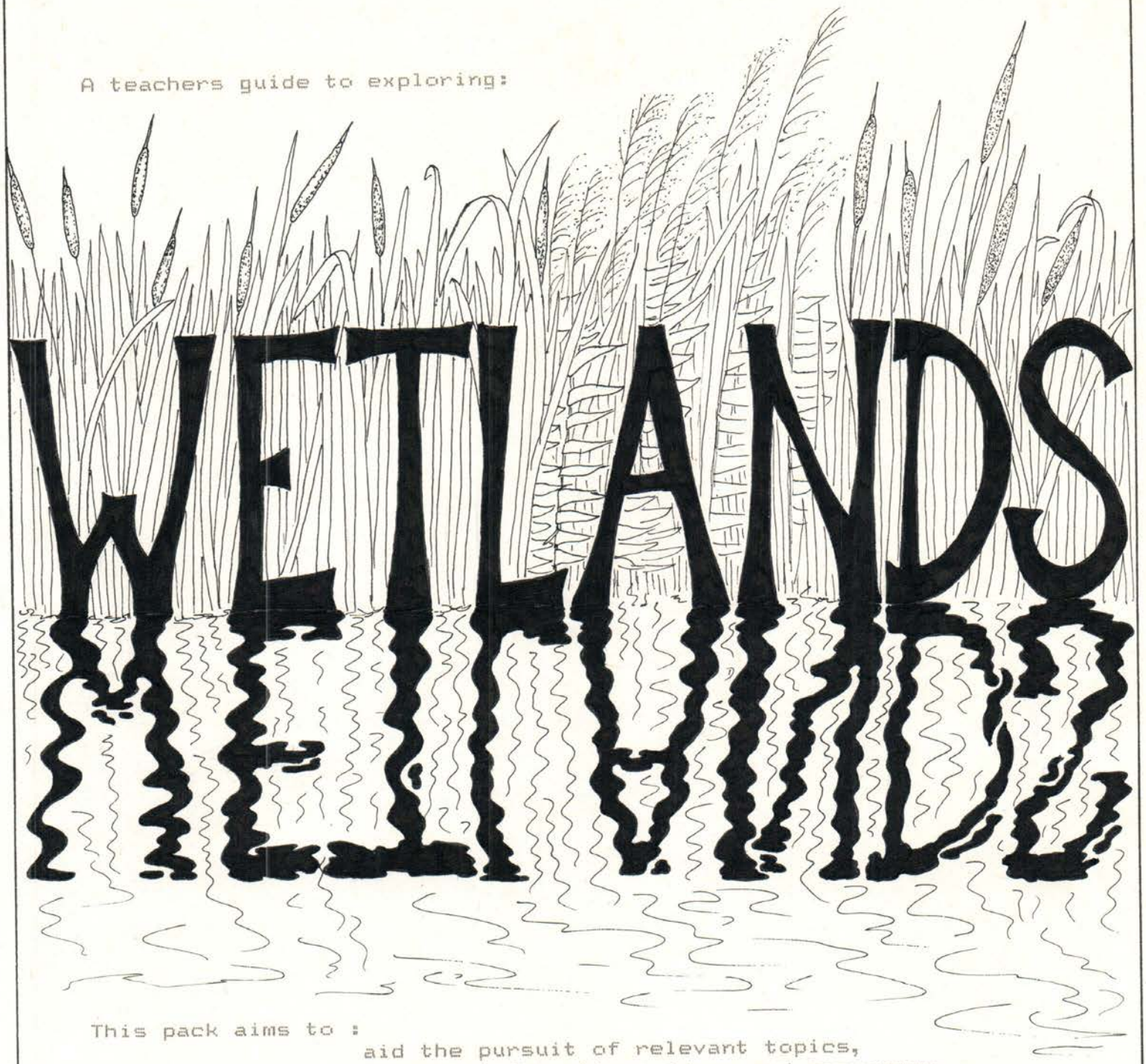
A teachers guide to exploring:



This pack aims to :

aid the pursuit of relevant topics,
provide information, ideas and resources.

CONTENTS.

DJGx '88

WHERE ARE WETLANDS?

:::: Major Marshes, Swamps & Bogs. — Major Rivers

1 COLUMBIA RIVER
Important for the Salmon which swim up-stream to spawn

2 DANUBE
Flows through many of Europes great cities

3 VOLGA
Europes' longest river - 3688 km (2,292 miles) long.

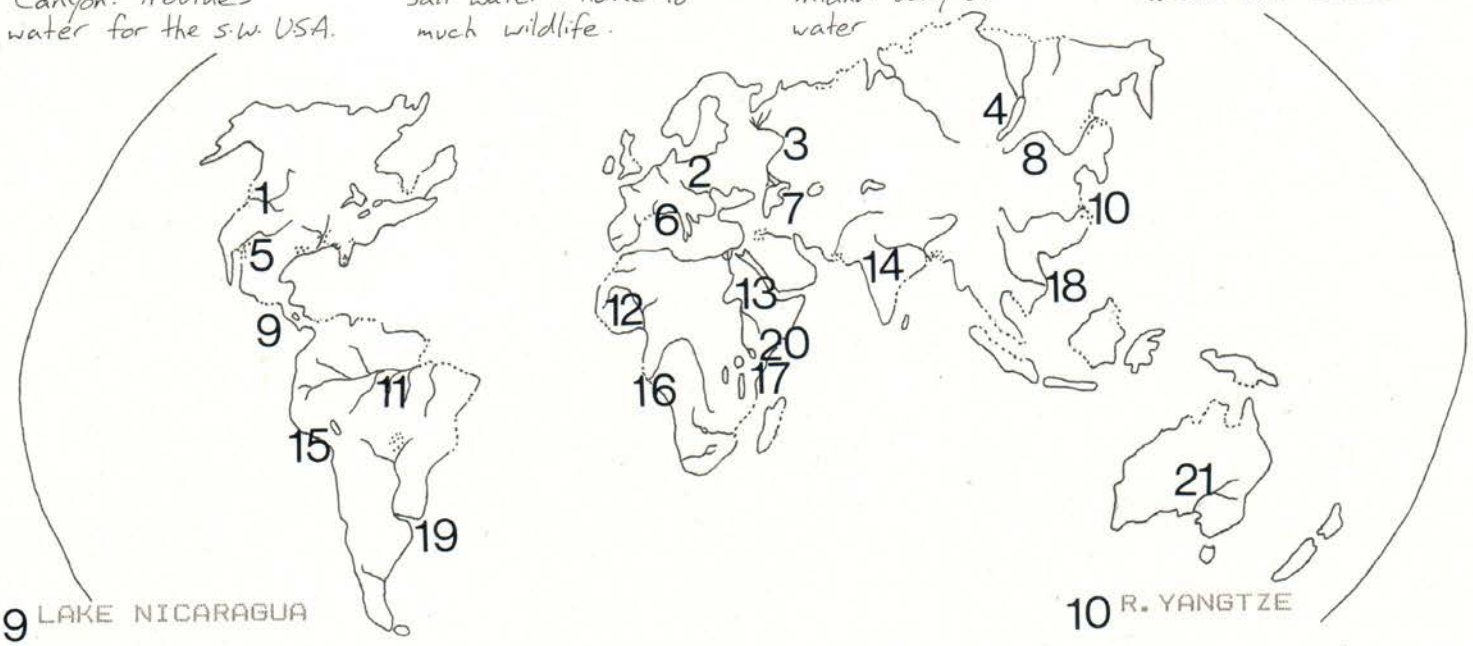
4 LAKE BAIKAL
Worlds' deepest lake. It is crystalline with a visibility to a depth of 40m.

5 COLARADO RIVER
Carved the Grand Canyon. Provides water for the s.w. USA.

6 CAMARGUE
A mixture of fresh & salt water - home to much wildlife.

7 CASPIAN SEA
Worlds largest inland body of water

8 AMUR
Forms boundary between Russia and China



9 LAKE NICARAGUA
Largest lake in Central America

10 R. YANGTZE
Chinas' main artery of communication

11 AMAZON BASIN
Worlds' largest river (holds most volume of water) is 6436 km (4000 miles) long.

12 R. NIGER
Vital water source to many arid sub-Sahara regions.

13 R. NILE
Worlds longest river. Floods annually providing fertile mud for agriculture.

14 GANGES
Rises in the Himalayas. Its waters are sacred to the Hindu religion.

15 LAKE TITICACA
Highest navigable lake in the world - it is 3813 m above sea level.

16 CONGO
The only river to flow both north and south of the equator.

17 RIFT VALLEY LAKES
This lake system is home to an endemic race of cichlid fish and a myriad of other wildlife.

18 MEKONG
Its fertile delta is one of the Worlds greatest rice producing areas.

19 PLATA RIVER
Is really an estuary.

20 LAKE VICTORIA
The source of the Nile. It teems with wildlife.

21 MURRAY RIVER
Provides fresh water for much of Australias' populated areas.

WHAT IS A WETLAND ?

Wetlands are areas of fresh to brackish water, which provide a wide variety of habitats for a myriad of plant and animal life.

Types of wetlands include:

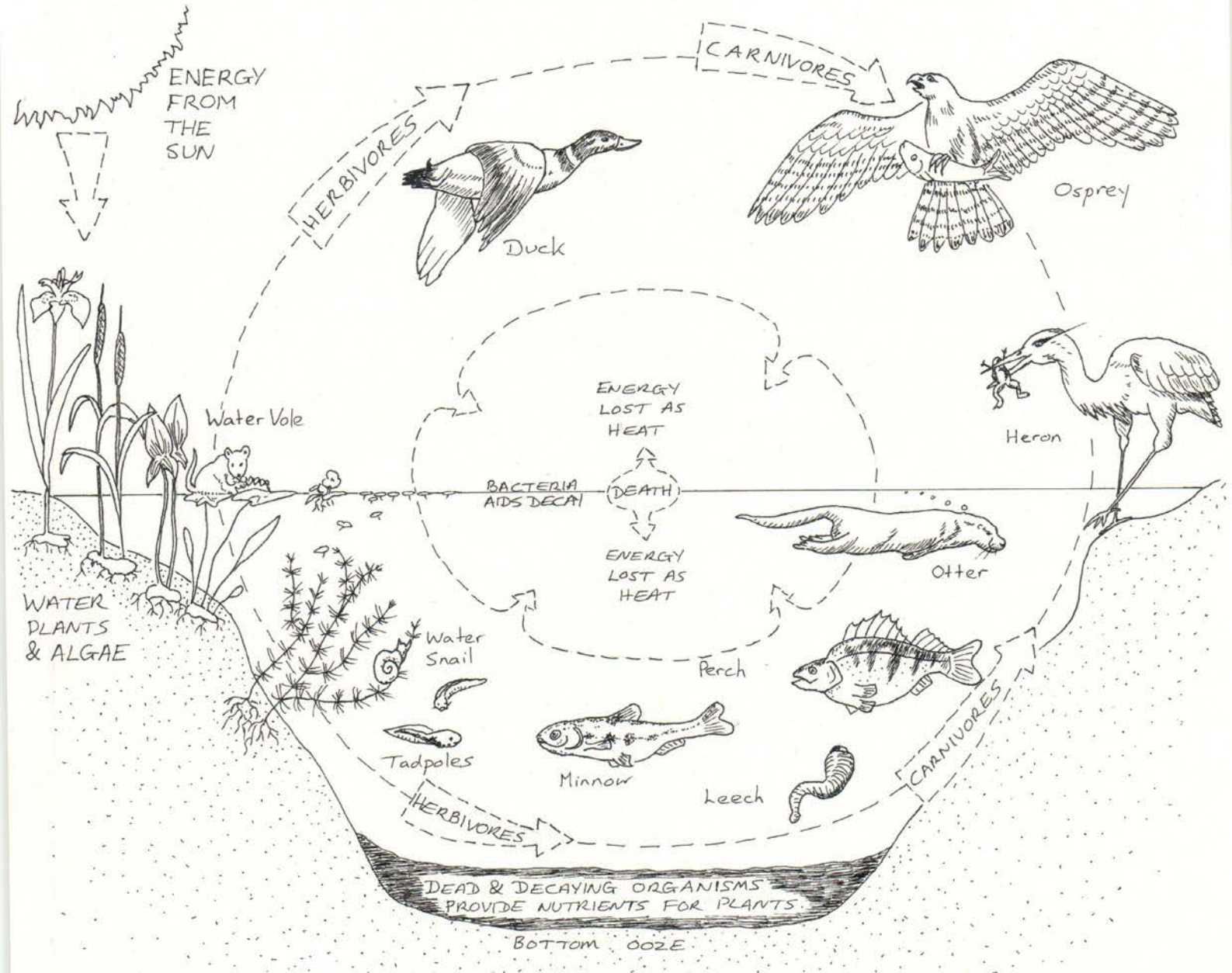
LAKES - cavities in the Earths' surface filled with water, but without direct connection to the sea.

RIVERS & STREAMS - water courses existing all year round, fed by rainfall, springs, glaciers or lakes.

MARSHES & BOGS - are usually lowlying waterlogged areas - places where you at least need your wellies!

Each wetland is different, supporting its own set of plants and animals which all interact forming a delicately balanced web of life.

A WETLAND LIFE CYCLE

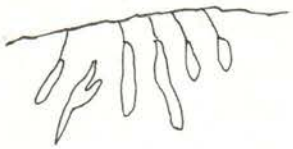


Every available space, or niche, is used in a wetland - making these so-called "wastelands" one of the most productive habitats in the world.

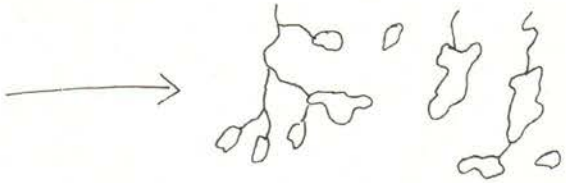
LAKES, RIVERS & STREAMS

LAKES come in various types - by looking at the shape you can tell how they where formed.

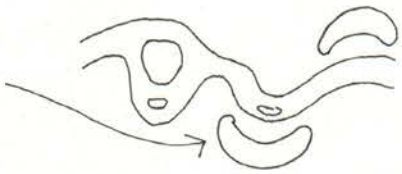
FINGER LAKE - formed from valleys made by glaciers & then filled with the melted ice.



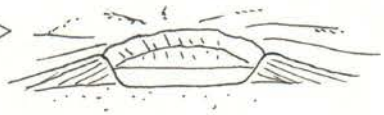
GLACIAL LAKE - formed by the gouging motion glaciers.



OXBOW LAKE - crescent shaped remnant of a low-land river which has since changed course.



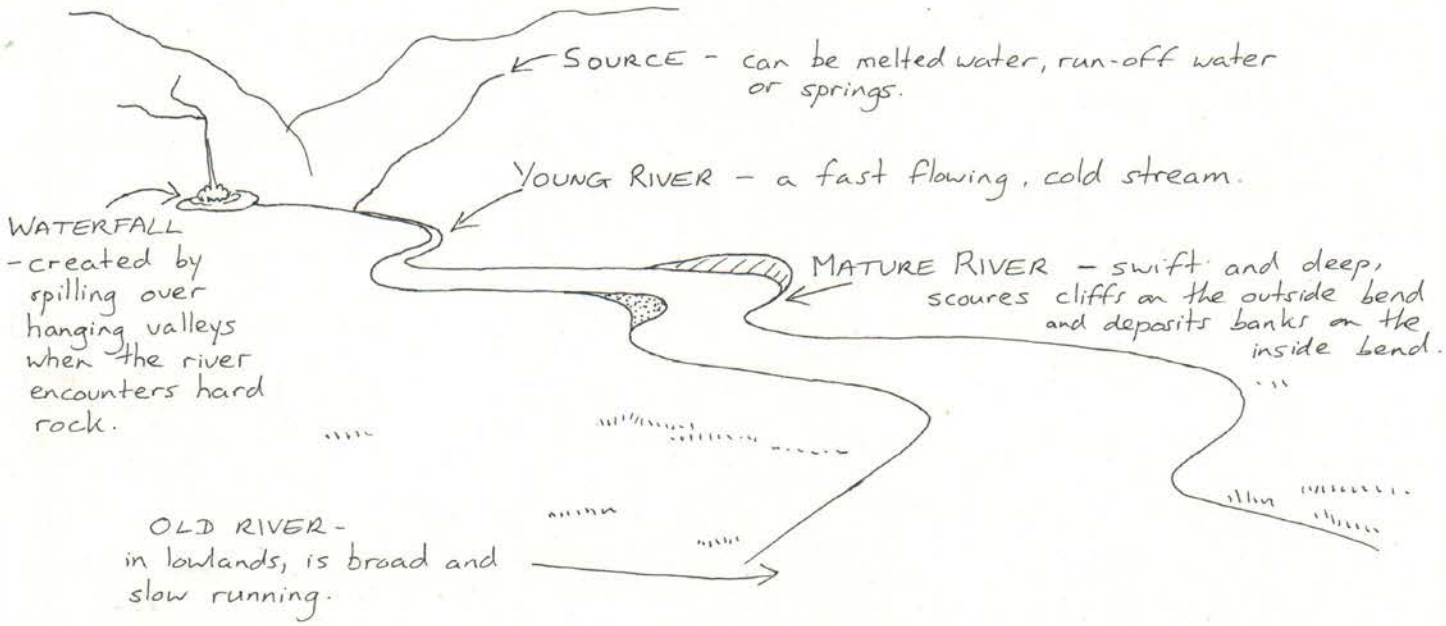
CRATER LAKE - formed when a volcano explodes or collapses.



STRUCTURAL LAKE - ancient lakes caused by the filling up of tectonic trenches.

PLYA LAKE - puddle deep & short lived - formed in the depressions of deserts after a rare rainstorm.

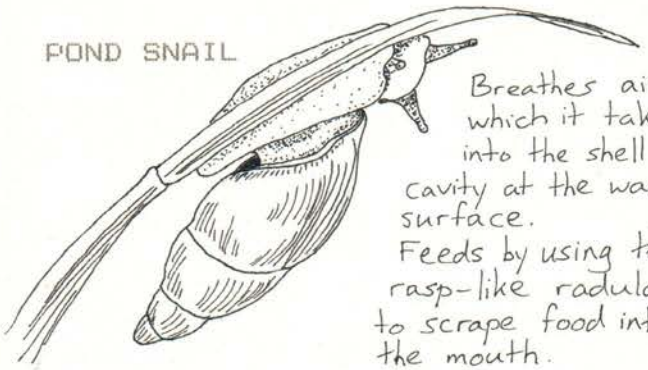
RIVERS -
can be large or small, and the various stages of its journey can be followed down to the sea, a lake or larger river.



Worlds' longest river - the Nile at 6,650 km.
Worlds' deepest lake - Baikal at 1.5 km.

ANIMALS OF LAKES

POND SNAIL



Breathes air which it takes into the shell cavity at the water surface.
Feeds by using the rasp-like radula to scrape food into the mouth.

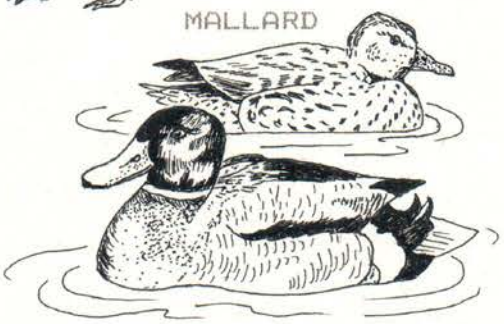
CHILEAN FLAMINGO

Feeds by using its tongue as a piston, sucking water in and out four times a second - filtering out algae and small shrimps which it then swallows.
The birds' pink colouration is obtained by absorbing the pigment in the food.

NORTH AMERICAN BEAVER

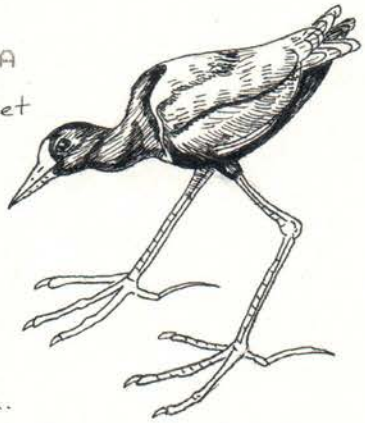
Feeds on various plants.
Adaptations include webbed hind feet, large scaley horizontally flattened tail for power and steering, & closeable nose, ears and throat (so it can carry food underwater without choking).

MALLARD



Feeds on animal and plant matter by dabbling on the water surface or by up-ending to reach food underwater.
The female has the familiar loud "quack," the male a quieter "aark" call.

JACANA

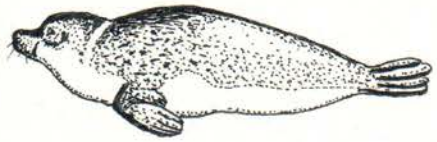


Large feet spread the body weight, allowing Jacanas to walk across floating vegetation.
Jacanas are also called Lily Trotters.

INDIAN SHORT-CLAWED OTTER

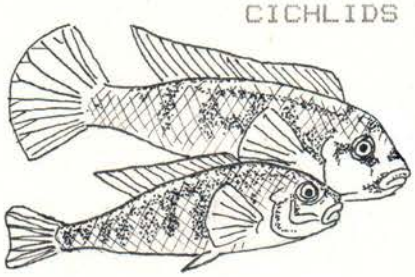
Adaptations to living in water include a streamlined body, webbed feet and closeable nostrils.
Feeds mainly on fish.

BAIKAL SEAL



The only freshwater seal, is found in Lake Baikal (U.S.S.R).
Live in deeper parts of the lake feeding mainly on deep-water fish.
Heavy claws on foreflippers are probably to keep holes open in freshwater ice.

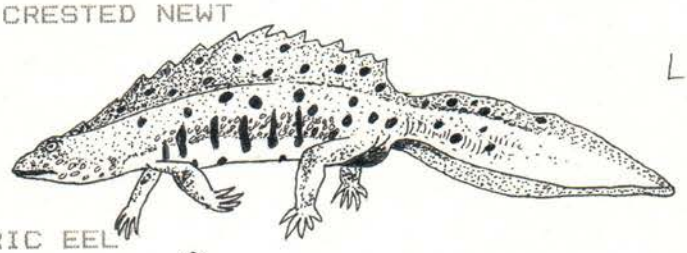
CICHLIDS



A group of mouth brooding fish endemic to the lakes of the Great Rift Valley. Cichlids have a huge variety of colour and form, and even the same type of Cichlid may vary in colour.

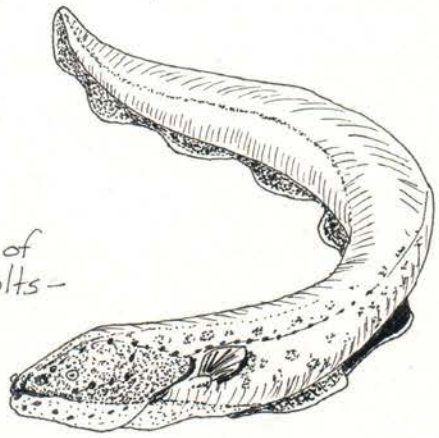
RIVER ANIMALS

GREAT CRESTED NEWT



Largest British newt (10cm long). The "warts" on the skin secrete a strong, unpleasant-tasting substance preventing predators eating them.

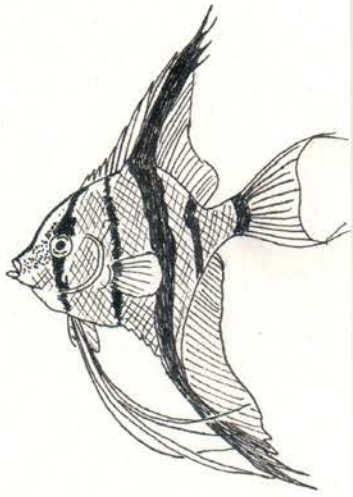
ELECTRIC EEL



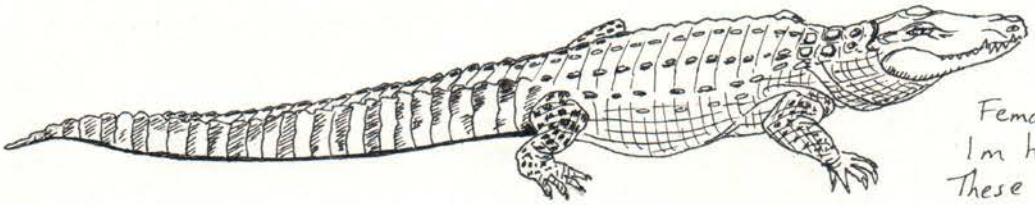
Found in the Amazon Basin. They can be over 2m long. Possess electric organs capable of producing 300 volts - enough to stun a horse!

ANGEL FISH

Found in the Rio Nigra and Amazon Basin, they can be up to 12cm long. Feed on insect larvae and small-fish fry.



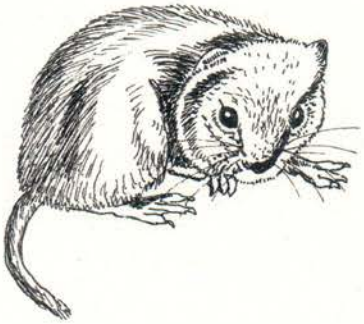
MISSISSIPPI ALLIGATOR



About 9m in length - feeds mainly on fish but can pull down and drown larger animals. Females make a heap of vegetation 1m high and lay 20-70 eggs there. These hatch after about 10 weeks.

EURASIAN WATER VOLE

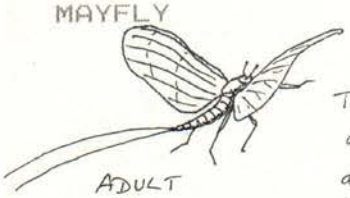
Rat-sized rodent with short ears, tail and muzzle. Excellent swimmer, has thick water-repellent fur and ears modified to keep water out. Gnaws on roots and grasses.



EUROPEAN KINGFISHER

Brightly coloured. These solitary birds feed on fish caught by plunging into the water. Away from the water the fish is swallowed headfirst.

MAYFLY



ADULT

These fragile insects live only for a few days as adults, just long enough to mate and lay eggs. The young (Nymphs) are adapted to live in fast streams having flat bodies which stops them from being swept away.

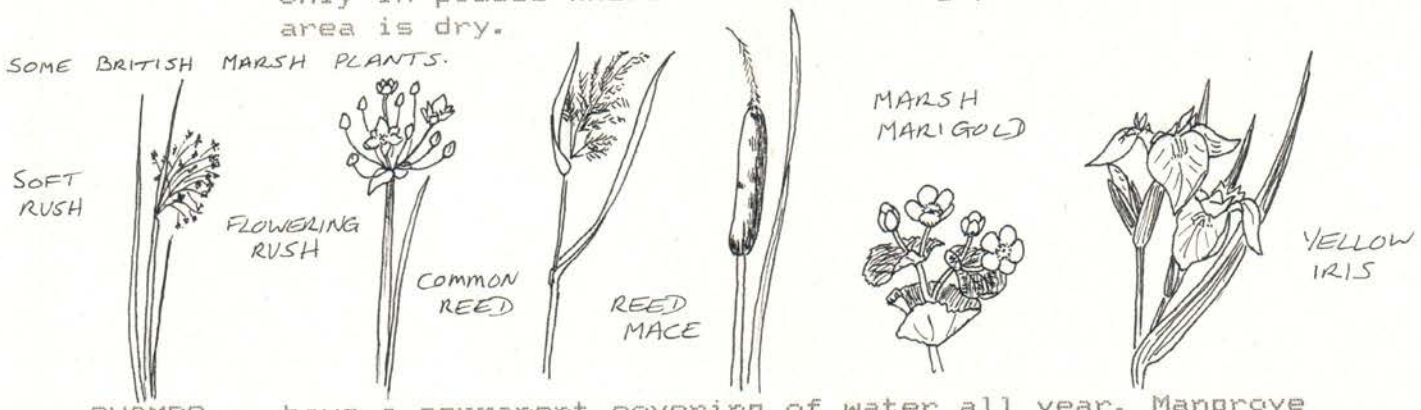
NYMPH

ARCHER FISH

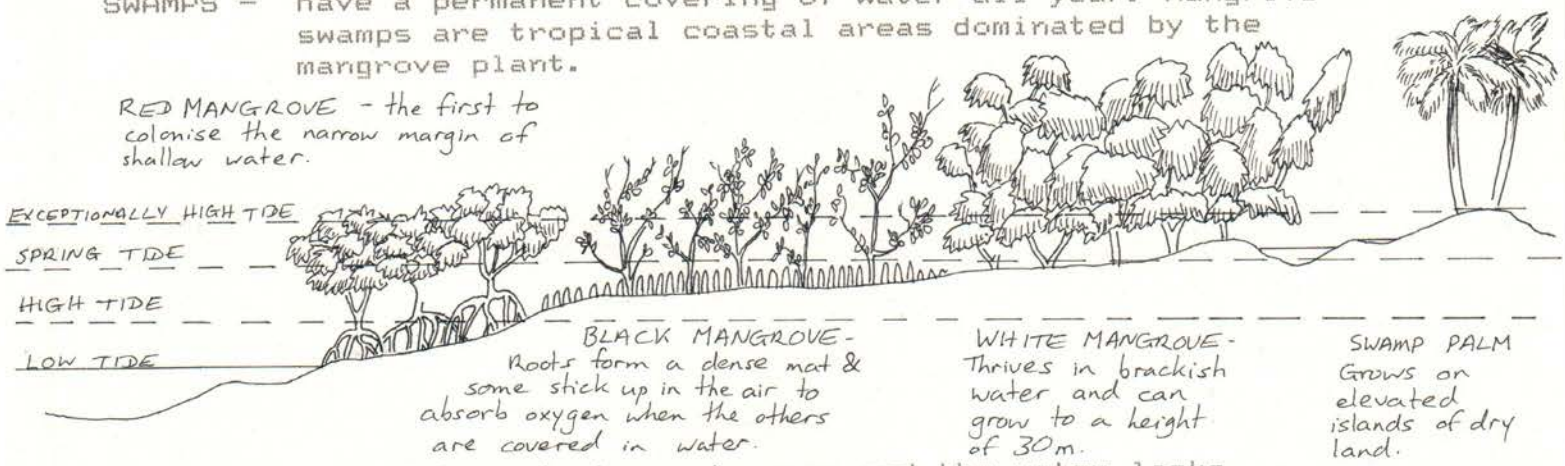
Feeds on insects by "shooting" them down into the water by spitting drops of water. The water is flicked out of the tubular mouth by the tongue. A fully grown Archerfish can spit 1.5m.

MARSHES, SWAMPS & BOGS

MARSHES - often have seasonal levels of water, affecting the vegetation that can grow there. Trees grow on marshes only in places where there are long periods when the area is dry.



SWAMPS - have a permanent covering of water all year. Mangrove swamps are tropical coastal areas dominated by the mangrove plant.



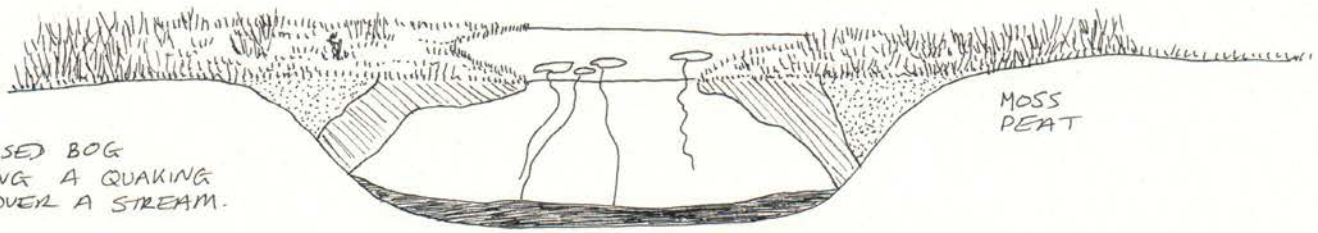
BOGS - occur where drainage is poor and the water lacks calcium, so the water is acidic due to the decaying vegetation and gives rise to specialised plants.

There are three types of bog:

VALLEY BOG - found in shallow depressions amongst wet heathland. Dominated by carpets of sphagnum moss.

RAISED BOG - develop on top of valley bogs due to continually growing moss - leading to accumulation of moss peat which may grow over some water creating floating mats of quaking bogs (or quagmires) which can "swallow" people and animals.

BLANKET BOG- found in places where the rainfall and humidity are high, creating a thick layer of bog moss.



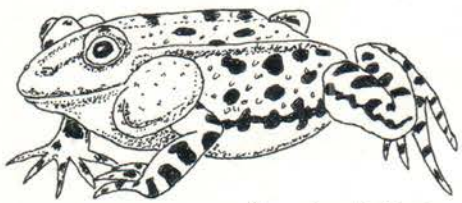
A RAISED BOG SHOWING A QUAKING BOG OVER A STREAM.

The boggy soil provides little nitrogen, so some plants make up for this deficiency by "eating" insects.

Egs. Sundew - one plant can catch as many as 2000 insects in summer.
Venus Fly Trap
Pitcher Plant.

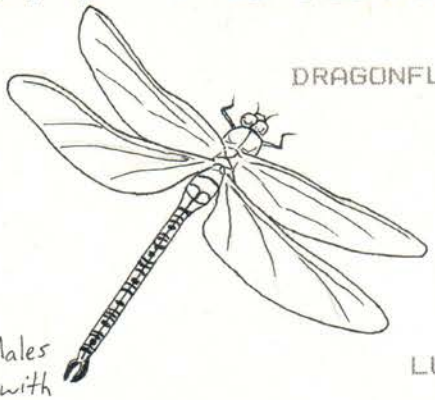
MARSH ANIMALS

MARSH FROG



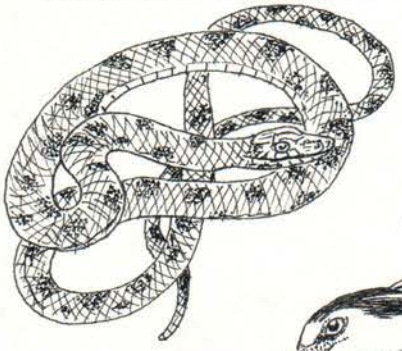
Biggest European frog (up to 12·5 cm). Males gather in the water croaking loudly, with two inflated vocal sacs, to attract females.

DRAGONFLY



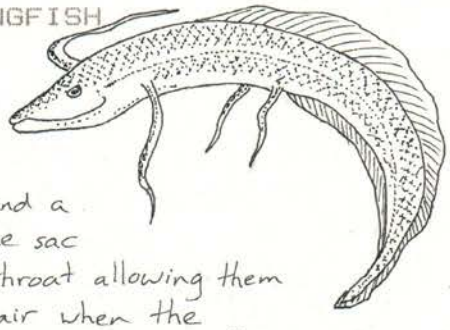
These predatory insects are strong fliers, but can only use their legs for gripping so they are unable to walk. Feed on smaller insects.

VIPERINE WATER SNAKE



Feeds on small animals. It is not venomous, but when cornered it will coil up and strike in a viper-like manner.

LUNGFISH



Have gills and a long lung-like sac along the throat allowing them to breathe air when the water drys up. Feed on frogs and small fish using teeth made up of a pair of sharp plates.

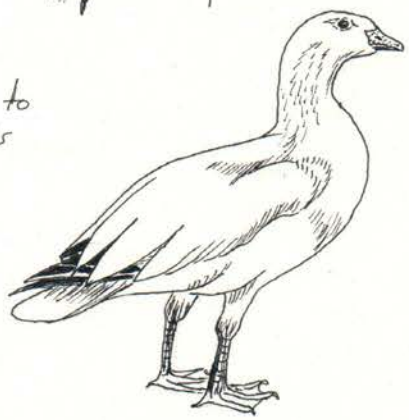
NIGHT HERON

Feeds on fish & frogs at dawn & dusk by standing very still, waiting for prey to come close enough to be caught.

RUFF

Ruffs compete for females (Reeves) in the spring by ritual dances and mock fighting. The individual who wins takes his choice of female/s.

SNOW GOOSE

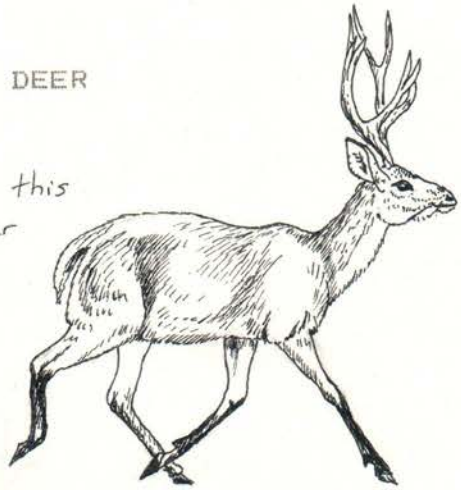


Migrate long distances to marshy feeding grounds and to breed. Graze on short grass, especially young shoots with their scissor-like beak.

MUSKRAT

Largest of the voles, they live among the water plants in summer and build an above-water lodge in winter.

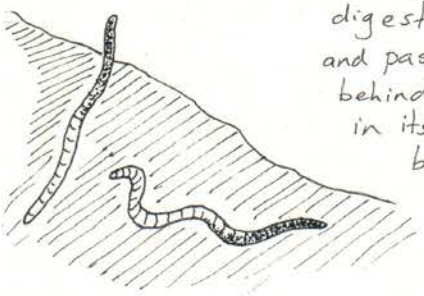
MARSH DEER



The hooves of this S. American deer are very long and can spread wide to help it walk over wet areas without sinking. Feeds mainly on aquatic plants.

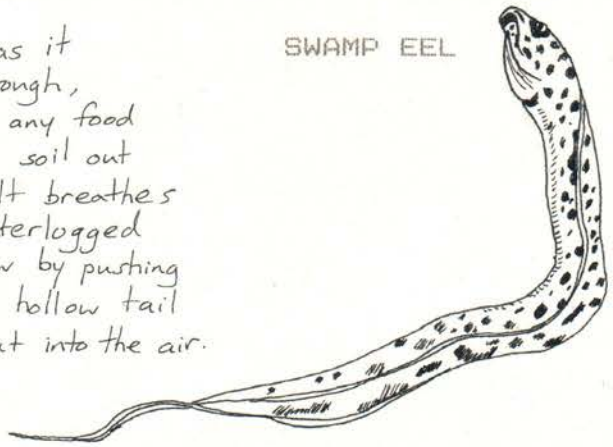
SWAMP ANIMALS

SWAMP WORM



Eats mud as it burrows through, digesting any food and passing soil out behind. It breathes in its waterlogged burrow by pushing its hollow tail out into the air.

SWAMP EEL

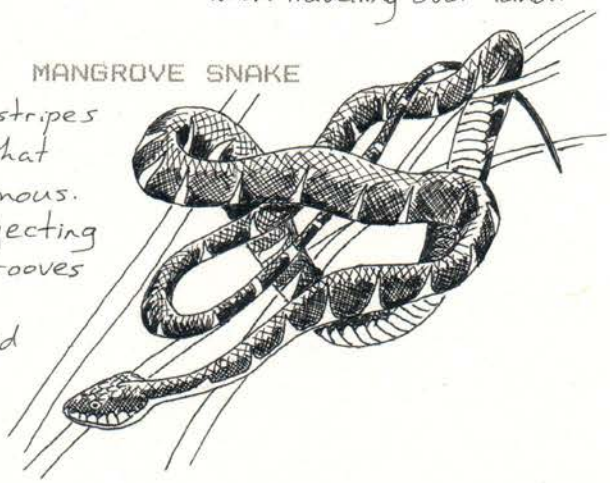


Nocturnal fish; called an eel due to elongated shape. Live in poorly oxygenated water, and can fill their gill chambers with water so they can 'breathe' when travelling over land.

BIOMPHALRIA SNAIL

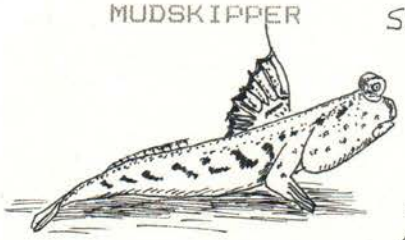
Feeds on aquatic vegetation. Carries flatworm larvae which leave the snail to bore through peoples' legs to the bloodstream. The parasite causes 'snail fever' or bilharzia which can be fatal if untreated.

MANGROVE SNAKE



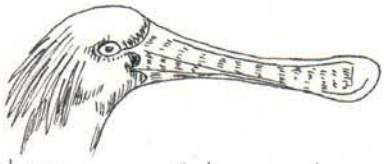
Black & yellow stripes warn others that they are venomous. Kill prey by injecting venom down grooves in the fangs. Prey is swallowed whole.

MUDSKIPPER



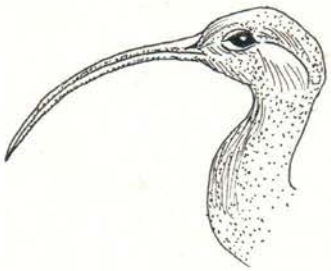
Skims food from water surface, spitting out the mud & water. Live half in half out of water, breathing in a similar way to swamp eels when on land. Front fins modified into primitive legs.

SPOONBILL



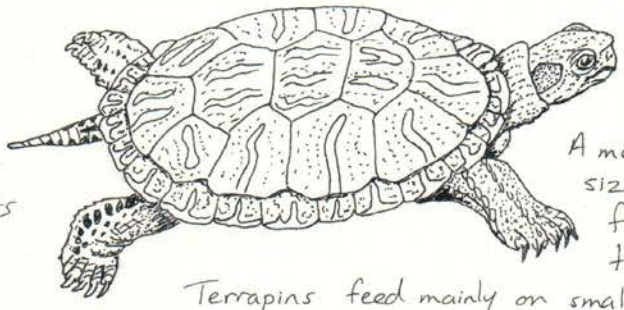
Feeds by wading into shallow water and sweeping its bill from side to side stirring up fish, crustaceans, molluscs and plant material which it feels with its touch sensitive bill.

SCARLET IBIS



Probes in soft mud and around roots for frogs, insects, crustacea & small fish. Bright red colour is obtained from pigments in their shrimp-like food.

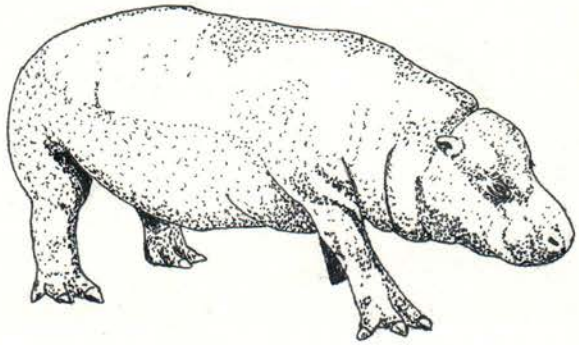
RED-EARED TERRAPIN



A medium sized freshwater turtle.

Terrapins feed mainly on small animals, but will also take some vegetation, especially waterlily buds.

PYGMY HIPPOPOTAMUS



Up to 1m in height and weighing up to 275 kg. Has slightly webbed feet and can swim underwater for long distances. Eyes, ears and nostrils on top of the head. Feed at night out of the water on shoots, leaves and fallen fruits.

WETLAND PEOPLE

Wetlands are not wastelands. Many people need and use them in many different ways.

Dyak people of East Malaysia - live in longhouses of bamboo with rush covered roof which are constructed on stilts. Access to the longhouse is often only by boat along the river.

Floating cities - some eastern countries have heavily populated cities, and many of the people live in boats in the estuaries and rivers eg. Bangkok and Hongkong.
Europe also has floating cities - Venice is built on more than 100 islands criss-crossed by canals. Venice originally developed on the banks of lagoons formed by the Po River delta.

Wetlands are a rich source of food.

*Fish are caught in rivers and estuaries by net fishing from boats.

*In Africa, on a tributary of the River Niger, the Argungu fishing festival is held once a year. The river contains few fish for most of the year, but on a given date the "keeper of the river" says that fish will arrive. Up to 5,000 fishermen catch Nile Perch which appear in great numbers, providing an important source of protien for the local people.

*In France, the Danube has a local Sturgeon fishing industry which dates back to 1000 BC. The same techniques are still used today.

*Many countries depend on wetlands for their staple diet. Rice is grown in paddyfields which are, in effect, wetlands as the water level is always kept above the soil surface.

*Reeds are used in many ways and in many countries around the world including Britain. Reeds are used for building, thatching and making mats. Papyrus reeds were used for making boats and paper.

*Willow is pollarded for timber; important in areas where no other trees occur. The young branches are used for basketmaking.

Most developed countries use wetlands for pleasure - boating, waterskiing, windsurfing, bird watching, angling (Britains'most popular sport), yachting, or simply for a pleasurable walk are just some of the activities we can enjoy.

THREATS TO WETLANDS

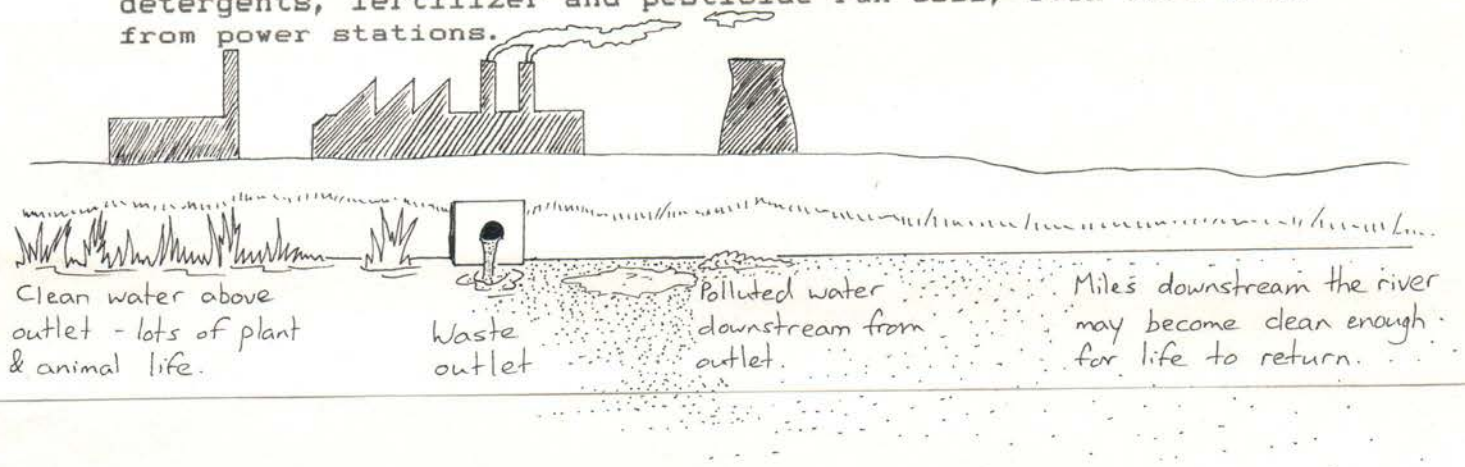
Wetlands, especially marshes, swamps and bogs are threatened by many of mans' activities.

DRAINAGE

WATER IS DRAINED FOR:
AGRICULTURE - the soil in marshy areas is extremely fertile and is sought after for growing crops. So these areasare drained, the vegetation modified and flooding controlled. Resulting in a totally different habitat.
ROADS and RAILWAYS - drainage for the building of such course-ways has removed or damaged the wetland habitat, depleting the wildlife population.
BUILDING - the further development of towns and cities has completely removed some natural wetlands.
ALSO some irrigation schemes that are not well planned have led to major wetlands drying out.

POLLUTION

Waterways become polluted by sewage, industrial effluent, detergents, fertilizer and pesticide run offs, even warm water from power stations.



OTHER THREATS

LANDFILL - for houses, industry, transport & recreation leads to total habitat loss.

RECREATION - often leads to damage of wetland habitats, sand dunes and bogs for example.

DAMS - the creation of reservoirs changes the habitat completely.

PEAT - cut directly from bogs for burning or use in the garden. This is causing extreme damage to peat bogs of Britain and Ireland.

WOOD - often the only fuel supply for wetland people, so trees are cut down, often with little replanting.

REEDS - harvested for roof thatching, they are in danger of being overexploited in many wetland areas.

HUNTING & FISHING - laws restricting these activities to seasons or completely banning them are often difficult to enforce. Also lead weights used in coarse fishing have killed many swans in Britain and Europe, as the birds swallow them and gradually die of lead poisoning.

CONSERVATION

Wetlands are extremely important places, not just for the plant and animal life but for many humans as well. So we should try to protect and maintain these wonderful habitats.

INTERNATIONAL CONSERVATION

34 countries signed Conventions on Wetlands of International Importance in the 1970s to protect 279 wetland sites covering nearly 190 million km.

Many countries have made wetlands into National Parks ensuring protected habitat for the wildlife.
Eg. The Everglades in Florida, U.S.A
The Carmargue in southern France.

BRITAINS WETLANDS

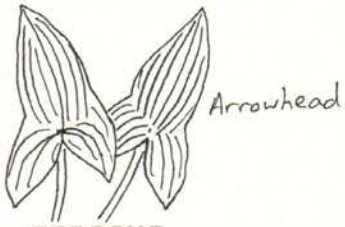
Some of our wetlands are protected as nature reserves by the Nature Conservancy Council, the National Trust, the Royal Society for Nature Conservation and other organisations. The Wildfowl Trust also owns more than seven sites around Britain providing important sanctuaries primarily for ducks, geese and swans, but also for the plant and animal life of the sites.

WHAT CAN YOU DO?

Join local conservation groups and help clean up ponds and streams.
Join the Wildfowl Trust.
Join the Otter Trust.
Join the World Wide Fund for nature conservation (W.W.F.)
Create your own pond.
Moniter a local pond, stream or canal by the types of plants and animals you find there - NEVER GO NEAR WATER ALONE , ALWAYS LET SOMEONE KNOW WHERE YOU ARE GOING.

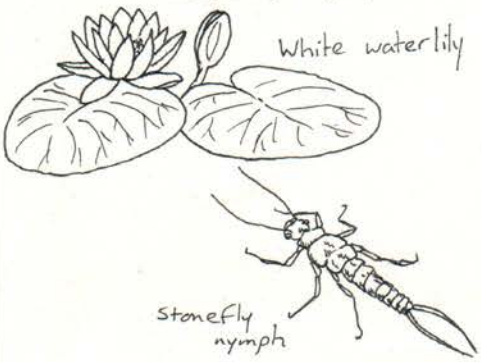
Plants tollerant of:

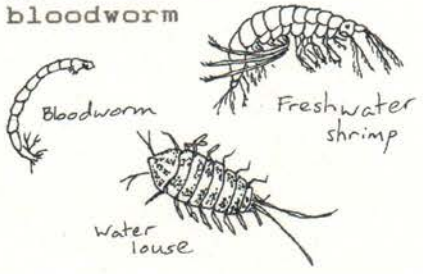
NO POLLUTION	SOME POLLUTION	SERIOUS POLLUTION	HEAVILY POLLUTED
Water millfoil	Reedmace	Fennel pondweed	None
White water lily	Water starwort	Blanket weed	
River crowfoot	True bulrush		
	Arrowhead		
	Yellow water lily		
	Duckweeds		
	Curled pondweed		

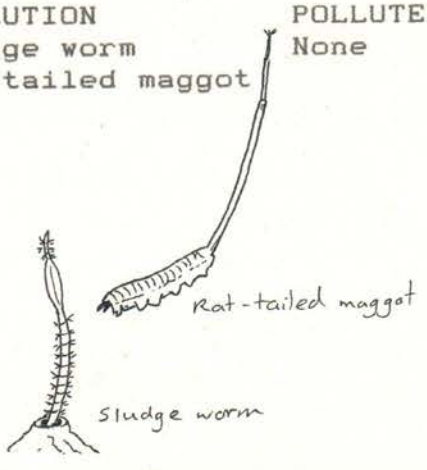


Invertebrates tolerant of:

NO POLLUTION	SOME POLLUTION	SERIOUS POLLUTION	HEAVILY POLLUTED
stonefly nymph	caddis fly larvae	sludge worm	None
mayfly nymph	freshwater shrimp	rat-tailed maggot	
	sludge worm		
	rat-tailed maggot		
	water louse		
	bloodworm		







WETLAND ACTIVITIES

DRAW the feet of ducks, otters, flamingos, terrapin, frogs etc.
MAKE plasticine models of the feet.

REPORT the different ways of swimming, use as many descriptive words as you can.

LOOK at wetland birds - compare their beaks & discuss what and how they eat.

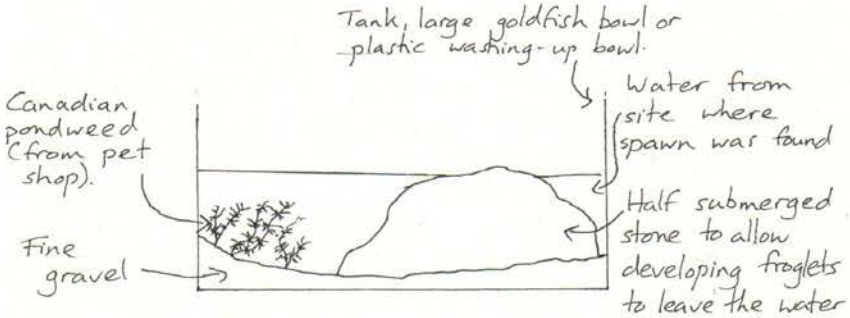
DESIGN your own "Save Our Wetlands" posters.

MEASURE the dimensions of the aquaria. Calculate the volume of water, and discuss the sizes and numbers of fish kept in that space.
Try designing your own aquarium - think about the ways of keeping it clean etc.

MAKE up dances based on the movements of a chosen wetland animal eg. terrapin, pirahna, duck, otter, flamingo etc.

RAISE your own frogs from tadpoles, and then release them back into the wild :

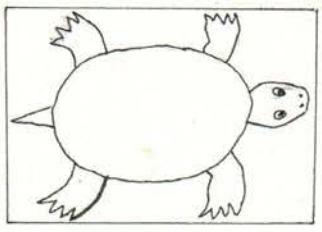
1. Make a habitat for them.



2. Collect a small amount of frogspawn
3. Keep the tank in a cool place, away from direct sunlight.
4. Tadpoles feed on pondweed. As they develop legs hang a piece of raw liver or chopped earthworm in the water. Change the meat daily.
5. When fully developed, release the frogs into the pond where the spawn was found.

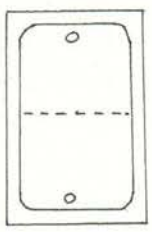
MAKE wetland animals :

Walnut shell terrapin -

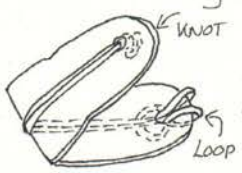


Trace round half a walnut shell on thin card. Remove shell & draw legs, head & tail. Cut round outline & glue to open side of shell. Bend legs & tail down & head up. Paint card to match shell, adding eyes and scales.

Jumping frog -

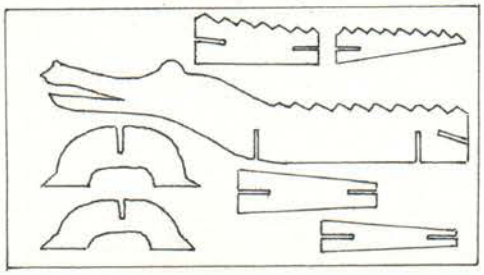


Cut a piece of card 20x10cm & round off the corners. Pierce holes in either end. Score across middle & bend forwards & backwards a few times.
Paint frog on one side.
Loop elastic band through one hole, and knot it through the other hole.



Bend card until elastic is stretched & hold. Place on table & let go !

Slot-together crocodile -



Draw outline on strong card. Cut out and paint/crayon etc. the sections. Slot the sections together.
Make a number of crocodiles in different sizes & make a wetland habitat to put them in.

Sorry, the real page 13 has been lost.

Bad gnus travel fastest

USEFUL INFORMATION

GLOSSARY

Algae - types of non-flowering plants, ranging from microscopic single celled species to the large seaweeds.

Nymph - a stage of growth in some insects prior to becoming adult.

Tectonic - refers to the movements of land giving rise to structures such as mountain ranges and trenches.

Viperine - type of snake which resembles vipers, but is not venemous.

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SOCIETIES

EARTHLIFE, 10 Belgrave Square, London, SW1X 8PH.

FAUNA & FLORA PRESERVATION SOCIETY, 78-83 North Street, Brighton, East Sussex, BN1 1ZA.

FRIENDS OF THE EARTH, 377 City Road, London, EC1V 2NA.

RSPB, The Lodge, Sandy, Bedfordshire,

WATCH (junior membership of the Royal Society For Nature Conservation), 22 The Green, Nettleham, Lincoln, LN2 2NR.

WILDFOWL TRUST, Slimbridge, Gloucester, GL2 7BT.