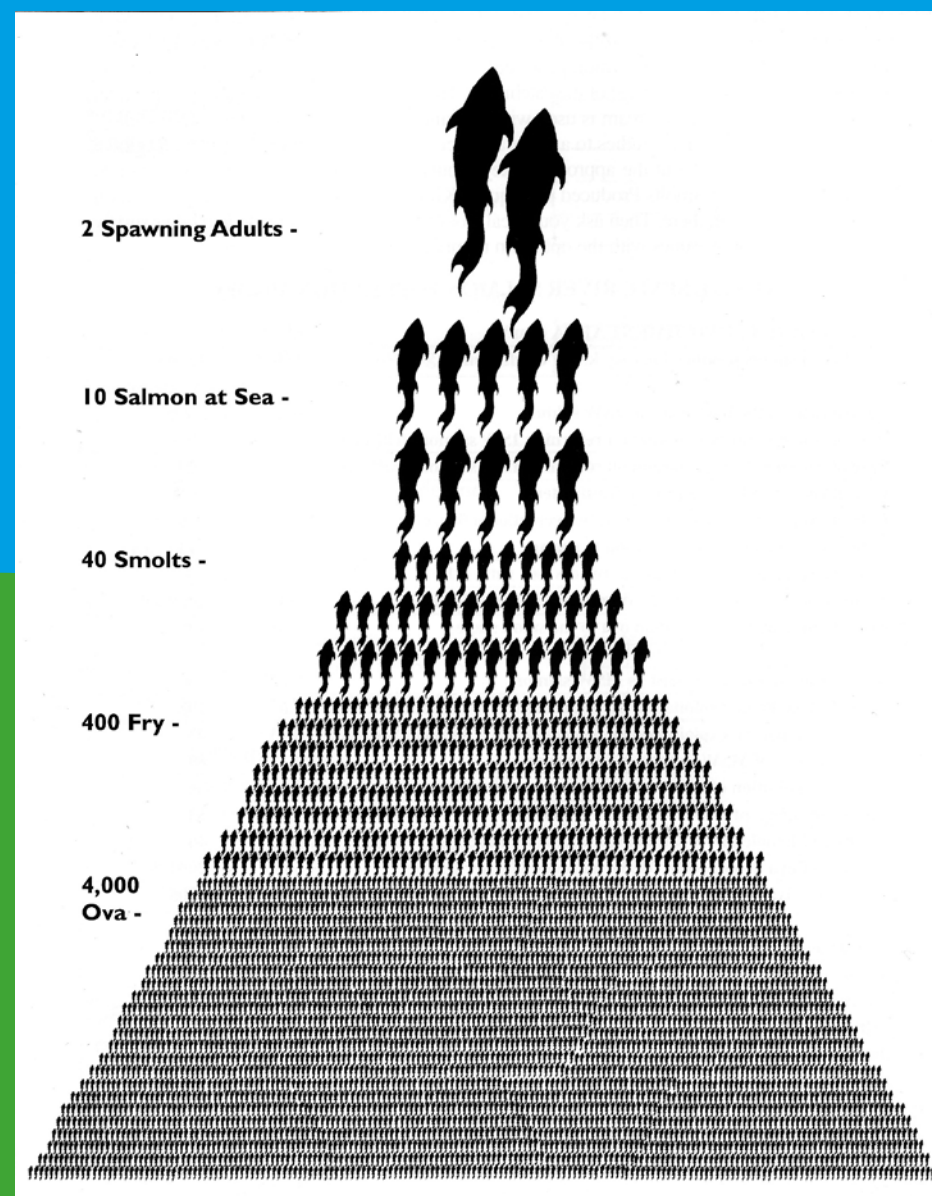


Figure 2: "Current Deflectors" used to strengthen alternating stream banks, which will concentrate flow and promote scour to re-establish pool/riffle habitats.



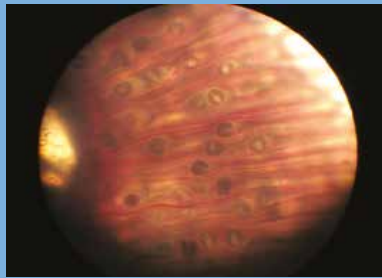
### Salmon - 'The Numbers Game'

A frequently asked question is, "how many salmon survive from egg to maturity?" This graphic conveys the odds against survival.



# Freshwater Pearl Mussels

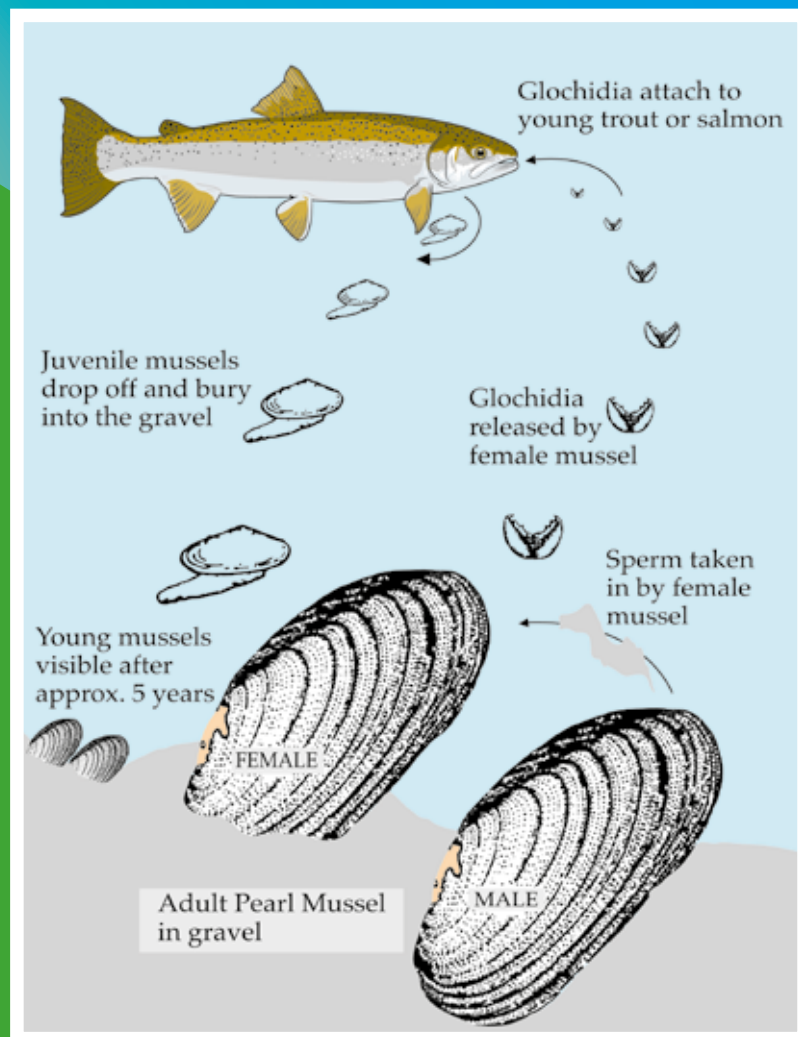
Freshwater Pearl Mussels (*Margaritifera margaritifera* and *M. durrovensis*) were historically present in most of the rivers of Ireland and indeed throughout northern Europe, but have been widespread and largely anonymous victims of our inability to protect our waters. This is due in part to their complex life-cycle: freshwater mussels are our longest-lived freshwater species (in excess of 100 years), and are able to tolerate short-term pollution incidents (owing to their ability to 'clam-up' for some days at a time and seal themselves off from malign water-borne influences such as chemicals and silt). Hence older mussels may be present in a river of only average water quality and the conclusion may be erroneously drawn that that river is ecologically sound. But what dedicated Irish researchers found over the past few decades was that, due to even low-level pollution, there were few or no juveniles present; they are unable to successfully reproduce in the vast majority of our rivers! Hence we must be aware that, in our negligence to employ 'best-practice' in land- and sewage-management, for instance, we are presiding over a slow-motion but inevitable extinction of a unique and precious species in our midst!



Left: Juvenile freshwater pearl mussels on a native trout's gill. Photograph at 250x by Evelyn Moorkens / Coomhola Salmon Trust



Right: Adult freshwater pearl mussels on a river bed. Photograph by Evelyn Moorkens

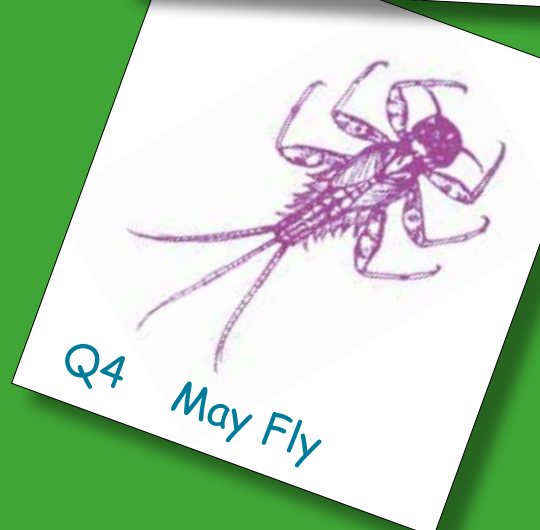
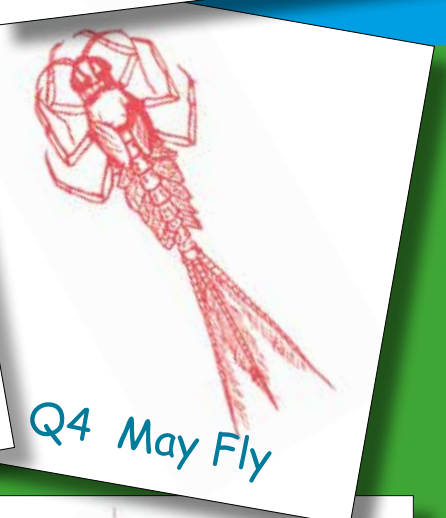
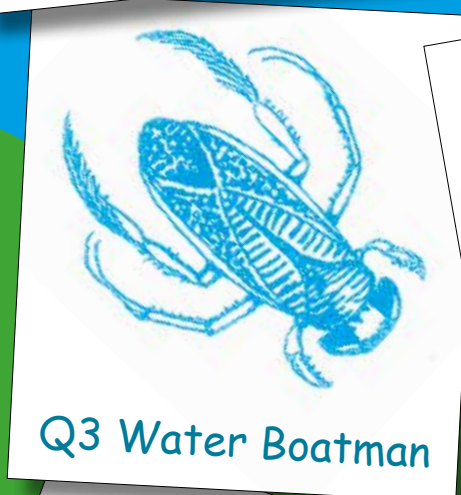
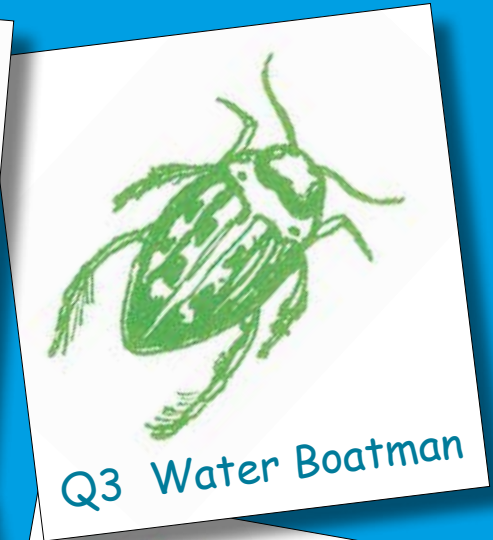
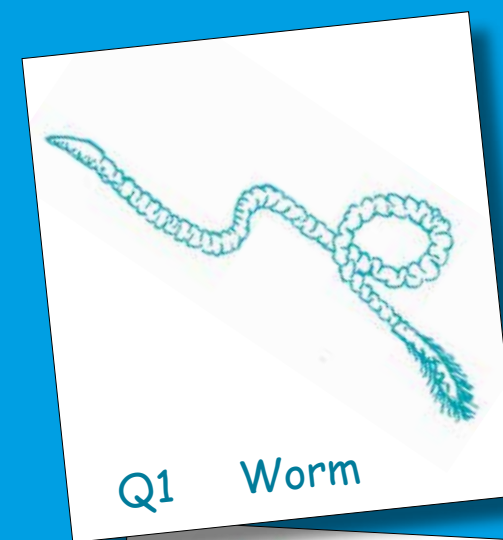


# Our Bugs

The Aquatic Insects that we find in our local stream can tell us what the water quality is on what is known as the 'Q Scale', so:

Q1 = Very Poor Q2 = Poor Q3 = Moderate Q4 = Good Q5 = Very Good

Q1 = Worms Q2 = Whirligig Beetle Q3 = Water Boatman/Caddis Q4 = Mayfly Q5 = Stonefly





# Our Wildlife

If we can achieve high-quality waters in our Catchment, lots of benefits follow. Following are drawings of a few examples of the variety of species which we might see in our River and along its banks.

# How many species can you find?

Tick the boxes of any of the species below that you are lucky to see...  
tell your friends and family!



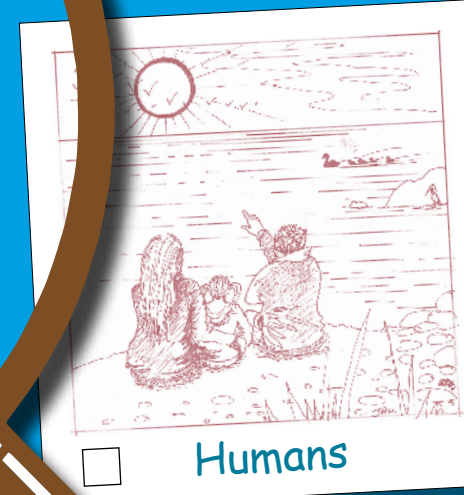
☐ Cormorant



☐ Dipper



☐ Egret



☐ Humans



☐ Otter



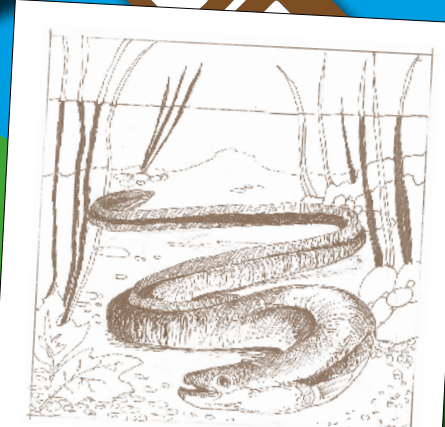
☐ Heron



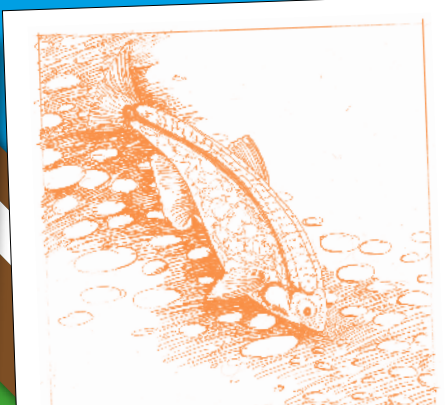
☐ Kingfisher



☐ Mallard



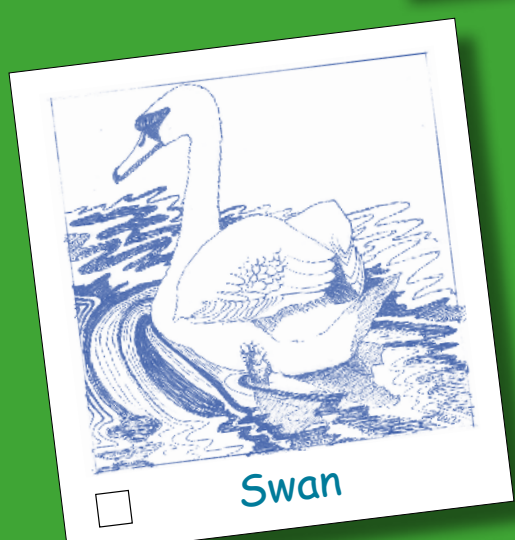
☐ Eel



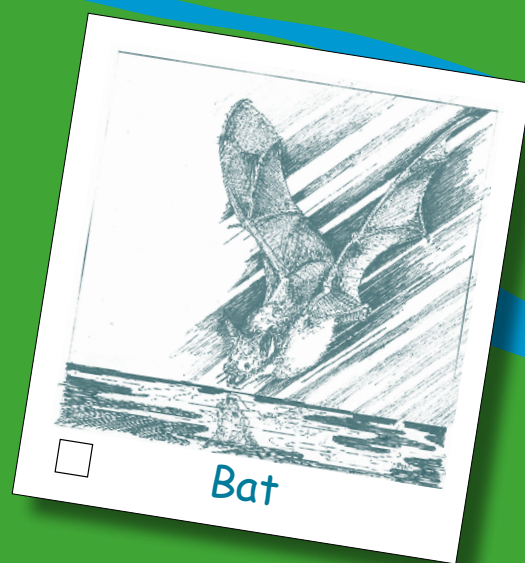
☐ Minnow



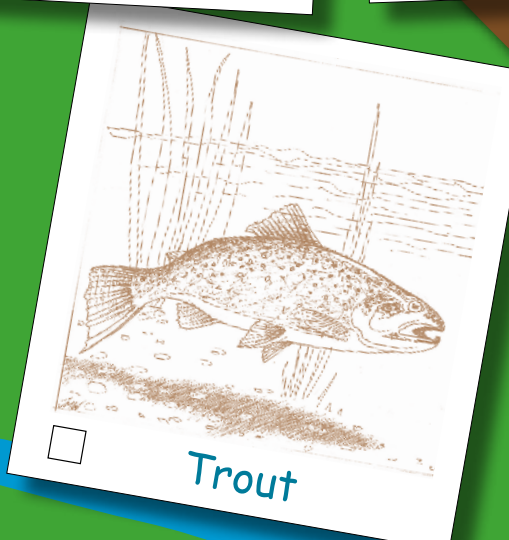
☐ Salmon



☐ Swan



☐ Bat



☐ Trout



☐ Stickleback



# Notes & Doodles

## What is Biodiversity?

Biodiversity, or "Biological Diversity", refers to the sum total interdependent web of life, from bacteria, microscopic algae, fungi, through to plants, trees, amphibians, fish, birds and mammals – and people!!! If we achieve "best-practice" we can greatly assist our community's capacity for Biodiversity.



## Salmon

The status of Salmon in local rivers is a great indicator of local environmental quality. When they are present, they are proof that multiple terrestrial, instream, and marine habitats are in balance. This is because salmon depend upon an entire suite of other, similarly sensitive organisms to thrive...Biodiversity!



# HOME TRUTHS

The StreamScapes method views our toilets, sinks, baths and showers as Tributaries to our Rivers! What we put in them has a huge capacity to impact on local Water Quality and Biodiversity. Outside our homes in our gardens and yards we have an equal ability to create or destroy natural habitats. These tips will help restore water quality & biodiversity:

## Household Best Practice

- Avoid any Cleaning Products with Phosphates or Bleach – they spoil the good work of your sewage treatment plant / septic tank, leading to aquatic pollution – use "eco-friendly" products!
- Use the minimum of any cleaning product – enough is enough!
- Do not use in-sink food macerators (they put added strain on sewage treatment) – compost your vegetable wastes and use as fertiliser in your garden!
- Any common household product labelled Hazard or Poison or Irritant must be treated as toxic waste when disposing of – follow Local Authority guidelines and do not put in drains!!!
- Keep your garden low-maintenance and low water-dependent, but covered in established sod (and not hard-surfaced) to avoid contributing to peak urban rainfall run-off. Use native plants and trees to establish suitable local habitats.
- Avoid herbicides, pesticides, and application of fertilisers – find natural ways to garden.
- Remember that disturbed ground contributes silt to local water courses – silts are a major enemy of aquatic biodiversity.
- Finally, control your use of water at home and in the garden...treat it as the precious substance that it is!

**Don't let Nature go down the Drain!**

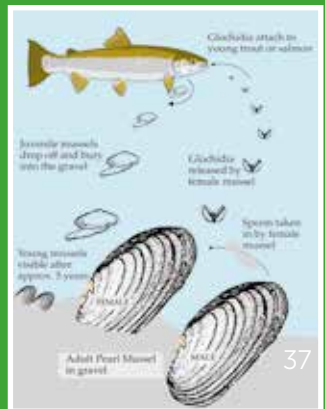
## Instream Insects

Did you know that a survey or census of the bugs that live in your local river reveal the environmental quality of the water? Stone flies, mayflies, and cased caddis fly larvae are amongst the most pollution-sensitive aquatic bugs...if you find them in your river it is a good sign! And another good example of Biodiversity in action.



## Freshwater Mussels

The study of Biodiversity is full of wondrous stories... the Freshwater Pearl Mussel (FPM), which used to live in most of Ireland's rivers but is now considered extremely threatened, is the longest lived species, living over 100 years. The microscopic juveniles spend a winter attached to a trout's gill... this is how they migrate. They are very sensitive to nutrient & silt pollution.







Detail of fenced riparian buffer zone from front cover photo along the Cooleenlemane Stream



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Comhshaoil, Pobal agus Rialtas Áitiúil  
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