YEAR 10 BASIC SCIENCE: **BIOSPHERE**

Outline is the topics outcomes. These outcomes are expected by students to achieve. The handout has all the information that is needed for the students to read through and complete the questions. Please take time to read through so you have a fair idea as to what is expected from you as a student in order to complete this topic. The outcomes are also part of the prescription which is used to assess students during the end of year exams. By completing this topic with reference to the outcomes students should be in a better position to do well in this topic. The questions you need to do are provided below and you need to do only these questions at this time. The answer will be provided in due time. The answer will be provided in due time.

OUTCOMES:

SECTION A: Evolution (2 HOURS)
Topics: simple ideas of evolution as a theory;

B1: Evaluate the following aspects of evolution: (1) the changing climate and landforms of the earth since its formation, (2) the 'primeval soup' theory of the origin of life, (3) that life evolved from simple to complex organisms, from micro-organisms, to plants to animals, and from sea to land, (4) that scientists have found much evidence to support the general idea of evolution, but (5) that many details of the process are not yet understood; (U1.3)
B2: Discuss how Christians find the idea of evolution is somewhat compatible with their religion, but other do not; (U2.1)

SECTION B: The Producer/ Consumer/ Decomposer Basis of Ecosystem (3 HOURS)
Topics: ecosystem: the producer/ consumer/ decomposer basis of ecosystems, the needs of each group and how these are met with reference to local examples (field studies are expected and keys should be used to classify all organisms studied; see Topic 8.5).

B3: Explain the producer/ consumer/ decomposer system as the basis of all ecosystems; (U1.3)
B4: List and explain the following needs of producers; warmth, oxygen, light, carbon dioxide, minerals, agents of pollination and seed dispersal, anchorage/ shelter/ protection; (U1.1)
B5: List and explain the following needs of consumers; warmth, oxygen, water, food, removal of excretory products, mates, company (for social animals), shelter/ protection; (U1.1)
B6: List and explain the following needs of decomposers; warmth, oxygen, water, food, removal of excretory products, shelter/ protection; (U1.1)
B7: Describe some examples of the ways in which producers, consumers and decomposers are adapted to obtain their needs in a local environment which they have studied (e.g. reef, bush, river); (U2.1)

SECTION C: Recycling in Ecosystems (3 HOURS)
Topic: - recycling of oxygen, carbon and nitrogen (see also Topic 8.5);

B8: Explain, in simple terms, how oxygen, carbon and nitrogen are recycled (see also objectives H3, E8, E9 and E10 from the Year 8 course); (U1.3)

SECTION D: Pyramidal Food and Energy Flows (1 HOUR)

Topics: pyramid of numbers and biomes, feeding, levels, (carrying capacity and overgrazing).

B9: Explain pyramids of numbers and biomes and be aware of the superiority of the latter as an indicator of the transfer of energy in an ecosystem (see also objective En11, Topic 9.3): (U1.2)
B10: Explain and use appropriately the following terms in relation to the pyramid of biomass; feeding level, carrying capacity, overgrazing; (U1.2)

SECTION E: Food Webs (3 HOURS)

Topic: feeding relationships, food webs and food web stability, introduced species and biological control.

B11: Explain and use appropriately the following terms concerning feeding relationships: herbivores, carnivores, omnivores, predators, scavengers, saprophytes, parasites, food web; (U1.2)
B12: Construct and explain simplified food webs; (U1.3)
B13: Predict some of the probable effects of the elimination of one species from a given food web; (A)
B14: Be aware of the relationship between food web complexity and ecosystem stability, with particular reference to oceanic islands, old tropical forests and coral reefs; (U1.3)
B15: Explain and use appropriately the terms "introduced species" and "biological control" referring as appropriate to Lantana, the African snail, Rose beetle and guppies as local examples; (U1.2)
B16: Discuss the threat of the crown-of-thorns starfish to local reefs and of the possible relationship of this threat to the collection of it predator the Triton, as a tourist souvenir; (U2.1)

SECTION F: Different Biomes (1 HOUR)

Topic: - the world's major biomes, the biosphere.

B17: define the term "biosphere" and state at least 2 significant characteristics of each of the world's major biomes; polar, tundra, taiga, temperate woodland and grassland, tropical rainforest, savannah, desert; (K1.1, K1.2)

SECTION G: Environmental Pressures (4 HOURS)

Topic: man and the biosphere: pressures on natural activities; pollution of air, water, food and land; conservation.

B18: Describe and explain in general terms the effects on natural ecosystems of pressures resulting from the following: industrial development, mining, urbanization, communications systems, over fishing and hunting, deforestation, overgrazing and poor land management, intensive farming, over pollution; (U1.2)
B20: Discuss possible long-term dangers to man from the following effects from some of the activities in

B18; upsetting ecological balances loss of animal and plant species, impoverishment and erosion of soils, pollution; (U2.1)

B21: List some local and overseas examples of pollution of air (carbon monoxide, sulphur dioxide and nitrogen oxides), water (sewage and non-biodegradable rubbish), food ("food poisoning" and mercury), and land (DDT and dangers associated with each example; (K2.1)
B22: Discuss the threat to the quality of life posed by excessive overcrowding, the accumulation of rubbish and excessive noise (see also objective S8, Topic 8.3) with reference to local examples; (U2.1)
B23: Discuss the dimensions of some notorious environmental problems, e.g. the Exxon Valdez oil spill, Bhopal and Chernobyl; (U2.1)
B24: List and explain the main arguments for conservation; (U2.1)
B25: Discuss conservation measures taken worldwide; (U2.1)
B26: Explain the purpose of the Vanuatu National Conservation Strategy as the planned, sustainable exploitation of the land and its natural resources and be aware of the ned for such planning: (U2.2)
B26: Explain the purpose of the Vanuatu National Conservation Strategy as the planned, sustainable exploitation of the land and its natural resources and be aware of the need for such planning; (U2.2)
B27: List SPREP, IUCN, Greenpeace and VNSS as conservation groups active in the area; (K1.1)
B28: Relate the following to their potential for reef damage: reef walking, careless shell collecting, Triton removal, coral removal, rubbish (especially plastic bags), fishing with explosives and poisons, riversilt and sewage; (U2.2)
B29: List some of the ways in which forest areas are of value to local people; (U2.2)
B31: With reference to local examples, explain the terms: sustainable exploitation, over exploitation protected species, catch quotas, closed season, size limits, export controls, moratorium, commercialization ban,(U2.1)

Chapt-1: <u>The origin of the land/inhabitants</u>

Land Form

Two Forces that form land from sea are:

LAND UPLIFT & VOLCANIC ACTION

Table of evidence

LAND UPLIFT	VOLCANIC ACTION
Earth tremors	Visible eruption
Coral/limestone cliffs	Lava flows
Landform ledges	Volcanic ash soils
Boulder coral die-off	Pumice on land/sea

Explain

Vanuatu formed by Australian plate slowly being forced under Pacific plate. This creates islands/Vanuatu in two ways by UPLIFT & VOLCANIC (Uplift – land rises out of sea- Volcanic action - at the same time rock layers may fracture causing formation of volcanoes. Volcanoes erupt become an island)

Geological time scale

Australia is oldest (4000 million). Santo (20 million) is oldest in Vanuatu. Plants/animals **colonised** island through wind/ocean currents

Modern man reach PNG about 40000 yrs ago then thru Melanesian countries.

Chapt-2: <u>ECOSYSTEMS</u>

An **ecosystem** is a small community of plants, animals and smaller organisms that live, feed reproduce and interact in the same area/environment. (***ecosystem – is a habitat together with group of organism in it/All living & non-living in an area***).

Habitats is where organism live/make their home

Plants grow where they are best adapted. Plants root system/stems/leaves/flowers/fruits develop to suit that place.

Eg. Orchards are **epiphytes** (grow on trees instead of in the soil) <u>Adaptation:</u>

-leaves photosynthesis (make sugar/starch) +

-roots absorb nitrate/other minerals

= make protein+ other needed substances needed in plants.

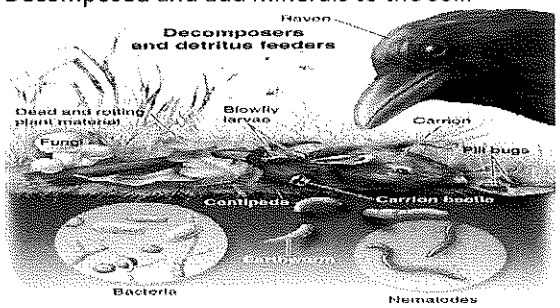
<u>Plants</u> are **producers** (photosynthesise/make their own food)/stay in one place.

<u>Animals</u> are **consumers**/move about to food/adapted to catch food.

All Animals obtain food from Plants/directly or indirectly through a **<u>food chain</u>**

Grass → Grass hopper → *→Human*

Decomposers are .. Minerals are recycled rapidly in forest. Many dead leaves / branches /flowers / fruits Decomposed and add minerals to the soil.



<u>Studying an ecosystem</u>

Many organisms are involved-we'll look at Habitat/Producers/Consumers/Decomposers

Habitat features

Land form

- Describes slope-surface/ direction
- Measure distance/angle/ boulders size..

Nature of soil

- Soil kind-volcanic/coral/forest?
- Features – thick/deep
  – pH/ air&water/humus content.etc

Climate

- Sun/Rain -exposed/sheltered?
- Rainfall- high/low?
- Measure temperature/wind speed/ humidity

Producers and food supply

Producers supply food (Plants). Photosynthesis (obtain light/water/carbon dioxide to make food)

Producer grow well provided

- certain minerals
- suitable temperature/pH..
- (some) firm anchorage
- (some) sheltered / exposed

To Reproduce

- need environment to pollinate/ seed dispersal

Consumers

Animals are consumers- obtain food/ $O_{2(g)}$/$H_2O_{(l)}$

-need suitable temperature

Aquatic animal need right pH/salt concentration

Animals need

- shelter from predator/sun heat
- to find mates
- special place to breed/raise their young

Decomposers

Decomposers find food in moist condition/are essential for the life of an ecosystem

Some need oxygen/others don't

Their activity require right temperature/pH

Chapt4: <u>Mangrove Swamps (ecosystem)</u>

Mangrove

Mangrove swamps develop where shore is

Chapt.3/4/5: <u>Different ecosystems of Vanuatu</u>
Primary forest/Secondary forest/Coastal forest/ Mangrove swamps/the shore line/the tidal zone/the living reef/ the open sea/freshwater system

Chapt.3: <u>Primary Forest (ecosystem)</u>
Primary forest is the original forest which was here before people came to Vanuatu
Primary forest

- Is the old forest
- Contains variety plants/animals
- Endemic (only found here) – endemic birds/insects

PRIMARY FOREST	
Plants	**Animals**
Wild kava/Canoe tree/ whitewood/ natora ..etc	Fantail/ flying fox/ elephant beetle ..etc

<u>Secondary Forest (ecosystem)</u>
Secondary forest is the "bush" that grows back where a land has been cleared.
Example: along side roads/ edge of forest/ neglected plantations/ old gardens/ around village – most plants are **introduced** to Vanuatu

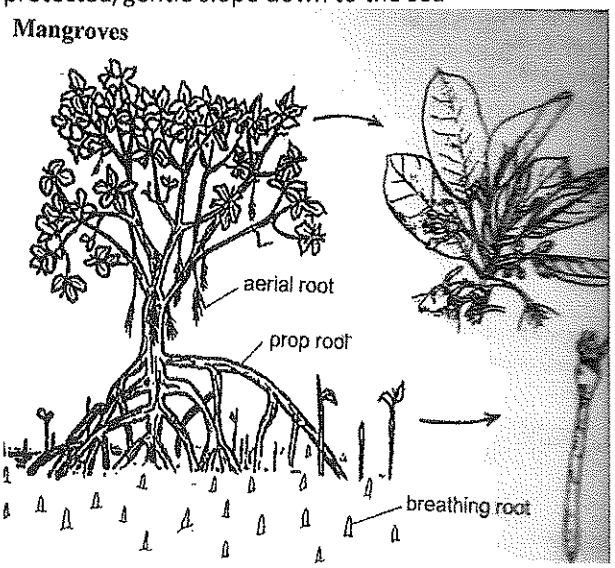
SECONDARY FOREST	
Plants	**Animals**
Lantana/ Guava/ Cassis/ castor oil/ mimosa (nailgrass)	Mosquito/ Hornet/ rat/ mynah bird/ cockroach/ African snail/ barn owl

Feral animals are animals that are once tame (domestic) become wild...eg chicken/ cat/ wild bullocks. Man introduce it to our forest. Wild raspberry disperse by wild bullocks.
Forest regeneration is when young tree seedlings grow after a clearing (created by fallen large old tree..etc).

<u>Coastal Forest (ecosystem)</u>

COSTAL FOREST	
Plants	**Animals**
Fish-poison tree/ Namele/ pandanas/ Acacia simplex /tree helicopter	Land crab/ nakato/ coconut crab/ kingfisher/ coconut lorry

protected/gentle slope down to the sea



Mangroves have 3 kinds of roots;

1. Prop roots – strong with thick branches... it stabilise the tree from wind/waves
2. Breathing roots (pneumatophores) – grow upwards out of the mud...it provides oxygen
3. Aerial roots – hang down from the branches.

Mangrove seeds start germinating while still attached to the parent plant and develop a long spear like root. When the seed drop off they float vertically until they lodge in the mud and they quickly produce additional roots and begin to grow.

Animals of the mangrove ecosystem
Mangrove provide

- good place for fish to breed
- good hiding place for young fish
- tangle of roots provide protection from predators
- good supply of plant debris (dead leaves/flowers/branches) for planktons
- fish eats planktons

Planktons –microscopic plants(algae) and animals(larvae of sea creatures).
Animals: Hairy crab/ fiddler crab/ mangrove heron/ oyster/ nerite/ fish larva/

Herbivores feeding on the mangrove (eg crab beaking leaves into small pieces) also cycle nutrients into the water to support the growth of planktons. Planktons feed on nutrient-rich waters.

<u>The Tidal zone (ecosystem)</u>
Tidal zone has several distinct area.

- Driftwood zone – at the top of the shore

The Shoreline (ecosystem)

Beach Plants – beach bean/spinifex grass/beach morning glory.

Beach is difficult for plants to grow

Beach is exposed to hot sun/ocean winds

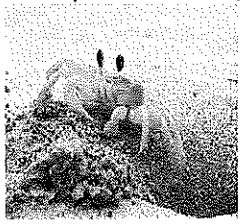
Roots not anchored well/nor hold rain water long

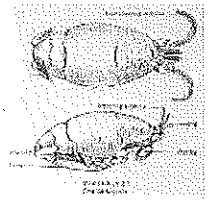
Salt spray falls on plants at high tide/strong winds/ cyclones(plants swamped by seawater)

An explosion in Indonesia 1883 wiped out all life. One of the first plants to grow on the island (recolonisation) again was the beach morning glory. The plant seed was dispersed by ocean current enabling it to drift ashore. Beach morning glory is a pioneer plant and it grows horizontally to support itself with minimum water and nutrients available. A tall tree would not survive.

Beach animals- sand ants/beach flies/sand hopper/hermit crab/Ghost crab/Green rock crab/rock murex/chiton/rock hopper(blenny)

Animals' main problem is to shelter from hot sun(similar to very small deserts)





Ghost crab Hermit crab Mole crab

During day Ghost crab stay in the tunnel safe from the predators/cool protection. At night it's not hot and safe (from predators) to find food.

Hermit crab are well adapted for life in a shell. The colour of their shell will have to camouflage (blend) with the colour of the beach to increase chance of survival. White shell if white beach...etc

Mole crab burrow into sand where beach slopes to meet the breaking waves/they have pointed heads and move forward instead of sideways/legs beneath body – they are NOT true crab. They are very sensitive to pollution therefore are good pollution indicators. No mole crab where beach are polluted.

Most crabs are scavengers therefore they eat dead decaying matter – dead fish/marine organism/plants

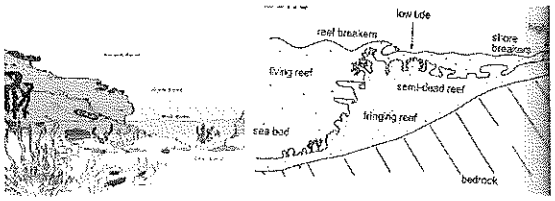
changes(position with the strength of the tide)

- Upper beach of sand/pebbles/rocks

Some shore no reef

Shore – reef present

- area of semi-dead reef in tidal zone leading to live reef & to ocean.



Changing tide alter conditions for organisms in the tidal zone twice a day. Organisms are more exposed to high temperature/high salinity/high carbon dioxide when the tide is low...this differ when the tide is high.

Plants of tidal zone

- rock algae/turbinaria/padina/ sea grass/halimedia/valonia

Shallow water at edge of reef support abundance of life- algae (plant growth).

Good condition for plant (algae) growth

- bright light/warm water/firm anchorage on dead reef/plenty dissolve gases($O_{2(g)}$) due to wave action

Herbivores feed on plants(algae) mostly at night

Halimeda is a useful algae..it helps make sand

Sea grass is not an algae.

Animals of tidal zone

- brittlestar/sea anemone/sea slug/ sponge/pistol shrimp/rock worm/bivalve sea worm/spaghetti worm/cone shell/ sea snake/sand dollar/muray eel/ sea urchin/ conch shell/ auger shell/ sea cucumber

at semi-dead reef shore

- animals hide at crevices/tunnels
- lots of food(most animal eat at night)

Different feeding method at reef tidal zone

-algae grazer/filter feeder on plankton/scavenger/ sand eater/bore holes in other snails/ eat debris/ use a poisonous bite/ use a poisonous harpoon (spearlike weapon)

-some animals lay eggs with no shell (jelly-like balls)/ mothers carry egg around(eg. crab). Eggs hatch to larva which are microscopic animal that drift in ocean current/many eaten/few survive

Plant Plankton -> Animal Plankton -> Smallfish -> bigfish

(microscopic algae) (zooplankton)

(Photosynthesis)

Crown of thorns starfish can damage coral/the whole reef. It produces an enzyme which dissolves polyps in

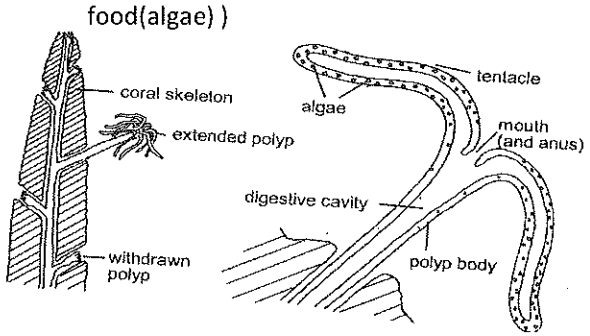
Chapt.5: <u>The Living reef (ecosystem)</u>

Algae

- are producers
- are not attached to rocks due to strong wave action
- live within bodies of coral polyps(tough rock-producing animal)

coral polyps

- polyps retreat when wave action is strong
- polyps waves its tentacles when all is calm/sunshines
- polyps tentacles has tiny algae that make food by photosynthesis(**symbiosis** – both benefit to live relationship/provide shelter(coral)/ food(algae))



Corals are only found in tropical seas and to a depth of about 20 metres. Temperature (warm water) and normal salinity are the two factors supporting growth of coral. River changing salinity in salt water always break the reef. Light intensity is a factor that will enable photosynthesis by algae..also determining growth of coral.

Coral provides shelter and carbon dioxide to algae. Algae use carbon dioxide to photosynthesis and provide food and oxygen for the coral. **Symbiosis.**

<u>Coral types</u>

Staghorn coral/black coral/mushroom coral/brain coral/ table coral/ soft coral/stony coral

Coral rock is made of calcium carbonate/polyps absorb calcium from sea water and make their own $CO_{2(g)}$.

Coral can be damaged by cyclone/tsunami/people walking/micro-organism causing fish poisoning

<u>Animals of the coral reef</u>

Butterfly fish/parrot fish/reef shark/octopus/reef cod/ ray/crown of thorns starfish/cuttle fish/spiny lobster/ puffer fish/ giant clam/ fanworm/shrimp

Live reef provide abundant food/excellent hiding place for animals

their tiny holes.

No polyps survivors- nor coral growth/reef destroyed – food chain affected (species affected by food supply/affect predator as well)..eg.large area of reef in Australia destroyed by Crown fish.

Sewage outflows can increase starfish population. Sewage fertilizes plankton growth and starfish larvae feed on plankton.

Triton shell is the natural predator on the Crown of Thorn starfish. Removing triton shell on reef (for tourist) will increase starfish population.

Feeding relationship: Clown fish defend its own sea anemone. Sea anemone has stinging tentacles to catch fish for dinner and clown fish will have the leftover. Fish that chase Clown fish usually end up for dinner. Clown fish have a special slime on their skin therefore they are not affected. (adaptation).

<u>Reef animals can be dangerous</u>

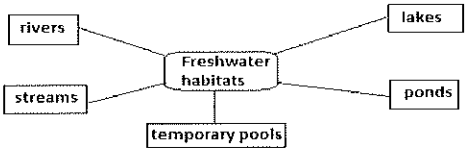
- bright blue ring octopus (10-15cm) – can kill an adult with one bite (be careful)
- coral cuts easily become infected
- stonefish are well camouflaged. They have very poisonous dorsal fin spines
- sea snake are extremely poisonous and should be left alone
- sea urchin spines can easily break and can cause infection/difficult to remove
- cone shells have poisonous "harpoon"
- jellyfish can give very painful stings
- the hair of bristle worms irritates
- Crown of Thorns starfish have poison spines that are extremely painful
- Stingray half buried in sand may lash you with their whip-like tails.

<u>Organisms of ponds and lakes</u>

Australian dabchick/water lily/mosquito pupa/water beetle/golden-eye frog/water boatman/flatworm/

The Open sea (ecosystem)
Two third (2/3) of our planet is ocean. Ocean is the largest ecosystem. Different depth/temp./current patterns. Microscopic planktons is what whales it/increase fish population. Plankton increase where converging current help the upward movement of minerals. Fish also feed on planktons
Over-exploitation of tuna by use of "drift net fishing"/ "walls of death-net kilometres long"
Drift net can destroy ecological balance of the ocean
The open ocean animals
Flying fish/dolphin/mahi mahi (dorado)/sardine/squid/ red snapper(poulet)/perch/nautilus/bream/thresher shark/ bonito(skipjack tuna)/tiger shark/jelly fish/common grouper(loche)/blue marlin/ long tail snapper

Freshwater ecosystems
Different fresh water habitats in vanuatu



Rivers & Streams
Rainfall enable water to flow down as rivers/streams can be seasonal(depend on rainfall)

Some river plants
Water taro/liverwort/moss/plankton/chara/watercress/ water hyacinth/potamogeton
Rivers varies in depths/speed water flow/bottom nature
Different Plants are found in different parts of river due to the above factors.
River algae
Blue-green algae in rocks/microscopic plankton/jelly-like blue-green algae/green filaments of spirogyra/ brown membrane algae
Most algae may be found in rivers.
Some river animals
Golden-eye frog/Two-spot river fish/gambusia(guppy)/leech/ water beetle(hydrophilic)/thiara(water snail)/limpet(septaria) /river prawn(naura)/fresh water crab/kingfisher/spire snail(melanoides)/clithon (water snail)

Scavengers –naura/freshwater crab
Carnivores- spotted eels
Snail eat algae/ gambusia eat mosquito larvae(biological control –to fight pest)/ Pipefish like many other fish can adapt to changes in river estuaries as tides flows in and out.

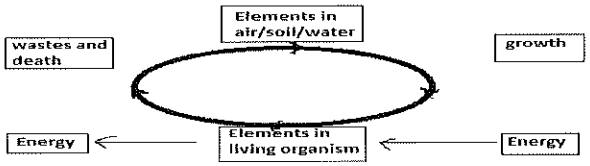
pacific black duck/purple swamphen

Lakes in Vanuatu: Lake Manaro(Ambae)/Lake Letas(Gaua)/Blue Hole(santo)/Duck lake(efate) Siviri Cave(Efate)
Water boatmen are insects that adapted to bonds/lakes. They swim on their backs with the hind legs rowing like oars

Temporary pools
Rainfall will collect in empty tins/temporary pool on the ground/leaf bases of banana/places where tree branches

- Mosquito breed – malaria/dengue fever
- Life cycle of mosquito completes in a few days(pupae to adult)

Chapt.6: Recycling the elements of life
Recycling is the re-use of substance. Eg elements such as carbon (c)/nitrogen(n)..etc



Energy is required to join elements into organic compounds which make up living tissues. Element is recycled but energy is NOT recycled. Energy is used by the organism(creature) in different ways/energy usually lost as heat.
Trapping energy in photosynthesis
Water($H_2O_{(l)}$)+ Carbon dioxide($CO_{2(g)}$)+ Energy(light) --→ -→ Glucose($C_6H_{12}O_{6(s)}$)+ Oxygen($O_{2(g)}$)

Sunlight energy is converted to chemical energy contained in glucose (organic compound). Many organic compounds make up an organism.
An amino acid
$C_6H_{12}O_6$ + energy + minerals(nitrate(NO_3^-) sulphates(SO_4^-)phosphates(PO_4^-)) -→ amino acids -→ proteins(C.H.O.N.P.S).

Plant photosynthesize/make glucose
Mineral carried from roots to leaves to combine with glucose (in different ways). This produces all the organic compound for the body.

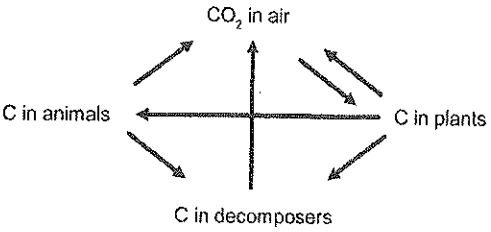
Organism store chemical energy in glucose and release energy in the process of **respiration.**
Nitrogen-decomposing bacteria break down soil nitrate (NO_3) to nitrogen gas (N_2) and oxygen gas (O_2).

Respiration

Glucose + oxygen → carbon dioxide + water + energy

Energy release when glucose broken down. Plants and animals obtain energy needed to operate their bodies by respiration

The carbon cycle



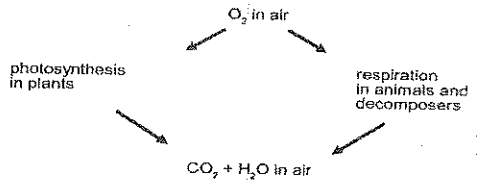
Plant takes in **C**arbon in the form of carbon dioxide to make glucose($C_6H_{12}O_6$) which also has carbon in it. Animal eat plant break down glucose to release **C**arbon as carbon dioxide back to atmosphere. Dead animal/plants decompose again carbon dioxide is release by respiration

The oxygen cycle

In respiration oxygen is used to releases the energy stored in food..carbon dioxide is produced.

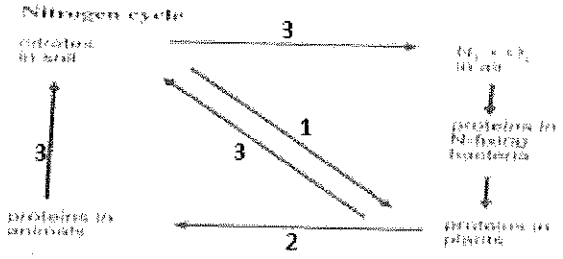
Animals and decomposers gives off $CO_{2(g)}$ all the time (via respiration)..plant only give off $CO_{2(g)}$ at night because it uses $CO_{2(g)}$ during day time for Photosynthesis and gives out $O_{2(g)}$ during day.

The oxygen cycle



The Nitrogen Cycle

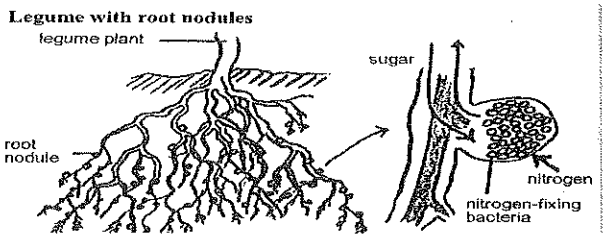
Nitrogen is an element needed to make protein..needed for growth/nitrogen from soil to plant ..we eat plant and we grow.



Pathways:

1. Absorption 2. Feeding 3. Decomposition

On the other hand Nitrogen-fixing bacteria that lives in the root nodule of legume plant is able to change nitrogen gas (N_2) from the atmosphere to ammonia (NH_4) form of nitrogen. NH_4 will be used to manufacture amino acids/proteins...legume will also benefit from it.

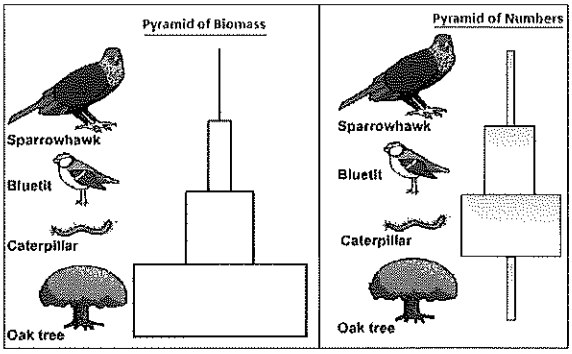


Legumes such as beans/peas/peanut/cassis...

Chapt.7: Feeding Levels

Plants are Producers/they make their own food by photosynthesis. Herbivores eat plants and carnivores eat herbivores. Only certain fraction of food is eaten/passed on from one level to the other.

In a stable ecosystem a balance is establish between different **feeding level**. This is often represented as Pyramid of numbers/pyramid of biomass



From the above pyramids identify the *producers/ primary consumers/herbivores/secondary consumers/primary carnivores/tertiary consumers/ secondary carnivores ....*

Pyramid of Biomass	Pyramid of Numbers

A banyan tree supporting many caterpillars supporting fewer lizards supporting one kingfisher. Draw on the above space a pyramid of numbers and a pyramid of biomass.

The coral reef ecosystem

Food webs- a pattern showing the feeding relationships between various organism.

(The **carrying capacity** of a biological species in an environment is the maximum population size of the species that the environment can sustain indefinitely, given the food, habitat, water and other necessities available in the environment).

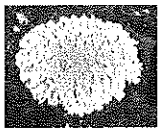
In farming livestock the **carrying capacity** of the land is the maximum number of animals which can be stocked on that land without damaging the quality of the pasture.
Understocking results in too much long grass
Overstocking result in overgrazing/soil erosion

Chapt.8: Feedzing methods
A variety of plant roots
Deep roots/shallow roots/roots adapted to rich soil/poor soil

Legumes/lichen & nostoc
Legumes use nitrogen fixing bacteria to be able to survive/grow well in soils short of nitrates.

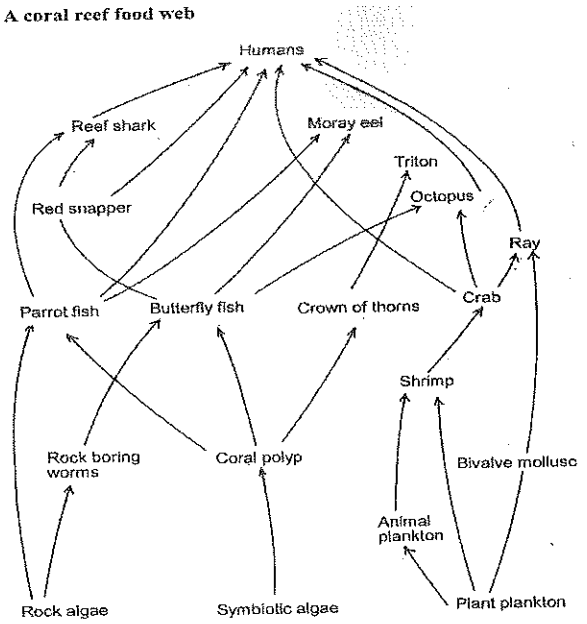
Noctic is a blue-green algae (found on stony ground/green jelly like) has the ability to fix atmospheric nitrogen.

Lichens (fungi&algae)are example of **symbiosis** (two kinds organisms live together and help each other to survive). Algae photosynthesise & fungi obtains minerals.



Reaching high by other method
In ecosystem producers compete for light and nutrients. Some plants become big by climbing up others. Rattan use hooked spines to aid climbing. Creepers like "mile a minute" can grow over other plants (shade them from light) and kill them.
Different plants/adapt to different places also different animals/different food source

Producers – plants which make food in photosynthesis/eg. plant plankton/symbiotic algae/plants
Herbivores- an animal that feeds on plants. Eg grass hopper
Carnivores- animals that feeds on flesh (other animals)
Omnivores- animal or person that eats food of both animal and plant origin
Predator- animal that hunt and kill another for food eg Owl hunt rat(prey)
Scavenger- animal that feed on dead decaying animals and plants.eg blow fly
Saprophyte- a plant/ fungus or bacterium that lives on dead or decaying organic matter eg. mushroom/brad mould
Parasite-an organism that live in or on another organism (host) and benefits by deriving nutrients at the host's expense.
Symbiosis-two organism coexist in one body form benefiting both/eg coral of algae&polyps
Filter feeder- animals that feed by filtering particulate organic material from water eg clam/barnacle



Specialised feeders on the reef
Different adaptive features to obtain specific food /according to specialised body part.
-Long-nose butterfly fish able to eat small crabs/shrimps hiding in staghorn coral
-Rockworms graze on surrounding rock algae
-Pistol shrimp made popping sound to each other and to catch food/fish for dinner.
-Sea horse is well camouflage/suck in planktonic organism
-Red spiked starfish has jelly-like star fish/eats dead sea grass leaves/debris on sea bottom
-Spaghetti worm live in tidal zone/extend arms from hole to trap plankton and cilia(microscopic hair) move trapped plankton to its mouth
-Bivalve are filter feeders/live undersand/gills absorb oxygen& trap plankton
-Sea cucumber eat sand/sand contain food(plant/animal remains)(different kinds)
-Box crab has wide front claws to burrow& hide also to break snail shells to feed.

Investigate food webs
Open stomach of reef organism/gives clue to the food eaten. Catch organism and observe them in aquaria
Determine the food web from the reef observation:
Turtles feed on sea grass&algae/Dugongs feed on sea grass/
Men eat dugongs & turtles & snappers. /
Blennies(Rockhoppers) eat algae/Snappers eat Blennies.

Chap.9: Our Living World: The Biospere
Exploring for life on earth

Disturbing nature's food webs

Food webs represent a balanced group of plants and animals adapted to each other and their environment.
Food webs maybe be disturbed by

- *cyclones* (reef recover after cyclone)
- *diseases* (some survive/some species become extinct)
- *human impact* (human disturb food web most)

Taking nature's surplus

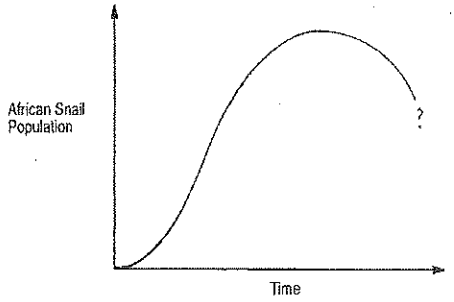
Nature always produce surplus/surplus is eaten and passes through food web. Example higher birth rate than needed... to maintain constant population. Most will be eaten and pass through food web. However the population will fall if it is over-exploited because of no surplus.

The effect of removing Tritons to sell to tourist (human impacts) will disturb food web meaning that the population of Crown of Thorns starfish will increase. Crown of thorns starfish will destroy the reef and definitely affect the food supply for parrot fish.etc .....affect the food web.

Fragile ecosystem and introduced species

Pacific islands 'land ecosystem' are usually incomplete/plant just arrive& animals incomplete.
So new species **introduced** has "explosive effects

Graph to show population growth of introduced African snails



African snail population exploded when it arrived in Pacific islands because there is no predator in pacific islands that will kill African snail. It damaged vegetation especially gardens. It also "carry" a disease of the brain called meningitis. To "**control**" their population a Predator snail was imported from Africa and release to kill this snail. Population of Africa has now decreased. This control is called **Biological control**. This Predator snail also killed our native snails

Quarantine regulation

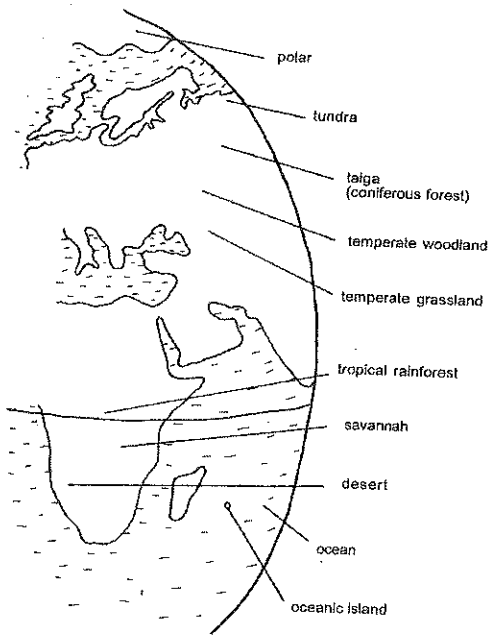
Isolation of Vanuatu provided by strict regulations of Quarantine has enabled many plants/animals farmed free from overseas pest and diseases
Plants taken to Vanuatu are watched for diseases and destroyed if it has. Eg. Rose beetle introduced to Vanuatu/noticed in airport area/spread to Santo damage cocoa plantation...etc..

Biosphere- is the part of the earth which can support life.
Biosphere consist of(land/sea/air)

- a thin layer of soil on the land surface
- a much more extensive and much deeper layer of ocean
- & the lower part of the earth's atmosphere

A greater variety of habitats and organism is found on land (**Terrestrial**).
Most **aquatic** (water) organism in ocean are found closer to the surface because of the high concentration of oxygen/high light intensity (most of plant phytoplankton are found there).
Ecosystem have been centred around volcano blow-holes in the very deep ocean trench because some organism (producers) are able to use chemical from the volcano to make their own food. (chemosynthesis)

The earth's major biomes



Regions with similar climates and geography have similar biological features. These similar regions are called **biomes.**
Example Hot Deserts found in several countries. Plant and animals of the *desert biome* show adaptations to survive hot dry conditions.
Most living things are found near the equator.
BIOMES. eg:- Polar/Tundra/Taiga/Temperate woodland/Temperate grassland/Tropical rainforest/Savanna/Desert/Oceanic island/Ocean

Chapt. 11: Pollution

Air pollution

Combustion (burning) of oil/coal (fossil fuels) to

Chapt.10: How people changed the world

A small group of hunters/gatherers

Hunter/gatherers in tribes collect fruits/plant roots in season/find honey/catch fish&birds affecting the environment very little. In contrast others clear vast area of ancient rainforest on a scale that can change the earth's atmosphere.

As human societies developed more and more of the land's natural ecosystem are now changed to farms.

Selective breeding where wild plants/animals were bred carefully to develop their useful characteristics

Progress in transport

Motor transport was invented and manufactured on a vast scale. Human population exploded because foods were **mass produced** and other needs like new medicine can easily be transported around the world.

The towns spread

Ribbon development is the pattern of growth caused by route of communication (more road/more transport) resulting in more and more people/towns & cities.

In Vanuatu ribbons are likely to extend along our coast. In other countries ribbon has been created along railways and in others along rivers.

Industrialisation

Economic systems have developed to combine resources of many people. Industrial devlopments/mining of earth's resources & farming(agribusiness) now take a massive scale. Now a world's population is 7 billion (march 12/2012) meaning there'll be more demand for resources.

Terraced farming on hillside

With high population farmers have been forced to make use of marginal land.eg dry areas/steep hillside. Some pasture lands have been overgrazed/ ruined...over hunting/fishing to extinction. Mistakes from the past are now recognised and steps are taken to correct them. We must take care of our planet in a global scale.

Industrial Revolution should now be followed by **Environmental revolution.**

Pollution and conservation

Pollution spoils natural environment/damage natural habitats/affect human health. Most pollutants are waste materials that are not properly disposed.

Conservation tries to protect the environment/keep its natural condition/manage it to bring about "sustainable exploitation." Existence of natural habitat with the survival of as many species as possible.

release energy also cause air pollution.

Incomplete combustion produces carbon particles and carbon monoxide gas ($CO_{(g)}$).

Complete combustion – all the fuel carbon becomes carbon dioxide. Impurities in fuel produce nitrogen dioxide ($NO_{2\,(g)}$) and sulphur dioxide($SO_{2\,(g)}$).

Carbon monoxide effect on Blood & Lung	
Effects on Blood	Effects on Lung
It combines with haemoglobin in red blood cells (its 'irreversible'). Therefore red blood cells can no longer transport oxygen	It breaks down the tiny air sacs (alveoli) in the lung (emphysema). Make it difficult to absorb oxygen (causing breathlessness)

Effects of Nitrogen dioxide and Sulphur dioxide	
Nitrogen dioxide	Sulphur dioxide
A poisonous gas. It increases the risk of cancer in humans	- Cause **acid-rain** which affects ponds/lakes(fish die-pH change)/ forest(trees die)..in US/Europe - Causes bronchitis & asthma (lung diseases)

Water pollution

Many industries have used nearest rivers/lakes as a "dustbin." Industrial pollution is mainly in the form chemicals which may poison the environment.

Chemical pollution

In pacific accidents of unloading pesticides from ships will result in chemical pollution.

Glass/Plastic/Aluminium

Glass/plastic & aluminium containers which decomposers cannot break down (**non-biodegradable**) are common waste likely to find on the beach. *Polythene bag may smother coral and sometimes suffocate turtles*

Human sewage

-danger of disease germs

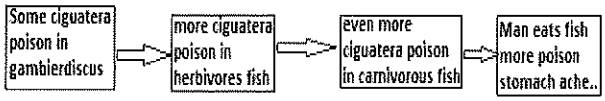
-sewage bacteria remove oxygen dissolve in water. Fish also need dissolve oxygen however not enough oxygen cause them to die.

-sewage will fertilize plankton causing it to increase making the lagoon looking green and unhealthy.

Radioactive decay

Food pollution

Fish poisoning caused by toxin ciguatera/ could depend on the state of the coral/or related to pollution
Disturbance of coral causes algae growing on it to produce toxins that cause fish poisoning.
Pollution in lagoons can cause much growth of a microscopic algae called Gambierdiscus that makes ciguatera poison.



A DDT food chain

DDT is an insecticide used to kill mosquito.
It is man-made and cannot be excreted by the body but stored in fat. Decomposers cannot break it down therefore stays in soil. It is described as an accumulative insecticides meaning it accumulate or increase in concentration as it passed (eaten) up the food chain. Human are the ones will mostly be affected by it since they are at the end of the food chain.

Arguments for and against DDT

For DDT	Against DDT
Cheap & easy to make	Kills good & bad insects
Very effective insecticides	Is not biodegradable & stays in the environment
In tropical countries death caused by insect carried diseases are very high	Accumulates along food chain
Can be transported in concentrated and diluted form	Is toxic to humans and other animals

DDT will kill mosquitoes which is good however spraying close to a coffee plantation could kill the Pollinators (insects). People have also died from DDT.

Toxic waste disposal

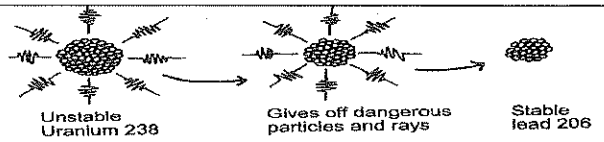
Heavily populated industrialised countries make rubbish waste on an enormous scale. Toxic (poisonous) waste from certain industries are a particular problem.

Nuclear pollution

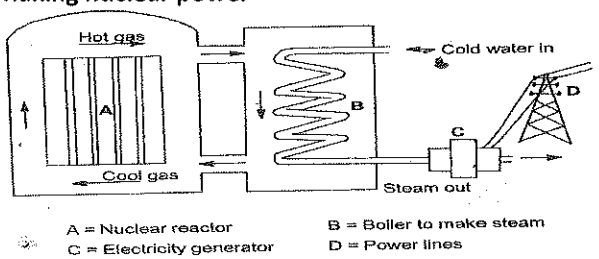
People have been using muscle power to provide energy for their activities. Later burning fuel (wood/coal) to provide energy and then oil + using engine. Now using nuclear energy which provides tremendous power. Nuclear energy is produced by converting mass into energy.

Symbol of **Radiation** 

eg. unstable Uranium 238 gives off dangerous particles and rays and become stable lead 206 (radiation – energy given off as moving subatomic particles or electromagnetic waves)



Making nuclear power



Production of nuclear energy and its conversion to electricity is very "clean" because no combustion gases into atmosphere. However "Radioactive waste" is also produced because uranium fuel is only partly converted into energy. Nuclear (radioactive) waste may remain for thousands of years – its disposal is a great problem facing nuclear power industry now.

The problem is the very long **half-life** of many radioactive wastes. Eg half-life of plutonium 239 24300 years. Some nuclear waste have short half-life eg iron 59 which 45 days.

A nuclear explosion

Radiation from military activities is another kind of nuclear pollution. Nuclear explosion create an enormous amount of short-term radiation as well as some long term radiation. Nuclear tests in the pacific blasted radioactive substance into the atmosphere. This atmospheric nuclear pollution returns to earth as **nuclear fallout**. Entire population had to be evacuated from several Marshall islands because of fallout. Nuclear test must now be carried out underground because of fallout.

In 1995 France agreed to discontinue its testing of nuclear devices at Muroroa in French Polynesia

Radiation affects the normal growth of body cells. Radiation can cause **mutations**. This changes the chemistry of the cells and causes abnormal growth.

Human beings face two main dangers from low level radiation

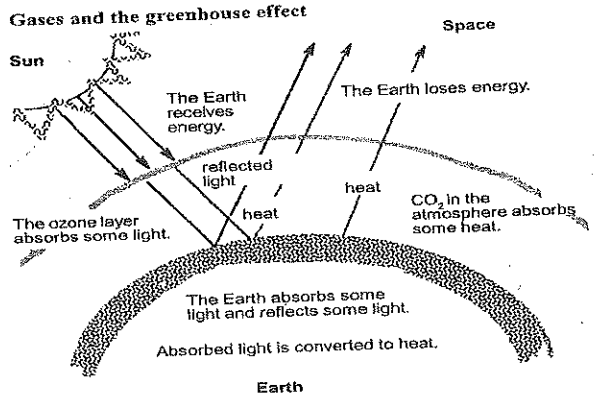
a. There is an increase of body cancer
b. Changes (mutations) may occur in the sex cells. This can cause birth of deformed babies.

Alaska Oil tanker disaster

The Greenhouse Effect

The warming of the earth's atmosphere due to build-up of carbon dioxide and other greenhouse gases that reduce the passage of heat out.

The earth's atmosphere acts like a blanket. It prevents big temperature changes.



The temperature of the earth depends on the energy receives and the energy lost.

Ozone layer is a layer found in the upper part of the atmosphere which contain high concentration of gas ozone ($O_{3\,(g)}$). Ozone absorbs some of sun's radiation particularly ultraviolet light. However its becoming thinner because of aerosol sprays.

Carbon dioxide is a strong absorber therefore it absorbs heat slowing down heat loss from the earth resulting in global warming. Man make more carbon dioxide through burning wood/coal/fuel in vahicles machines.etc.

Pollution disasters

Pollution are severe in the area of accidents. In April 1986 nuclear power plant at Chernobyl in Russia exploded blasting much radiation into the atmosphere as a small nuclear bomb. This accident was caused by human error – letting the reactor overheat/ over a 100 thousand people had to be evacuated within a 30km radius. Crops/water were contaminated in a large area of Ukraine. Radioactive "fallout" affect several European countries. Milk/fruits/vegetables were destroyed. Radiation cause cell mutation which may cause birth deformities and cancers.

2011 earthquake/tsunami in Japan also cause leakage of radiation from the plant which will definitely affect the unborn babies/births defects.

In 1989 an oil tanker (Exxon Valdez) struck a reef and was holed. Ten million gallons spilled into the ocean forming a huge oil slick. Many mammals/birds died because oil affect their means of insulation against cold- so loss of body heat results in death. Grizzly bear which depend on salmon were reduced oil has reduced salmon population.

Bhopal... India: an agriculture chemical tragedy

In 1984 an explosion at Bhopal pesticides factory resulted in release of poisonous gas (methyl isocyanate) into the atmosphere. Two thousand five hundred people were killed by the gas and many suffered serious injury.

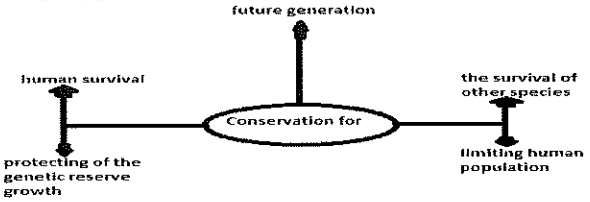
Mercury poison in Japan

In 1971... 45 Japanese died from mercury poisoning. Heavy metals such as mercury are poisonous to human enzymes. Waste from factories containing mercury compound passed into the sea and entered food chain. Humans at the end of the food chain become affected when they eat it.

Chapt.12: <u>Conservation</u>

Conservation is an activity that protects the natural environment.

Why support conservation?



Human survival

Human survival depends on maintaining a suitable environment. The earth's ecosystems are very complex. Human beings are capable of disturbing the environment on a scale that could threaten our existence. We must guard against **environmental deterioration.** Earth is a wonderful planet.

Future generation – we have an obligation to the people of the future to have abundant natural resources and enjoy what we can enjoy.

The right to exist – we are the most intelligent species on earth and we should respect the right of other species to exist.

Chapt. 13: <u>Protection of the environment in Vanuatu</u>

Protecting life's genetic reserve
The great variety of plants and animals is a **genetic reserve** for the future generation to use. Our genetic reserves are getting lost.

A limit to the earth's carrying capacity
Every environment has its carrying capacity. There is a limit to the population which the earth can carry ...must take care not to over populate the earth beyond its carrying capacity.

Worldwide conservation
VNSS – Vanuatu Natural Science Society
SPREP – South Pacific Regional Environment Program
SPC – Secretariat of the Pacific Community
IUCN- International Union for the Conservation of Nature
WWF – World Wildlife Fund

In past interested people have created reserves and parks to protect nature from people now we have need for "conservationists."

Vanuatu National Conservation Strategy
1972 – United Nations Conference on the Human Environment led to creation of UNEPA (the United Nations Environment Protection Agency)
1976 – SPREP was established to control the South Pacific Environment Programme.
1980 – a **World Conservation Strategy** was proposed
1988 – decision to prepare a Vanuatu National Conservation Strategy was adopted by Parliament as part of this worldwide program
1993 – **Vanuatu National Conservation Strategy** was published by the Environment Unit of the Republic of Vanuatu.///
Main aim of Vanuatu National Conservation Strategy is to plan for the long term use of the natural resources for future generation's benefits. Project should enable **sustainable exploitation** of natural resources. Natural resource is to be "cropped" to allow its survival. Avoid short-term project which have bad long-term effects on the environment. Studies of **Environmental impact** should be made before large projects go ahead.

Worldwide conservation activities
- **World heritage areas** –eg live volcano/religious or historical place..etc/ = protect from disturbance
- **National parks and forest reserve area**- eg in Africa National Park- tourist access &activities control/ Forest reserves develop to beauty spot/walking areas..
- **Conservation pressure groups**-eg pressure group halt France's testing in Pacific
- **Species monitoring**-species extinct due to **overexploitation** -over hunted/disappeared due to **habitat destruction**-place they live/feed-destroyed. Now **endangered species'** population are **monitored** for survival
- **Preservation of breeding stock** – where conservation not possible animals are transported to other countries to breed & increase poplution eg wild rhinos now in zoos

National heritage areas
"President Coolidge"(sunken ship) is the official **marine reserve** in Vanuatu since 1983. People all over the world come to Santo to "dive the Coolidge".

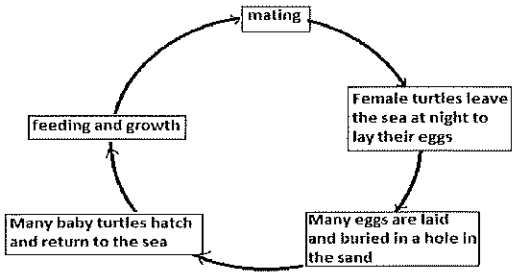
Big Bay Conservation Area (Santo) and Kauri Reserve (Erromango) are two conservation areas where local people continue to use it in a managed (not overused) way/enabling sustainable development.

Community intiated protected or conservation areas are Lotu Protected Area (Santo) – research purposes/ Narong Marine Park (Malekula)/ Ranki Te Suh(Maskelynes) – sustainable use of coastal resources.

Protected Species
Vanuatu a member of **CITES** (the **C**onvention on **I**nternational **T**rade in **E**ndangered **S**pecies)- regulated trade between countries and complete ban of certain items (eg. ivory banned in 1989).
Protected species.
1. **Marine mammals** – illegal to kill marine mammals in Vanuatu (Dugongs (cowfis)are marine herbivores/few in number because of few sea grass-until 12 yrs breed).
2. **Marine crocodiles** – are protected when they come ashore to lay eggs
3. **Certain birds** – certain birds are protected because they are endemic/could become extinct if hunted-out.

Declaring a moratorium to give temporary protection
Species that is being over-exploited is temporarily ban. Example sandal wood. A 5 year **moratorium** on sandalwood from 1987 to 1992.

Breeding protection
The life cycle of a sea turtle



the breeding stock remains high enough. In Banks and

Turtles have lungs to breath/ They are marine reptiles who are in danger when laying eggs on land/A mother turtle usually drag herself at night out of the sea to a lonely beach-she has to dig a hole in the sand/lay eggs (around 200 eggs)and carefully cover them- with hard work she returns to the sea. As human population increases their breeding sites are becoming fewer.

Commercialisation ban
Vanuatu Turtles – Hawksbill/Green Turtle/Leatherback Turtles are occasionally captured for feast- they can survive limited local use but not commercial use..eg sale of turtle shells. For that reason **commercial exploitation** is banned

Closed seasons and breeding protection
Lobsters are plentiful in Vanuatu's extensive coastline. A **closed season** operates from November to January when catching lobster is banned. Why?

The extraordinary incubator bird (megapode)-should not disturb their eggs.
Birds which are hunted for food (pigeon/doves/ wildfowl/ducks/incubator) are also protected by a closed season – to allow breeding – from beginning of July until end of March.
Incubator bird (scrubduck) belongs to a group of "strong leg" birds called megpode. They dig deep holes and lay their eggs in the holes where the ground is warm and then they carefully cover up the place.

Size limits to protect the young.
Creatures should never be harvested young. Only harvest adult after they have given rise to the next generation. In Vanuatu there are size limits for catching: **rock and slipper lobsters/coconut crabs/ trochus/ green snail /tritons**

Export controls
Control of creatures for commercialisation
Over-exploitation due local consumption and export of certain creatures (flying fox/coconut crabs/trochus/ coral) have to be prevented.
Export controls - regulation that stops or limit the sale of goods to overseas countries

Catch quotas
Balancing the harvest with population growth.
We are to manage our resources properly. We must make estimates of our populations and then work out **catch quotas** to allow the surplus to be taken to ensure

Torres (1988) the catch quota set for coconut crabs was 10% of the estimated population.

Forestry activity and the management of forest resources
Dangers of uncontrolled deforestation

- Forest removal in the hills: a water catchment area is spoiled; the climate changes; rainfall reduced.
- The land is not protected from wind and heavy rain/tree roots no longer bind the soil/massive erosion of top-soil results.
- Rainfall is no longer checked by slow drainage through soil/heavy rains rush into rivers which flow in torrents; river banks are eroded.
- River levels rise as silt deposits in river beds; flooding in the low lands ruins crops.
- Vast amounts of soil are swept out to the sea; corals which need clear water die; the reef ecosystem is destroyed.
- On a global scale deforestation contributes to the "greenhouse effect"; tropical forest destruction is the main cause of plant and animal species extinction.

Making use of the forest

- **Traditional forest use**
  House/church/school/canoes building material are obtained from the forest.
  Forest provides various fruits-naus/namambe.
  Forest plants for medicinal purposes.
  Firewood is the basic fuel from the forest.
  Plants use for local ceremonies/decoration...

- **Commercial forest use**
  Sandalwood & kauri were highly prized and extensively logged. Hardwoods valuable for furniture are Natora/ Rosewood/Blackbean/ Stinkwood/Natapoa/Nakavika.
  Softwood of low value extensively logged eg Milk tree. Orchid & Ferns also have commercial value.

- **Logging activity in the forest**. In some places:
  Selective logging – remove only the valuable hardwood leaving mixed untouched trees and new growth.
  Clear-felling – removing all softwood and hardwood of any value. (secondary forest takes over after some years).
  Some local enterprises provide local timbers. Others export timber overseas as **round logs/ sawn timber**. Only a small amount of **wood products** (furniture/carvings....) leave the country

Investigating environmental adaptations

The Forestry Department and forest management
Forest department

- control logging activities by a system of licences
- may insist on **replanting schemes** to ensure continuation of forest.
- may carry out an **environmental impact survey** before logging permission is granted. (to check for soil erosion/effects on people's lives)
- collects good seed and grows tree seedlings.
- started **local supply plantations** to provide local timber needs
- develop **industrial forestry plantations** to provide larger volumes of timber for export and local use. ("**IFP**'s" planted in Erromango/ Aneityum/Santo)
- set up Kauri Reserve in Erromango to provider source of kauri seed for future use

Chapt. 14: Ideas for environmental investigation
A survey of biodiversity on the reef
Biodiversity is the variety of life (different organisms) in a habitat or ecosystem or world.
Example reef have high biodiversity meaning a large variety of different organism can be found there..eg seaweed/sea grass/rock algae/live corals/fish/star fish/ brittle stars/ sea urchins/sea cucumber/ etc....

All the above organism can be grouped into producers and consumers. Coral can be regarded as producers as well as consumer because it consist of algae which photosynthesis to make its own food and the coral polyps do eat tiny floating animals called zooplankton. The biomass of the producer is more to support the consumers.

Comparing of biodiversity in ecosystems
High Biodiversity – habitat where many different kinds of birds and animals are found. eg. old ecosystems like Amazon rainforest/Coral reef
Low Biodiversity – habitat where few different kinds of birds and animals are found. eg. Specialised ecosystem such as desert.

Comparing biodiversity per m^2 in different habitat
Compare habitats mathematically by working out biodiversity per m^2. You do this by counting the number of different species in a square (quadrat) of size one m^2 in one place then the other. You place the quadrats in the area of study by **random sampling**.

Species that have survive today (many have extinct) simply because they are very well adapted to the environmental conditions around them.

An organism's environment is made up of PLACE (Land form & Soil) and ENVIRONMENTAL CONDITIONS (Climate & Other organisms).

Octopus' environment			
Place		Environment conditions	
Land Form Live in holes on the reef/ hide in narrow gaps under rocks. Sometimes swim in the sea.	Soil No soil/ only few sandy pools	Climate Most of the time wet and cool in the sea. Sheltered from rough waves in reef holes. Dry and warmer for a short time during low tide.	Other organisms Eat crabs and small fish. Have many predators when young. Adult octopus have to be aware of moray eels and people.
Octopus' Adaptation			
Place		Octopus' Adaptation	
Land form Can squeeze into narrow spaces. Can camouflage in the rock. Can easily crawl over rough rocks with eight arms having suckers. Shoot out a jet of water to swim a short distance in the sea	Soil Can change its skin to look just like sand. (camouflage)	Climate Obtain oxygen from water with gills	Other organisms Hunt by hiding and using the long arms to grab prey. With strong beak octopus bites and paralyse and tear its prey into pieces. Escape from predators by blinding them with a jet of ink. Can also camouflage.

Beach Morning Glory...an early coloniser
Krakatoa explosion in Indonesia in 1883 decolonised the islands. Beach Morning Glory is the first plant to grow again (colonise the island). This is because how it can disperse and too having the ability to adapt dry sandy soil/high temperature/wind/high salinity...

The invisible

Investigating seed dispersion
Seeds are dispersed by Wind/Water/Birds/flying foxes/ land animals/ by other method.

Seeds are adapted for dispersion eg Mango is juicy so flying fox that it eat could disperse it/ other seeds can float...etc

Investigating skinks and geckos
Lizards camouflage to adapt to an environment to escape predators. They 'freeze' before catching their food.

Why mangrove seeds float vertically?
The floating seed is able to be dispersed by the tides. Once it settled its root will grow.

Chapt. 15. <u>Traditional environmental knowledge</u>
Taboos about fishing and hunting helped protect species in the past. In the past good knowledge of nature's reserve was enough to feed people after a cyclone.

Surviving cyclones
In Ambrym breadfruit can be kept for many years in storage pit. Plant not normally eaten maybe be eaten at cyclone times.

Harvesting palolo worms
Palolo worms appears in millions in the sea and people scoop it from the sea and bake it in 'laplap.' The worms are known as "Nawel" in Malekula. In custom people thought the worms came from the newly planted yams. Six days after full moon the night is really dark... that is when worms come out. They secrete chemicals into the sea which excite each other enabling the secretion of eggs and sperm. Eggs and sperms fertilise to produce a vast number of planktonic larvae which are dispersed by tides/currents. The larvae fall to the sea bed and become palolo worms of the next year.
This is an example of how people are in tune with the mysterious cycles of nature.

"Nangol" the Pentecost jump
The ceremony demonstrates bravery of young men. The vines are used at the right time of the year of correct elasticity. The jump is carried out after the harvest of the yams. The ceremony involve fine calculation to enable the survival of the land diver.

YEAR 10 BIOSPHERE QUESTIONS

1. What are the two forces that form land?

I. .
II.

2. Give two evidences that indicate the formation of land through

I.
II.

3. Explain these terms

I. Ecosystem
II. Habitat
III. Decomposer
IV. Epiphyte
V. Consumer
VI. Producer
VII. Scavenger
VIII. Saprophyte Parasite
IX. Filter feeder

4. Describe what is a

I. Primary forest
II. Secondary forest
III. Forest regeneration
IV. Feral animal
V. Food webs

5. State at least three factors that may disturb food webs.

6. Explain what is Biosphere.

7. What three things make up the biosphere?

8. Scientist refers to different parts of the world as biomes. What does that mean?

9. Name the ten earth's major biomes and briefly explain what each is made up of?

10. Explain the terms

I. Selective breeding
II. Air pollution
III. Water pollution
IV. Incomplete combustion
V. Complete combustion

11. What effect does carbon monoxide have on the blood and lungs?

12. What are the negative effects of

I. Nitrogen dioxide
II. Sulfur dioxide

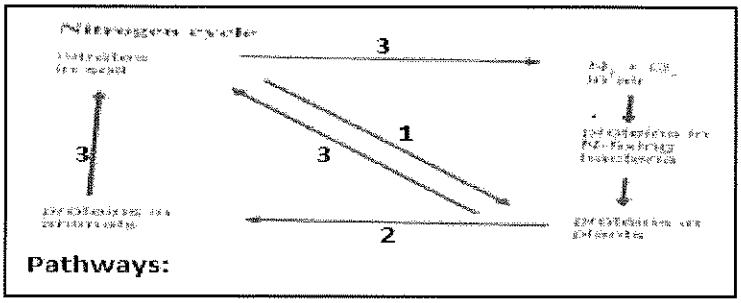
13. Describe several ways how water can become polluted. Give at least 3 ways.

14. What is the difference between biodegradable and non-biodegradable substances?

15. What is greenhouse effect?

16. Explain what is deforestation.

Nitrogen cycle



There are three things that occur in the nitrogen cycle according to the numbers shown. Identify them in relation the numbers shown.

1. _____
2. _____
3. _____

17. Describe the carbon cycle and the oxygen cycle in how it is recycled.