

BIODIVERSITY : WE ARE ALL IN THIS TOGETHER

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- UNIVERSITI SAINS MALAYSIA
- 11800 PENANG MALAYSIA

• Scope of presentation

- Intro to Biodiversity
- Biodiversity of Animals and Plants
- Production and Consumption values of Biodiversity
- Malaysian Mega-biodiversity
- Biodiversity and Climate Change
- Events precipitated by climate change and effects on population, poverty and disaster management
- Threats and Conservation Status of M'sian BioD
- Conclusions, Acknowledgements, References

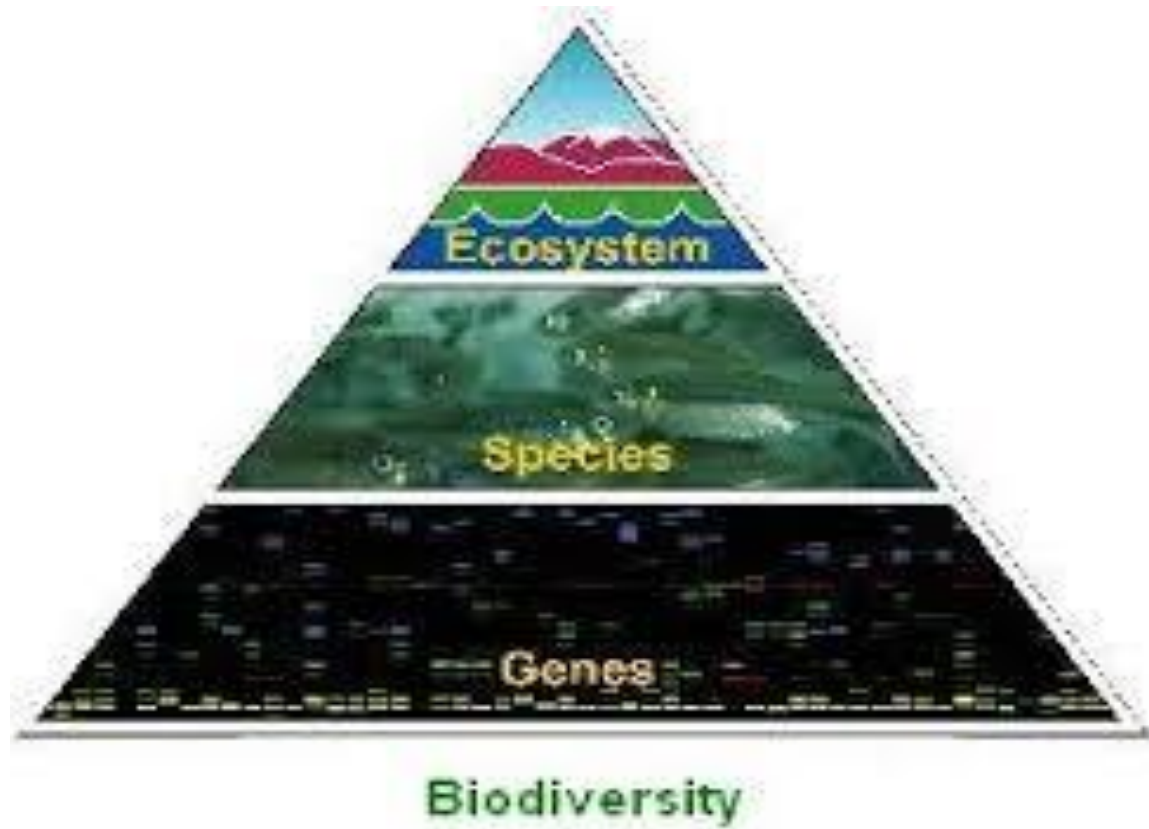
- **BIODIVERSITY**

- ‘the variability among living organisms from all sources including terrestrial, marine and other aquatic systems ; and the ecological complexes of which they are part: this includes diversity within species, between species and of ecosystems (UN Conv. On BioD, 1992)
- ‘the totality of genes, species, and ecosystems in a region’ (Wikipedia, 2009)

- The variety of life on Earth, its biological diversity is commonly referred to as biodiversity. The number of species of plants, animals, and microorganisms, the enormous diversity of genes in these species, the different ecosystems on the planet, such as deserts, rainforests and coral reefs are all part of a biologically diverse Earth. (Anup Shah, 2014)

- Appropriate conservation and sustainable development strategies attempt to recognize this as being integral to any approach. Almost all cultures have in some way or form recognized the importance that nature, and its biological diversity has had upon them and the need to maintain it. Yet, power, greed and politics have affected the precarious balance. (Anup Shah 2014)

- 3 levels of biodiversity identified:
 - Genetic diversity- the diversity of genetic materials in living organisms
 - Species diversity – the variety of living organisms
 - Ecosystems diversity – the diversity of habitats in the ecosystem, including abiotic and biotic components



- Biodiversity is measured as taxonomic (species) richness, commonly using 3 indices below (Whittaker, 1972)
 - Species Richness
 - Simpson's Index of Diversity
 - Shannon-Wiener's Diversity Index



2010 International Year of Biodiversity

Big ideas in
development

Banking on biodiversity

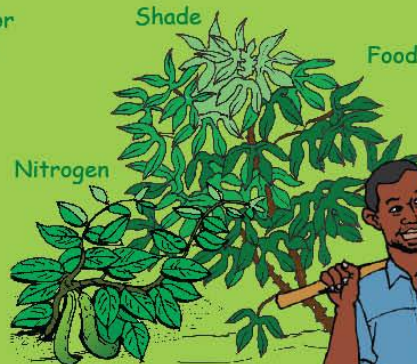
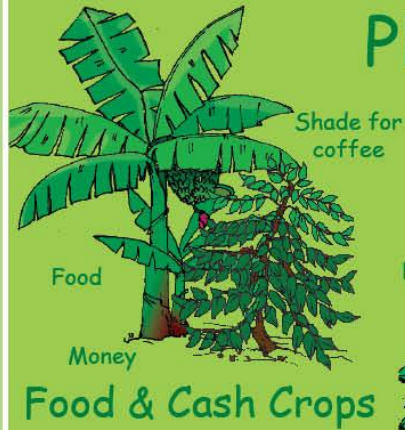
a natural way out of poverty



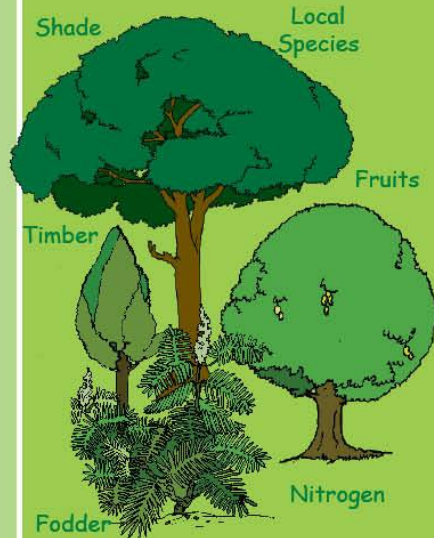


What is biodiversity?

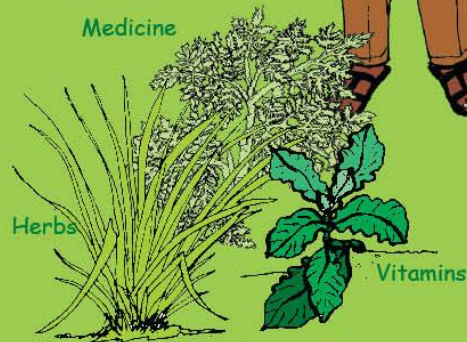
Plants



Intercropping

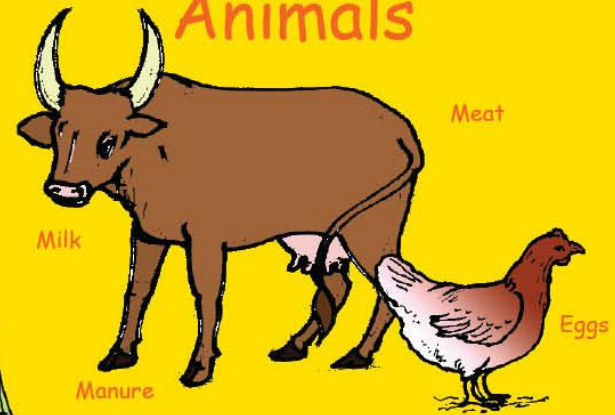


Trees



Kitchen Crops

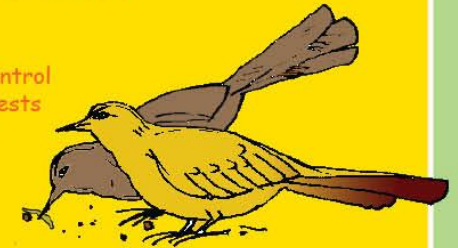
Animals



Manure

Farm Animals

Control pests



Birds

Pollinate plants



Make honey



Insects

BIODIVERSITY OF ANIMALS and PLANTS

Animals

- 1.25 million species discovered and identified.
- 10-14 million more undescribed (conservative estimate)

- Amphibians 6199
- Birds 9,956
- Fish 30000





19.12.20



19.12.2006 09:25





- Mammals 5516
- Reptiles 8240
- Insects 950000



- **Molluscs** **81000**
- **Crustaceans** **40000**
- **Corals** **2175**
- **Others** **130200**



Plants

Mosses	15000
--------	-------

Ferns and allies	13025
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Gymnosperms	980
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Modern green algae

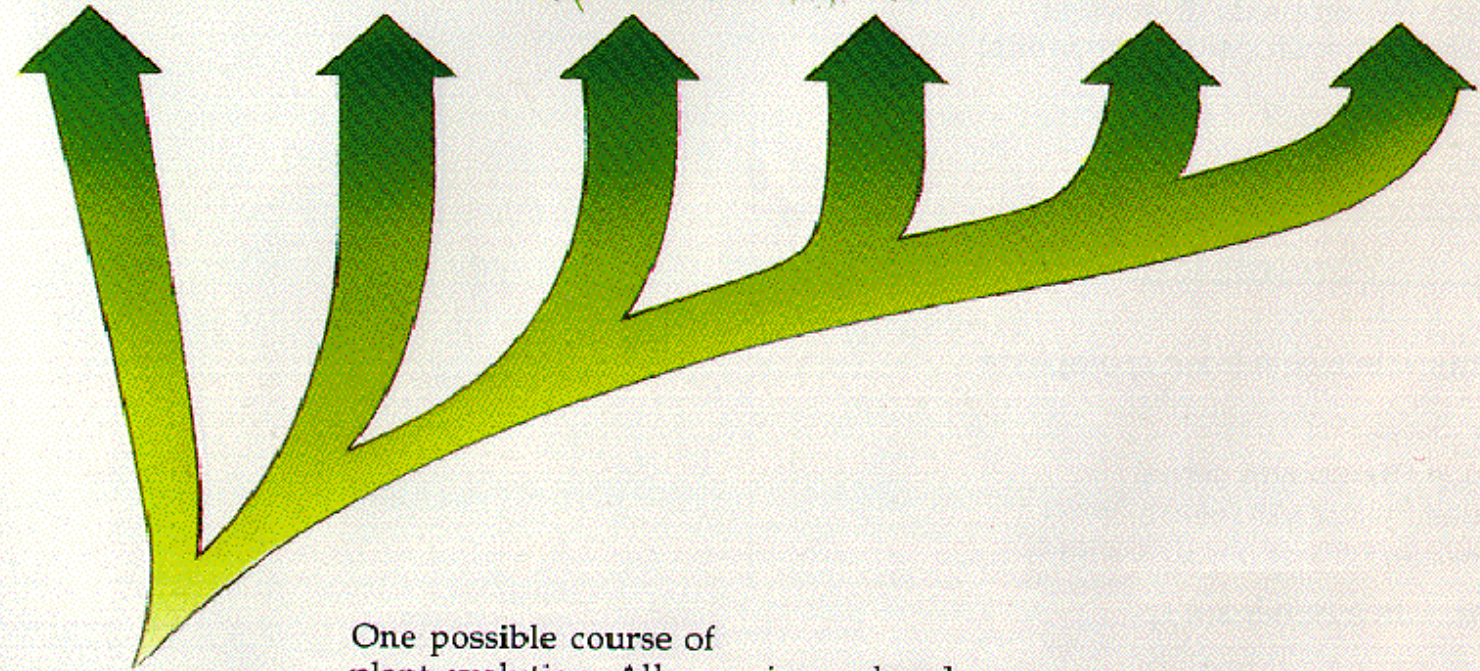
Bryophytes (mosses, etc.)

Club mosses

Ferns

Gymnosperms (conifers, etc.)

Angiosperms (flowering plants)



Ancestral green algae

One possible course of plant evolution. All organisms placed in the plant kingdom are thought to have evolved from ancestral green algae.



LOWER PLANTS OF SKYE & LOCHALSH

liverworts, mosses, ferns etc.



MALE FERN & LADY FERN - not male and female, but distinct species. They are two of the commonest ferns to be found in Wester Ross.



LEAFY LIVERWORTS - among the smallest green plants, they inhabit the shady wetter places, forming cushions or creeping over rotting logs.



WOODLAND LIVERWORTS, MOSSES AND FERNS



WOODLAND FERNS - bracken with hard, lady, male, beech and mountain fern, adorning the rich leaf litter in ancient woodland.



THALLOSE LIVERWORTS - consist of creeping plates of green tissue, here with spore capsules. They grow in shady, permanently humid or even wet places.



SPHAGNUM - bog mosses that form colourful green, yellow and red cushions (often mixed) in bogs, mires and wet woodland.



HORSETAILS - not all are invasive weeds like the notorious field horsetail! This unbranching one is the rough horse-tail or Dutch rush.



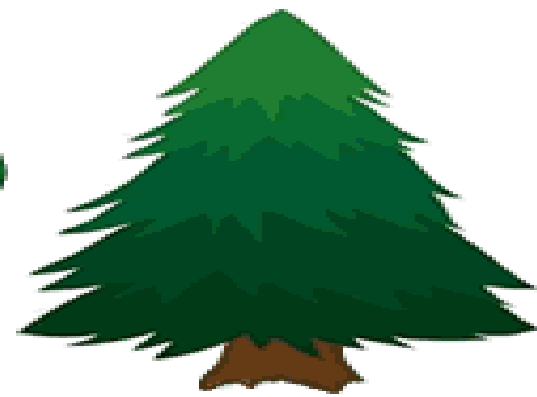
LYCOPODS - Wester Ross has all of the British clubmosses. This one, the alpine clubmoss, grows on high ledges and in rocky mountain turf.



MOSSES - a colourful selection of the many mosses found in Wester Ross woodland and forest, and on wayside, moor and mountain.



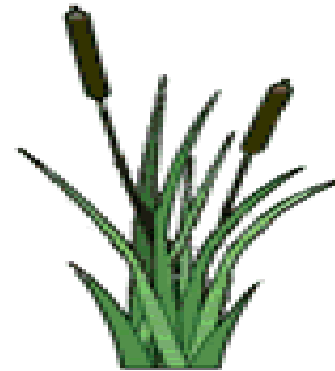
Deciduous



Coniferous



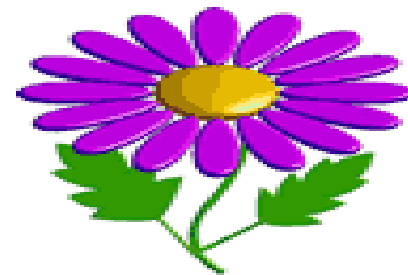
Shrubs



Rushes



Grasses



Wildflowers

- Dicots 199350
- Monocots 59300
- Green Algae 3715
- Red algae 5956
- Lichens 10000
- Mushrooms 16000
- Brown Algae 2849

- Grand total 1589361

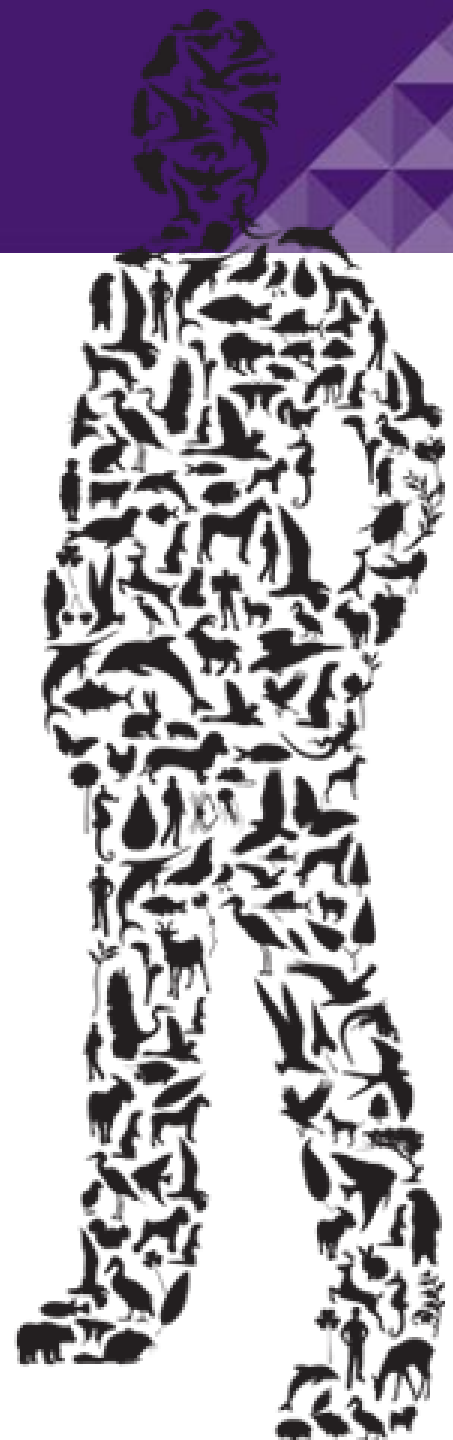
Biodiversity, the web of life that keeps our planet functioning, is an intricate puzzle. The first step in intelligent puzzle solving is to save all the pieces.

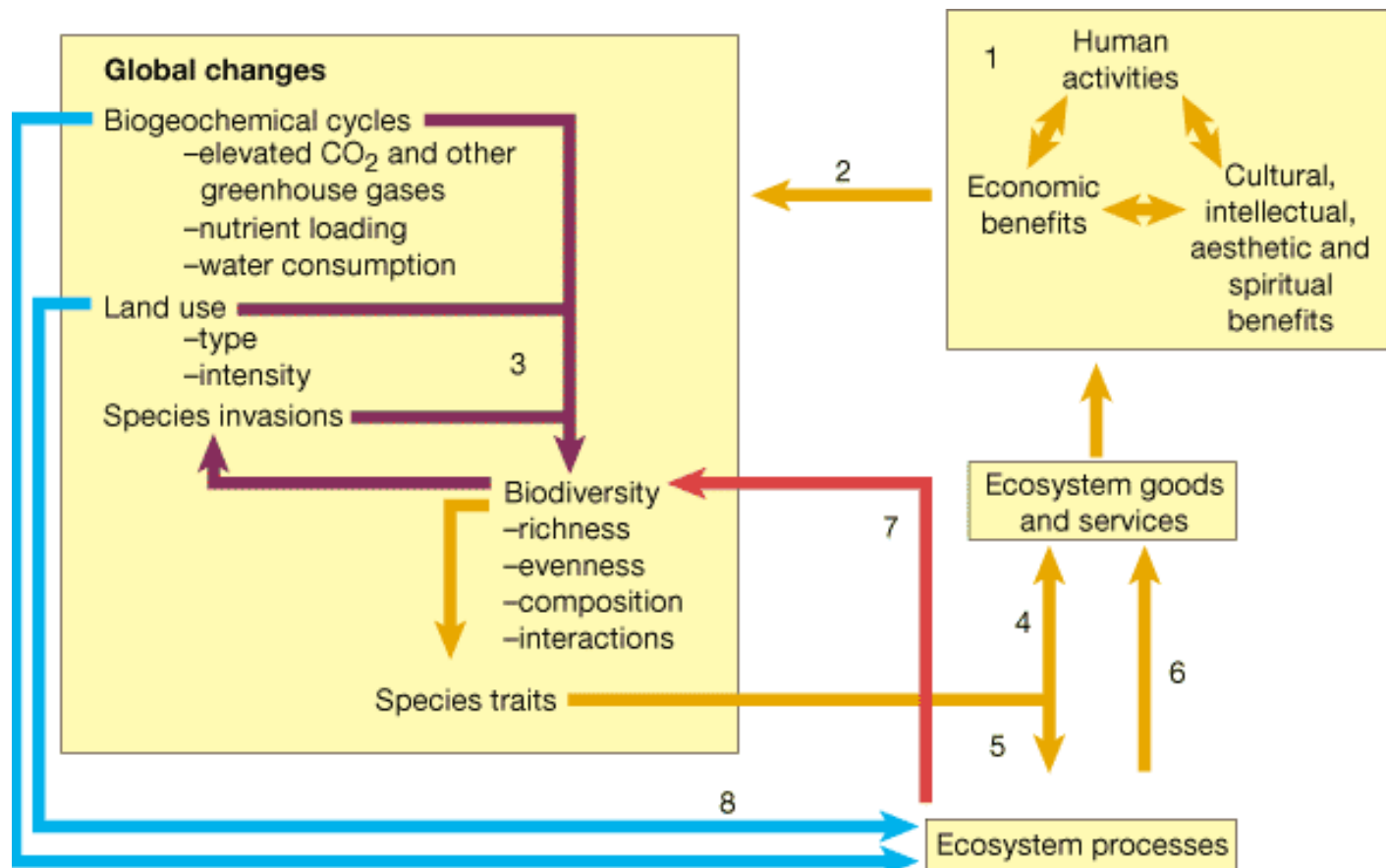
John Muir - "In the universe, we find it connected to everything else in the universe"



Biodiversity

WE ARE ALL IN THIS TOGETHER





- **Ecosystems processes and services supported and provided by biodiversity (Production and consumption values) :**
- air quality,
- climate stabilization,



Air Quality Objectives Review

Public Consultation

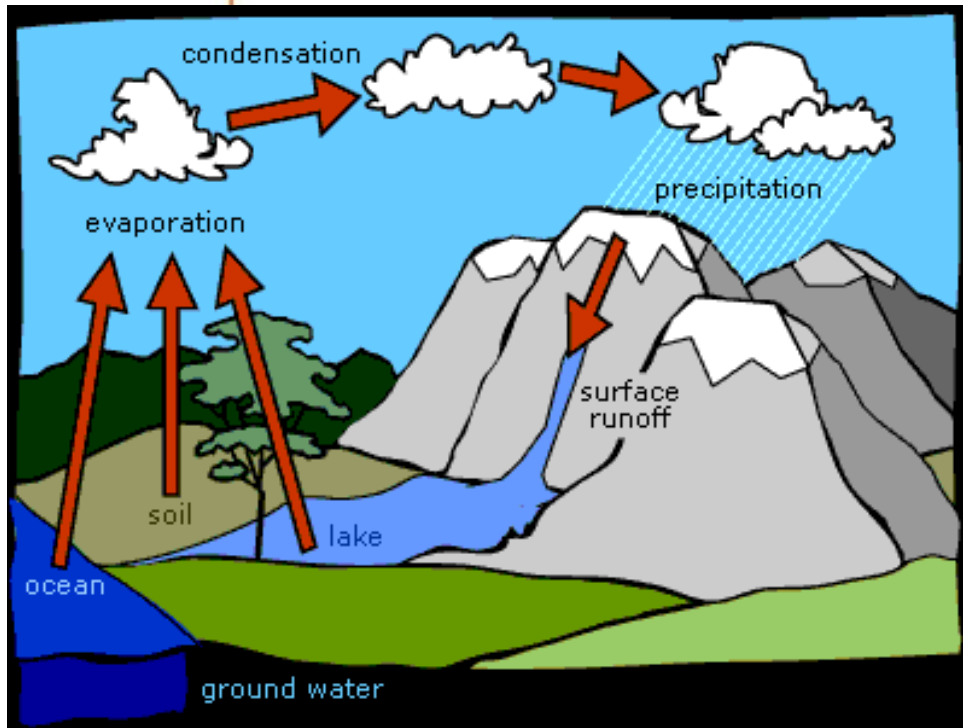
Environment Bureau
Hong Kong SAR Government



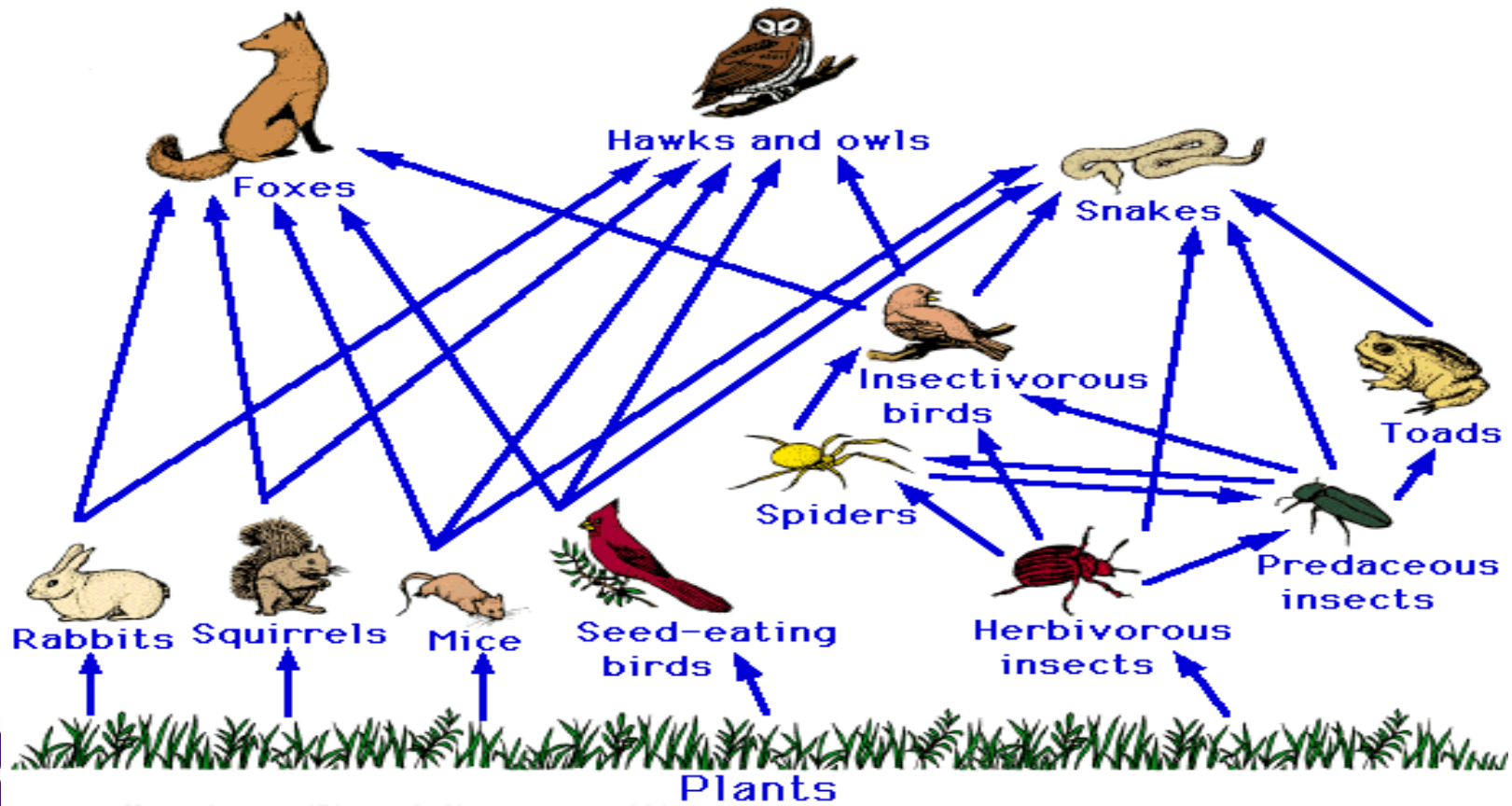




Water purification



- **disease control, biological pest control**



- **plant pollination,**
- **seed dispersion,**



A Bee Entering a Flower

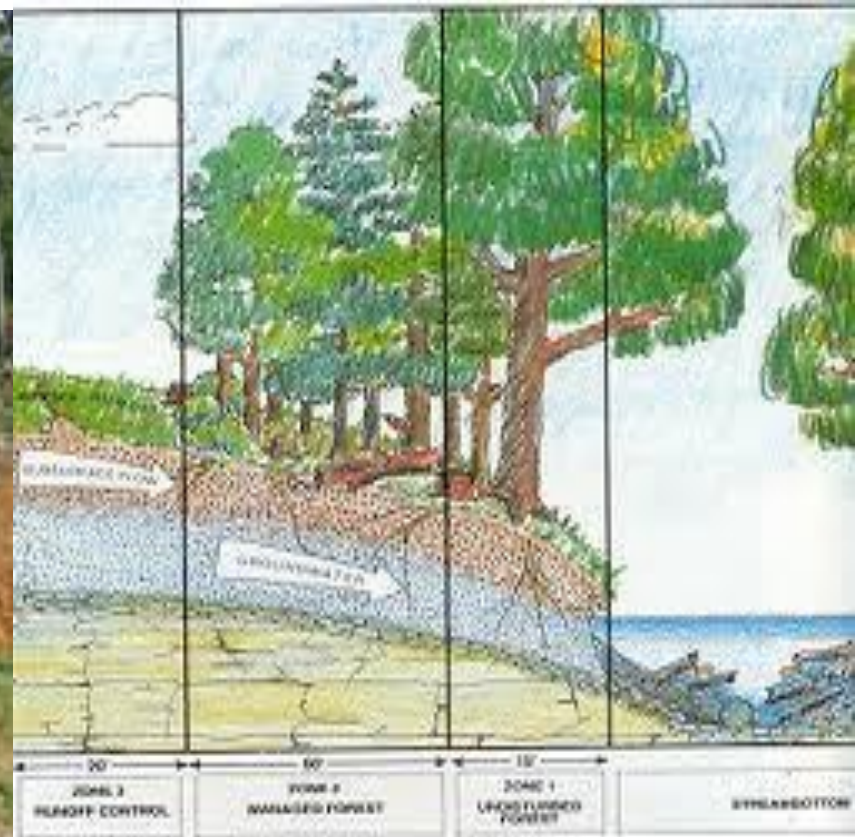


5L7774 [RM] © www.visualphotos.com

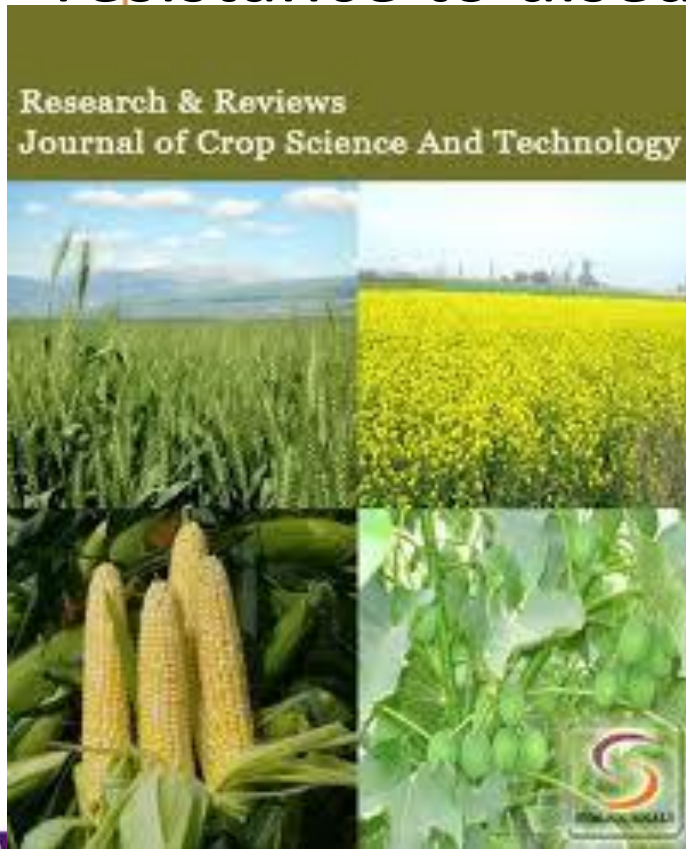




- erosion prevention.



- Also crop improvement and resistance to disease



Source: nottingham.ac.uk

Figure: 01

food and livestock provision.

cereals



wheat



ear of wheat



barley



corn



rye



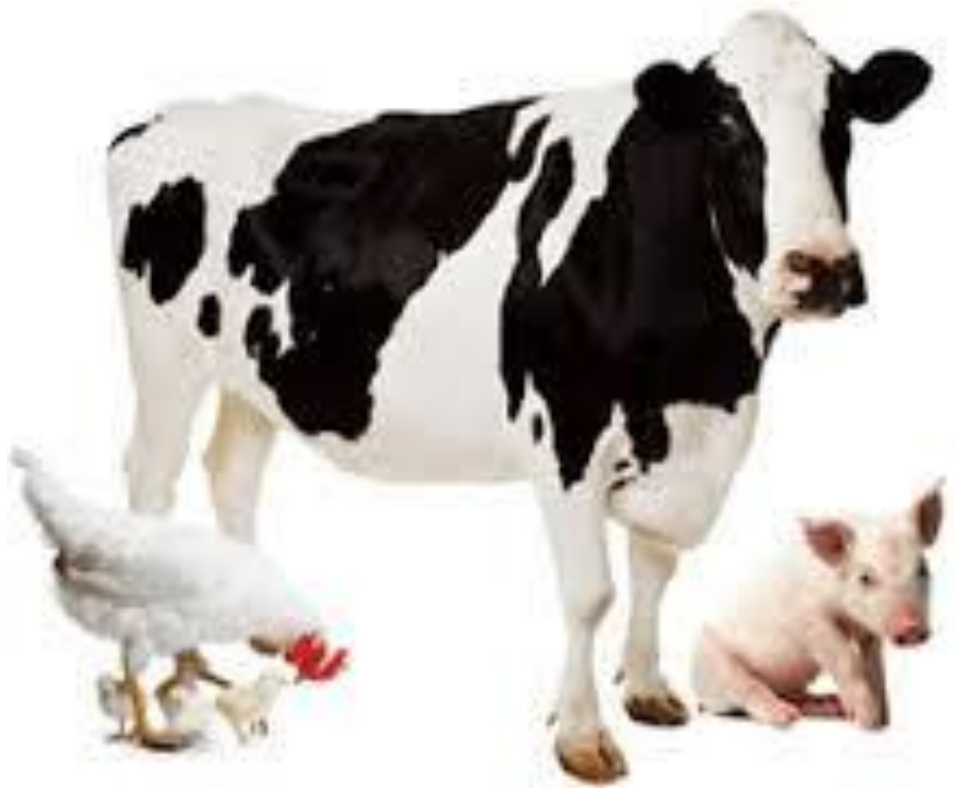
rice



oats



millet



- **And resources such as wood, wool, fibers, leathers, dyes, resins, oil, rubber, spices, etc,etc,etc**





MODEL: **CS/3315-2F**

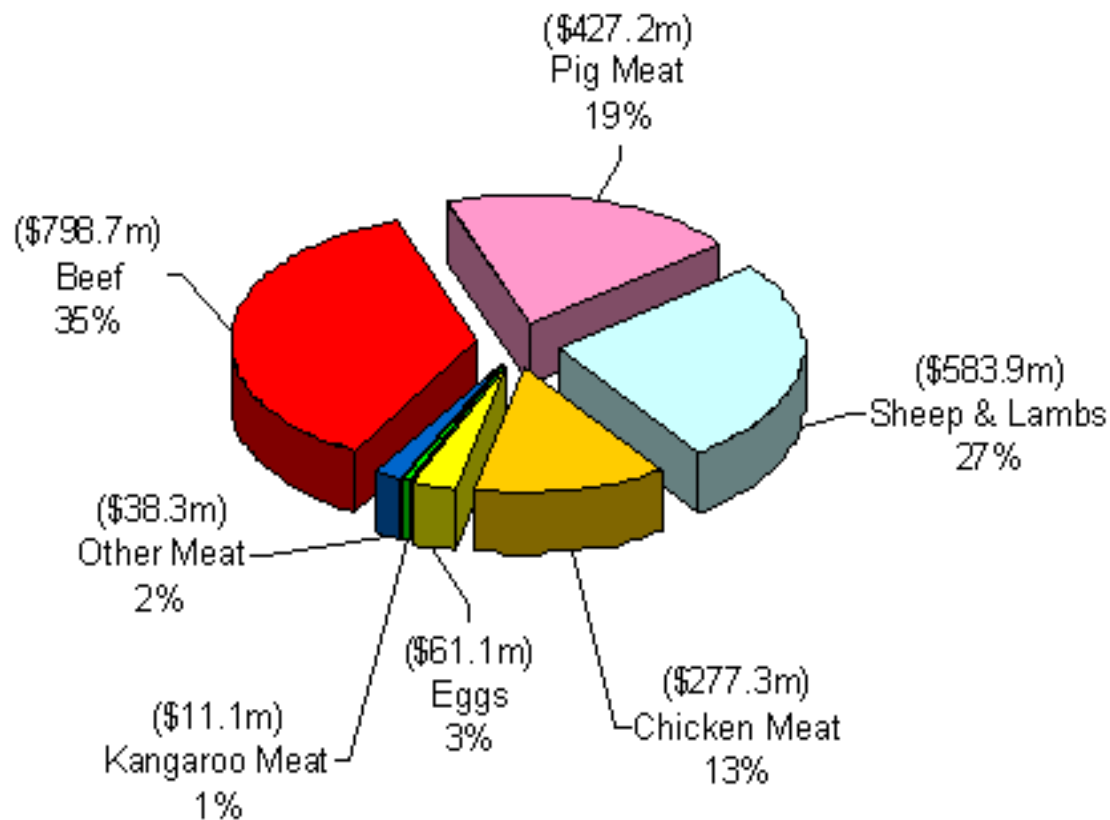


USM



- Estimated value of Biodiversity products and services is at 30 trillion USD/year (Con. On BioDiversity 1992)

Eg of Biodiversity value in *animal food* production of South Australia in 2012



~ \$ 2.2 b

Knowledge Systems and Education



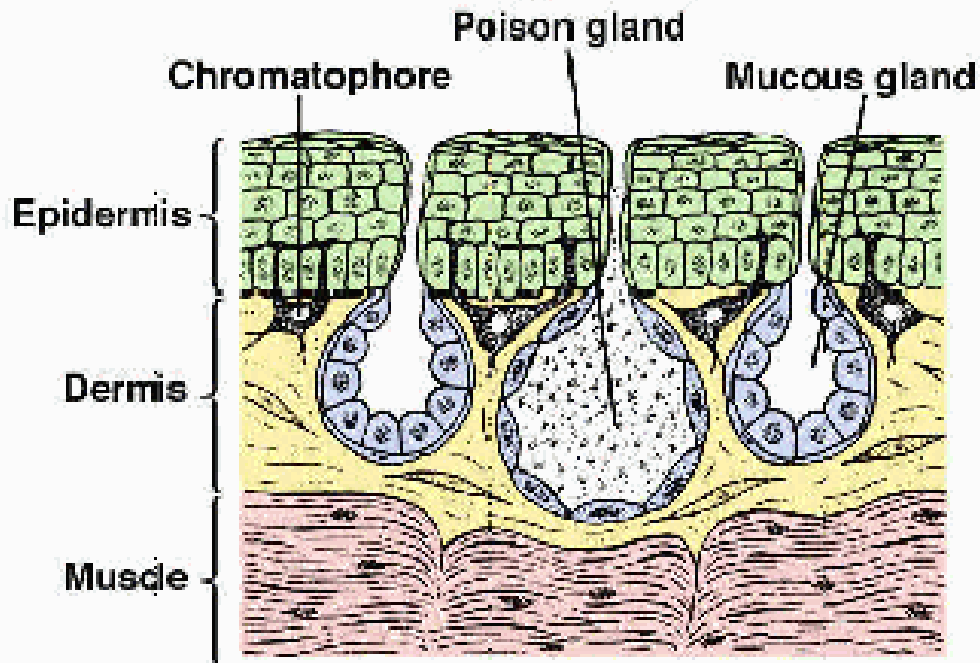
- Nature appreciation such as:
- Bird watching
- Hiking
- Mountaineering
- Camping
- Nature interest hobbies



- Inspiration for music, painting, book writing, sculpturing, songs etc.
- Medicinal and pharmaceutical products
- And much, so very much more.


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Section through frog skin



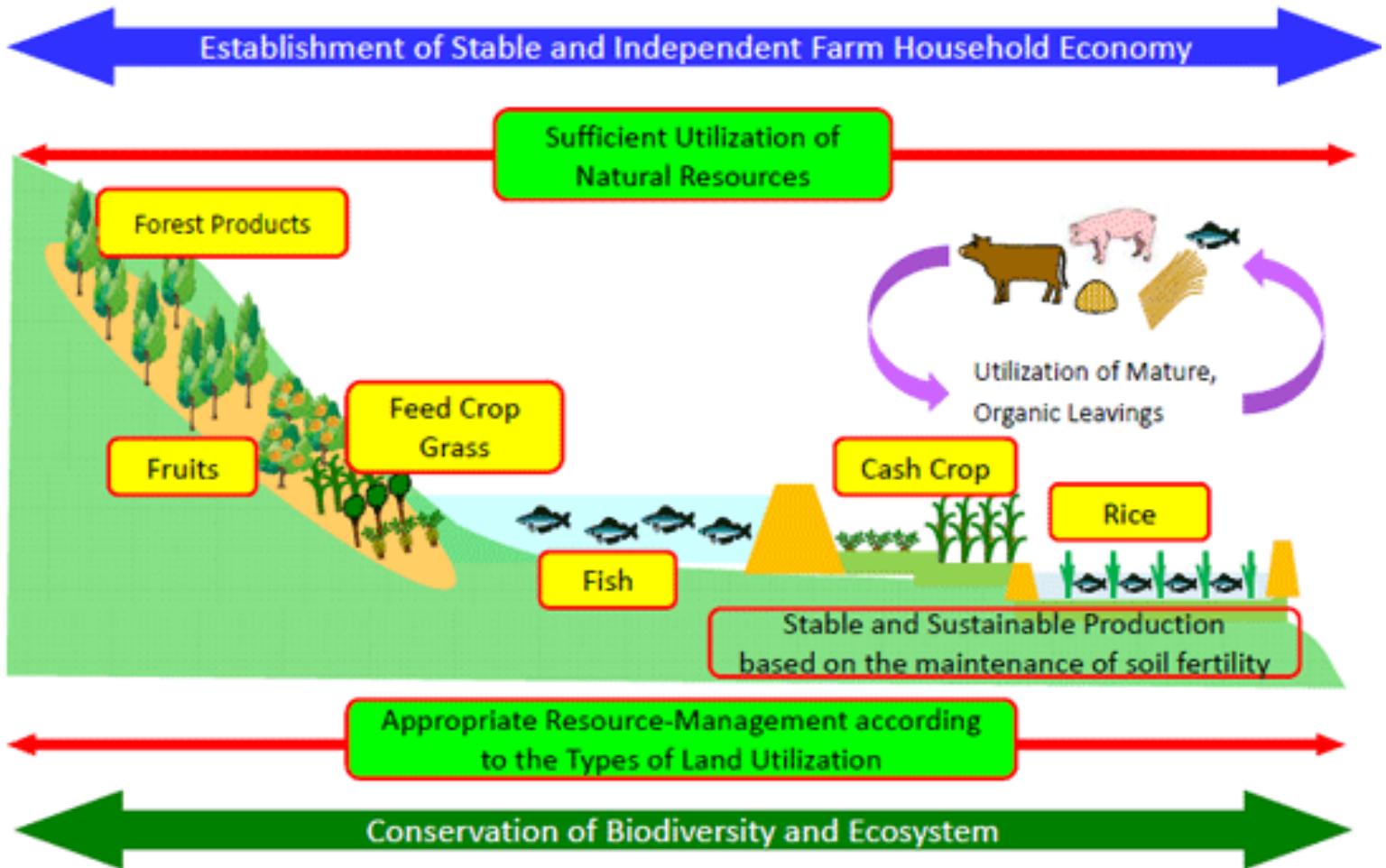
- Aesthetics and spiritual values:
- In most religious beliefs, All Mighty GOD created the earth and everything in it. Humankind are the Vicegerents of GOD on earth. We are supposed to take very good care of Earth and its ecosystems and biodiversity

- Malaysia is one of 12 countries with mega-diversity in terms of plants and animal species.
- 300 freshwater fishes (ca. 3 % of world's fish)
- 200 amphibians (3.5% of world species)
- 380 reptiles (ca. 5 % of world species)
- 700 birds (7 % of world's birds)
- 300 mammals (5.5 % of world's mammals)



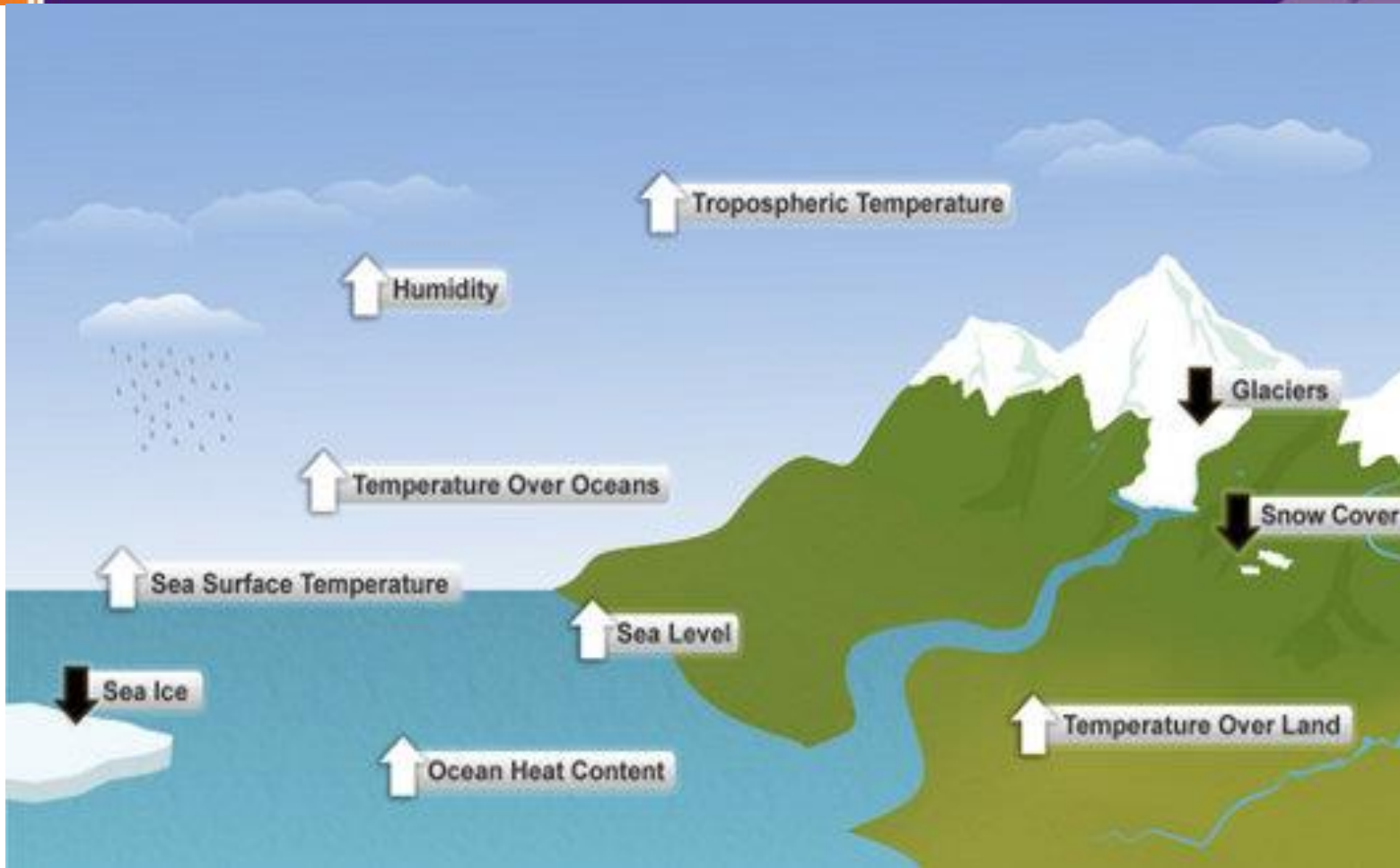
Biodiversity boosts ecosystem productivity where each species, no matter how small, all have an important role to play.

For example, a larger number of plant species means a greater variety of crops; greater species diversity ensures natural sustainability for all life forms; and healthy ecosystems can better withstand and recover from a variety of disasters.



Biodiversity and Climate Change

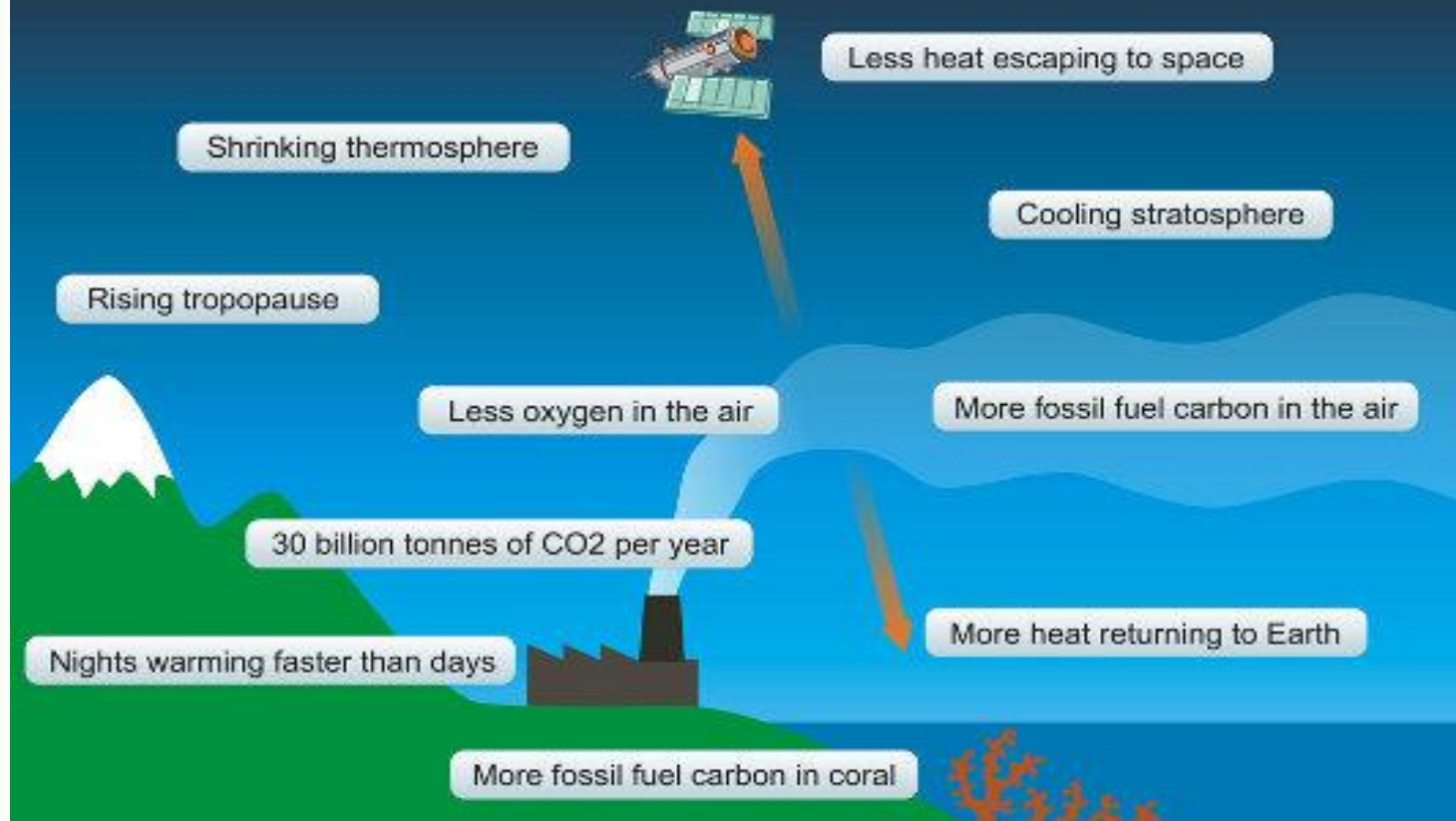
Climate change and Global warming refer to an increase in average global temperatures. Natural events and human activities are believed to be contributing to an increase in average global temperatures.

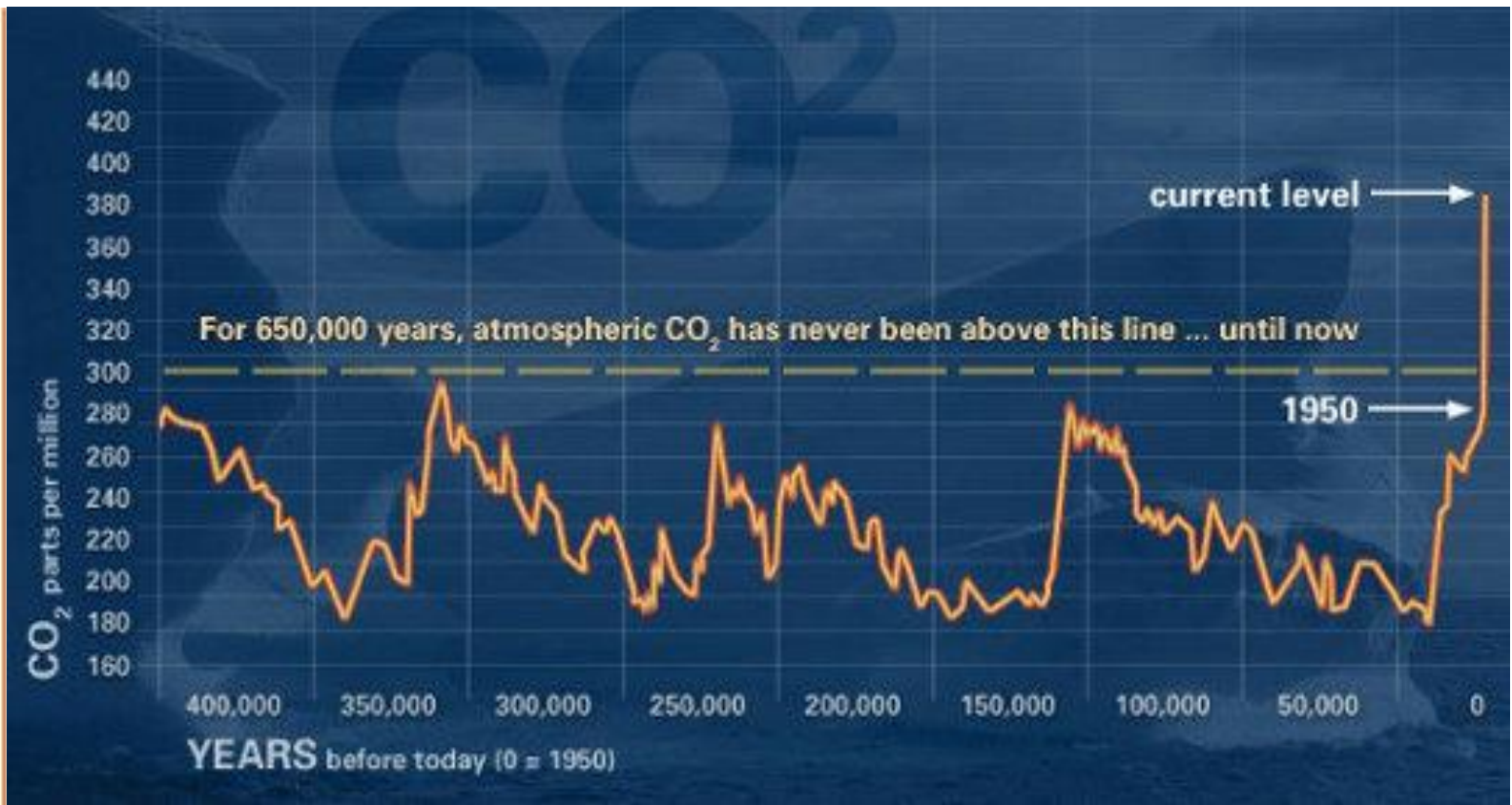


Ten Indicators of Climate Change

This is caused primarily by increases in “greenhouse” gases such as Carbon Dioxide (CO_2), methane (CH_4) (which is 20 times as potent a greenhouse gas as carbon dioxide) and nitrous oxide (N_2O), plus three fluorinated industrial gases: hydrofluorocarbons (HFCs), perfluorocarbons (PFCs) and sulphur hexafluoride (SF_6). Water vapor is also considered a greenhouse gas.

10 Indicators of a Human Fingerprint on Climate Change



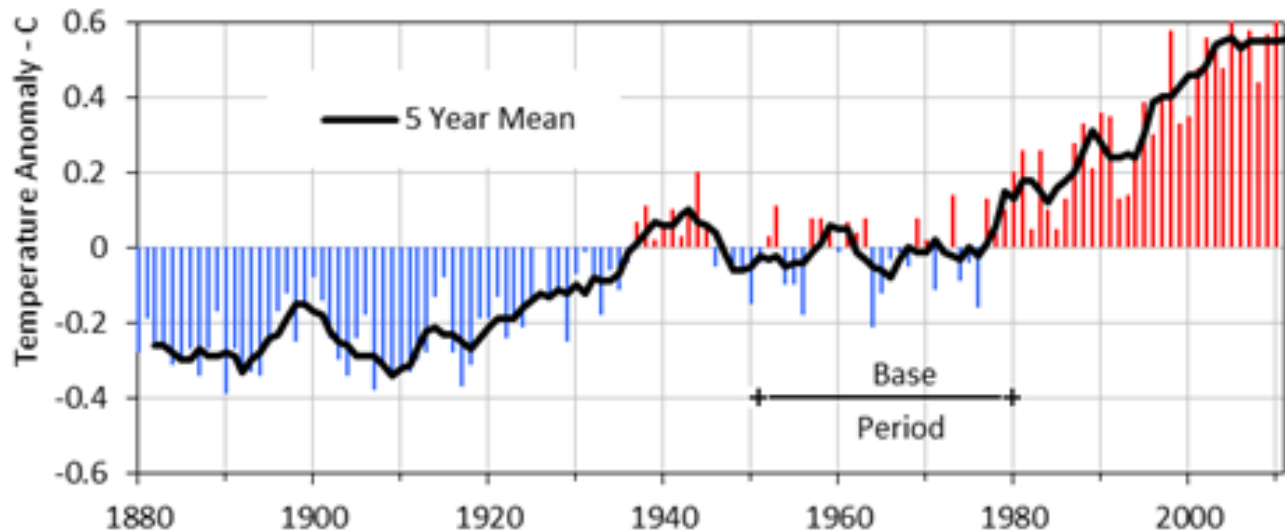


Increase of CO₂ in earth's atmosphere



Global Temperature, 1880 - 2011

Land - Ocean Index: 1951-1980 Base

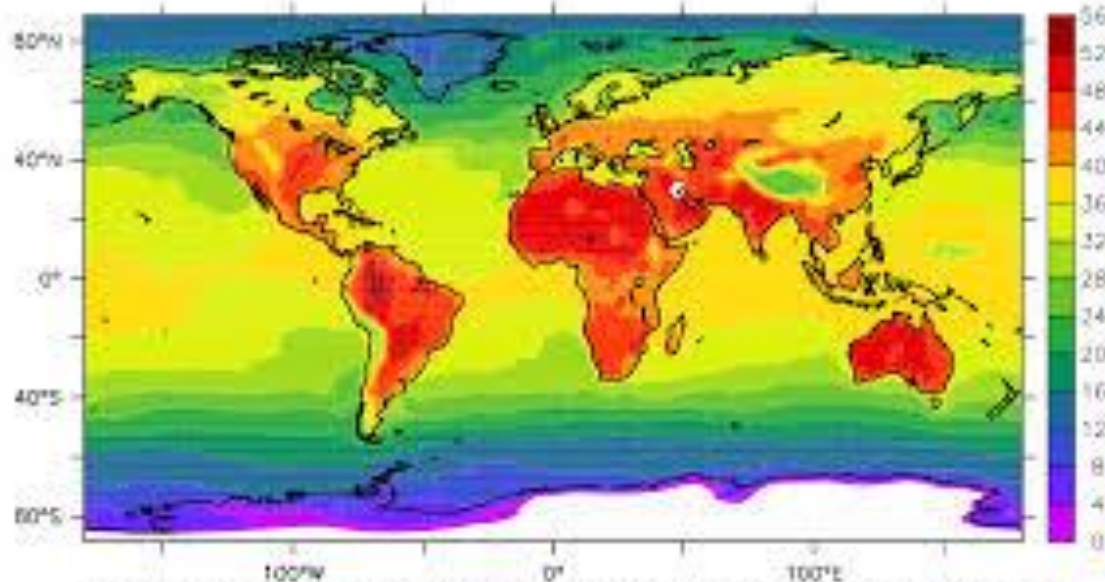


Source: Goddard Institute for Space Studies (GISS) and Climate Research Unit (CRU), prepared by ProcessTrends.com, updated by globalissues.org

Events precipitated by Climate change and Global warming:

a) Extreme temperatures (too hot/cold)

b) desertification



T100 values for difference between 2090-99 and 1990-1999 based on A1B scenario. Stef et al. *IS9*, 35: 114781.

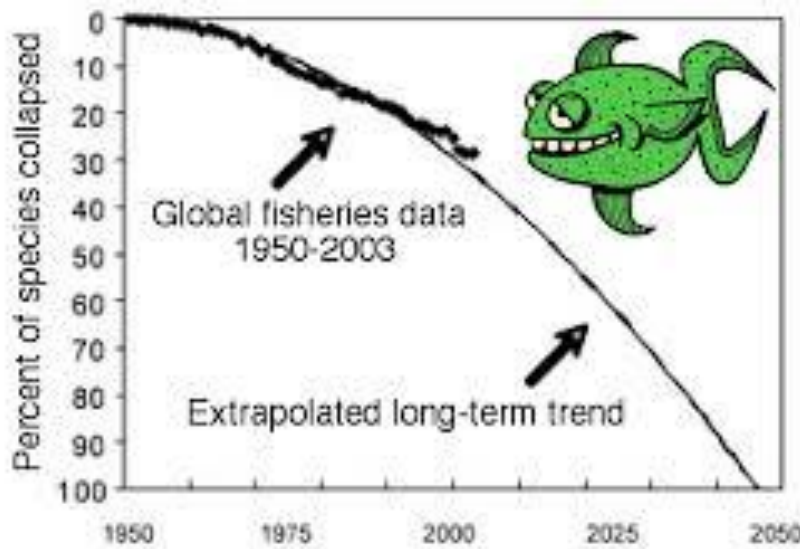




c) Marine ecosystem damage



d) Fisheries collapse



e) Rising Sea level

Rising waters

Sea levels going up 60 percent faster than previous UN climate panel forecasts, scientists report Wednesday

Largest cities exposed to risk by 2070

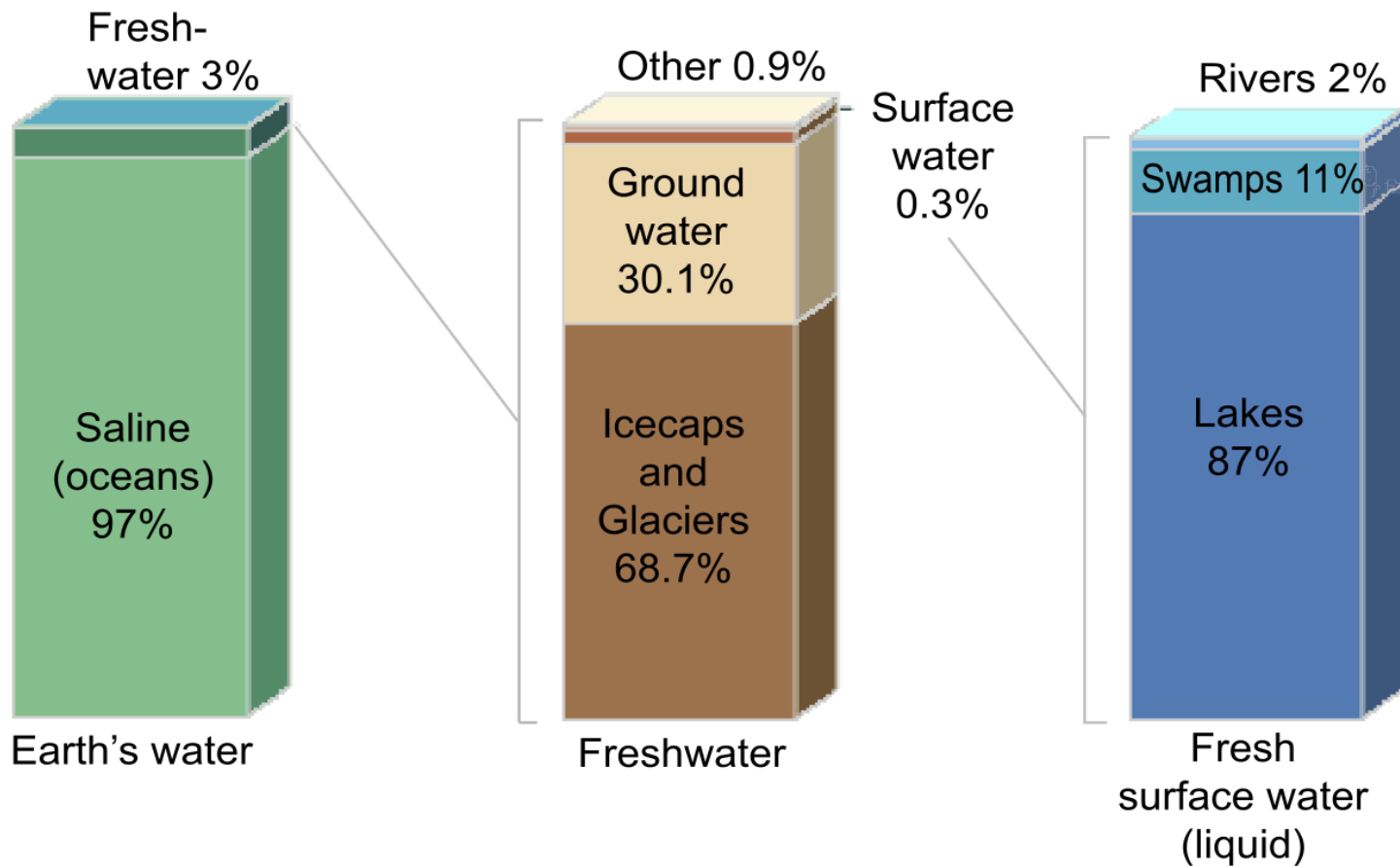
Most vulnerable to surge-induced events, by projected population

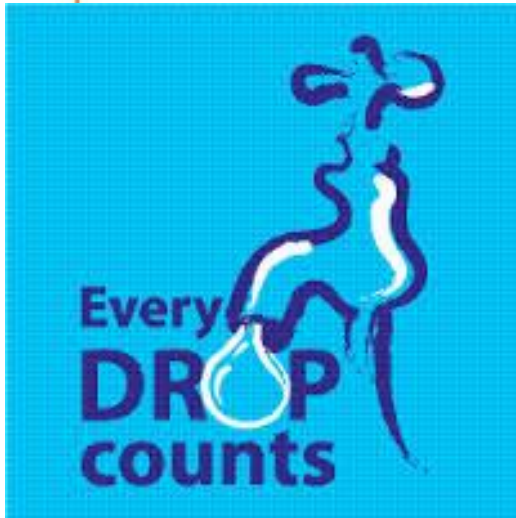
Millions



f) Water resources

Distribution of Earth's Water





g) Crop failure



h) Severe weather



i) Landslides



j) Forest fires

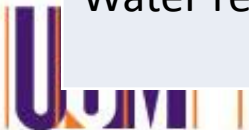


k) Floods



Effect of Climate Change

Climate change event	On population	Poverty	Disaster Management
Extreme Temperatures	-ve	-ve	Higher risk
Desertification	-ve	-ve	Higher risk
Marine ecosystem damage	-ve	-ve	Higher risk
Fisheries collapse	-ve	-ve	
Rising seas	-ve	-ve	
Water resources	detrimental	detrimental	



Effect of Climate Change

Climate change event	On population	Poverty	Disaster Management
Crop failure	-ve	-ve	Higher risk
Severe weather	-ve	-ve	Higher risk
Landslides	-ve	-ve	Higher risk
Forest fires	-ve	-ve	
Floods	-ve	-ve	

Last, but not least, benefit of biodiversity:

supply of exotic food for public consumption





- Hence we now know that biodiversity is actually very important, along with their vital contributions to ecosystems, environment and human society. Therefore it is indeed our essential natural heritage and more affirmative action should be done to protect our biodiversity.

Threats to Malaysian Biodiversity

- Habitat loss and alteration
- Pollution and pesticides
- Logging
- Environmental degradation
- Over harvesting
- UV radiation
- Disease
- Intro of exotic species





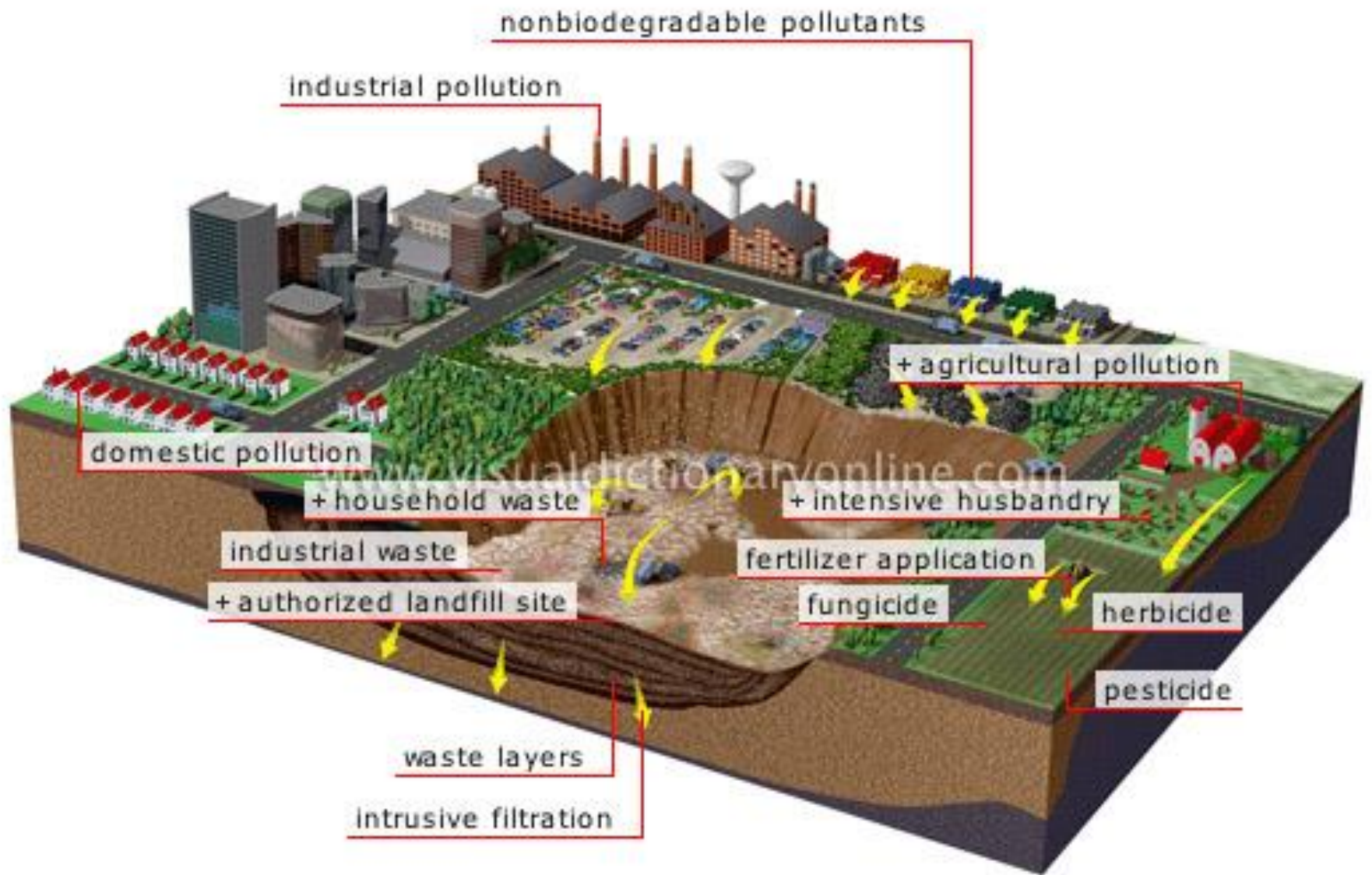




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Conservation Status

- Even as we speak here today our animal and plant friends are dying out there, their populations are declining
- Conservation efforts in M'sia very poor
- No concrete measures taken by authorities to safeguard our natural heritage.
- Laws may be enough but enforcement is sorely lacking.



- Conservation Issues

- Not charismatic, not high profile
- Minimal understanding of amphibian importance
- No support from politicians and public
- Minimal support for amphibian research
- Low priority in eyes relevant authorities
- Difficult subjects to do thorough studies
- Not many young people interested
- Laws may be adequate but lacking in enforcement activities.

**IF FROGS
GO EXTINCT,
YOU'LL NOTICE.**

VISIT THE
'FROGS FOREVER?'
EXHIBIT.



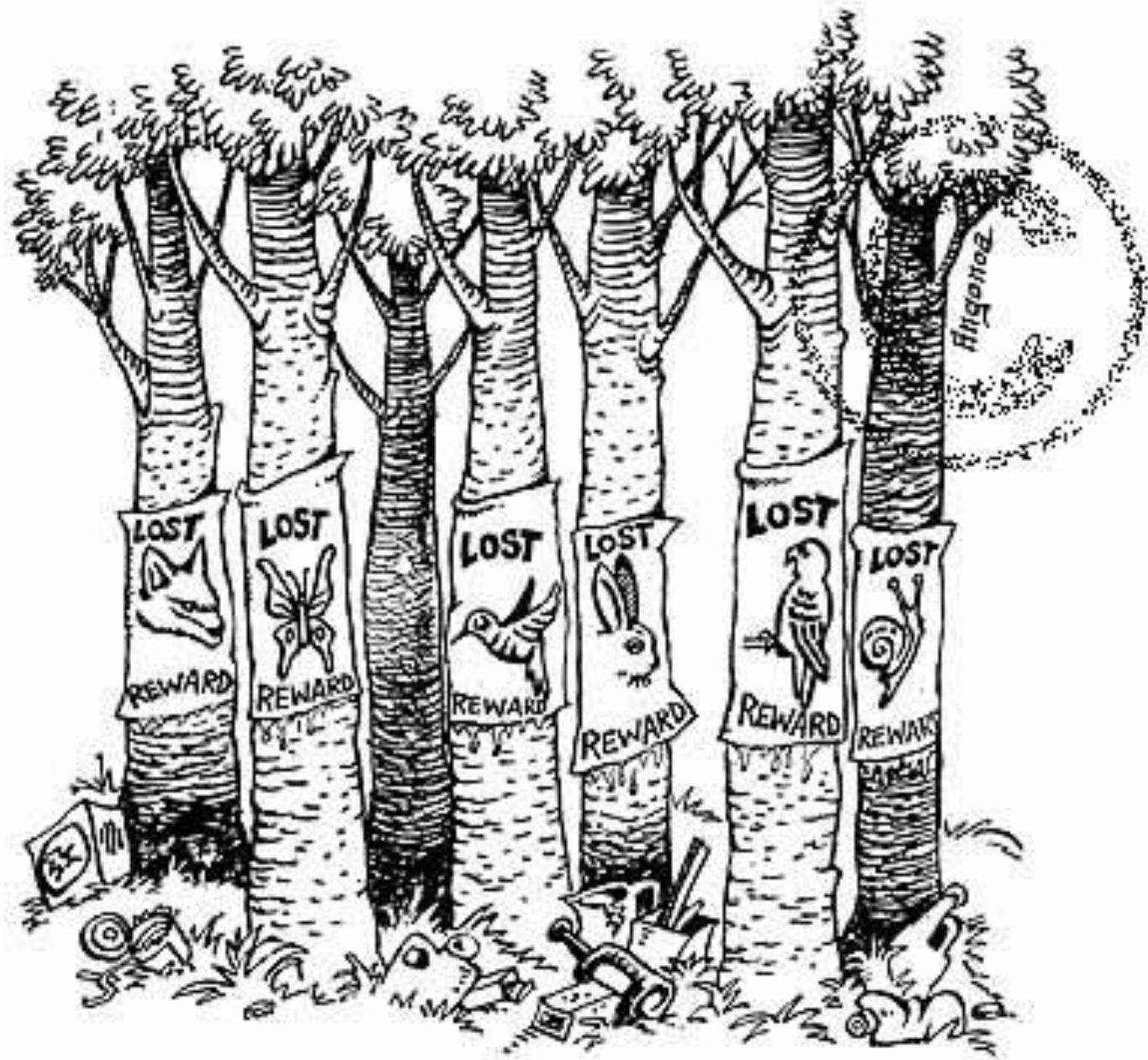
vancouver
aquarium
VANQUA.ORG

**IF FROGS
GO EXTINCT,
YOU'LL NOTICE.**

VISIT THE
'FROGS FOREVER?'
EXHIBIT.



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- Conclusions

You and I, Our Families , Our Friends,
Our teachers, Our Students, Our
Neighbourhood, Our Society, Our
Industries, Our Politicians, Our
Government.....Everybody.....

should play our part..insist
authorities...

stop altering environ...practise
sustainable lifestyle...to ensure cont'd
existence of our natural heritage.

Remember, we live on **Spaceship Earth and our resources are **limited**.**





If you are planning for one year, plant rice
If you are planning for ten years, plant trees
But if you are planning for 100 years,
then educate the people.

(Anon.)

Only when all the trees are gone from the forests,
Only when all the buffaloes are gone from the grasslands
Only when all the fish are gone from the rivers... will they
know that **money cannot be eaten** (Old Souix saying)

- Acknowledgements
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- Thank You
- Terima kasih
- Nandre
- Syeh she
- Merci boucoup
- Muchas gracias
- Arigato gozaimas
- Danke schon
- Karp Khun

Thank You

