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Concept/Challenge/Notes	Example
The Biodiversity Crisis	
Biotelemetry	• Radio • Satellite/GPS • Acoustic (underwater) **LONG TERM** • Archival Tags/Data-loggers
What is the biodiversity crisis? Many species are becoming threatened with <u>extinction</u> with climate change as a main driver for this. <u>Vertebrates</u> feature predominantly when highlighting this issue because they are more <u>noticeable.</u>	More noticeable because: • Larger (easier to see) • Smaller populations (easier to count) • Disturbances in lower trophic levels affects vertebrates higher up (trophic cascades) • We have knowingly hunted etc. • Of greater economic/utilitarian value (i.e. food, clothing, cultural, aesthetics)
Amphibians – indicator of environmental health Biomedically significant ("intrinsic value")	• Moist and absorbent skin prone to desiccation; effected by pollution and UV radiation • Used for production of medicines. EG) produces sticky glue that attached tendons together. • Models muscle disuse atrophy (waste away) and starvation. EG) species that live the desert and bury themselves for months until it rains
Mass Extinction – occurs when <u>>75%</u> of species goes extinct with a <u>geologically short time</u> period	• Most severe is the Permo-Triassic extinction where 96% of species where lost
The Sixth Mass Extinction – happening <u>now</u>? Species being lost <u>100-1000x faster</u> than previously	• One species is responsible

Threats to Species	• Habitat loss, degradation and fragmentation • Environmental change • Invasive Species and diseases • Over-exploitation of species/resources • Pollution
What is biodiversity?	• Biological diversity ('biodiversity') is a term that refers to the number of species in a region, or, more generally, in the world that creates complexity of life. • It can encompass ecosystems, species (richness) and genetics.
Why is biodiversity important?	• Utilitarian values - Ecotourism (EG. Koala, GBR) - EG. Antibiotics & ants • Ecosystem services and functions - Supporting ecosystem service (functions) - Provisioning eco. service - Regulating eco. service - Cultural eco. service • Heritage and national identity • Representative of evolution of life and ethical responsibility to protect
Species Diversity **-** Endemism/Endemic Species Confined to a geographically region (usually isolated); found nowhere else.	• Australia has high endemism because it was geographically isolated millions of years ago – evolved independently • EG) Kangaroo, emu
Native Species – their presence is NOT due to human involvement	• Cassowary are native to Aust. and PNG since they are naturally found in these locations
Hotspot – Biogeographic region that is biodiverse, has high endemism, and under threat	Criteria: • Contains 1500 endemic vascular plants • Lost at least 70% of original habitat
Genetic Diversity - • Must have genetic diversity for adaptability so that evolution can occur Low genetic diversity increases risk of extinction: • Vulnerable to disease • Inbreeding problems (increases homozygosity, more likely effected by homo. rec. trait)	• Tasmanian Devil – Facial tumour disease is able to spread because this species lack genetic diversity for a gene involved in the immune system • >90% susceptible
Ecosystem Diversity -	• Human microbiome – symbiosis of microorganism in digestive track

Ecosystem Functions (<u>supporting</u> ecosystem service) – processes that control/regulate the fluxes of:
- Energy
- Nutrients
- Organic matter
	• Nutrient cycling
	  - Symbiotic bacteria in plants fix nitrogen from atmosphere, fertilising the soil
	• Water cycling
	  - Spreads water to new locations
	  - Transpiration of salt bush draws from groundwater and puts it into the atmosphere. It lowers groundwater level which takes the salt with it, except with irrigation that draws salt to surface, increasing salinity.
	• Photosynthesis
	  - Primary production (autotrophs) – most life relies on production of organic molecules
	  - Replenish O_2
	• Soil formation
	  - EG. Decomposition creates organic component of soil by living organisms metabolically breaking down materials.

Ecosystem Services – suite of benefits to humanity - ***<u>Provisioning –</u>*** <u>production of renewable resources</u>	Provides us with: • Wood - utilitarian value • Food – utilitarian value • Oxygen • Medicine – utilitarian value

Ecosystem Services – suite of benefits to humanity
- ***<u>Regulating –</u>*** <u>lessen environmental change</u>
	• Water/air purification
	  - EG. Plants remove pollutant from air (along road sides)
	  - EG. Microbial immobilisation of sulphur (leads to acid rain if not controlled)
	  - EG. Wetlands purify water by catching sediments in root systems
	• Carbon sequestration
	  - EG. Photosynthesis takes CO_2, stores it and produces O_2.
	• Disease/pest control
	  - EG. Birds (native predators) feed upon disease-carrying insects and/or pests
	• Pollination
	  - Insects, birds and mammals pollinate natives and crops
	• Erosion control
	  - When vegetated stops erosion

	- Reef and mangroves prevent coastal erosion
Unity of Life – proves that we are all interconnected	• Cell • DNA
Diversity of Life – Evolution (Natural Selection) explains patterns of unity and diversity	• Evolution
Classifying Life – Small groups are nested in larger ones	• Taxonomic System Three domains of life: • Archaea (prokaryote) • Bacteria (prokaryote) • Eukarya (eukaryote)