BIOLOGY FIELD STUDY DAY 2-3 PRESENTATION

GROUP 4 HOON LING YIN TAM KIN LOK WONG HEI LUNG WONG KA YIU

TO INVESTIGATE THE VARIETY AND POPULATIONS OF ANIMAL SPECIES UNDER DIFFERENT WATER FLOW RATE

WHYND

Water flow rate

- Measured by water flow meter
- 3 times, record reading and take average
- 4 localities with difference in water flow rate are selected for investigation





•Number of species and population of each species in the selected areas.





•Number of species and population of each species in the selected areas.

• 0.5m x 0.5m quadrat





- •Number of species and population of each species in the selected areas.
 - 0.5m x 0.5m quadrat
 - look for animals in the area included





•Number of species and population of each species in the selected areas.

- 0.5m x 0.5m quadrat
- look for animals in the area included
- pick up small rocks from the bottom, and look for animals present on the rock surface or under the rock.





Use a brush pen to separate animals from the rock surface



Use a brush pen to separate animals from the rock surface

• Hold animal captured in a plastic sorting tray for identification



Use a brush pen to separate animals from the rock surface

• Hold animal captured in a plastic sorting tray for identification

• Release all of them to their original micro-habitats



Use a brush pen to separate animals from the rock surface

• Hold animal captured in a plastic sorting tray for identification

• Release all of them to their original micro-habitats

• limited to 20 minutes -> comparable



•River bed substrate composition:

• Find places with similar bed substrate content





• River bed substrate composition:

- Find places with similar bed substrate content
- Temperature
 - •Use a digital thermometer





• River bed substrate composition:

- Find places with similar bed substrate content
- Temperature
 - •Use a digital thermometer
- •Light intensity
 - •Use a light





•River bed substrate composition:

- Find places with similar bed substrate content
- Temperature
 - •Use a digital thermometer
- •Light intensity
 - •Use a light meter
- •Water depth:
 - •Use a ruler





ASSUMPTIONS AND LIMITATIONS

Assumptions

•Water at the four localities has same pH

 20 minutes is representative enough for counting populations of animal species at a selected area

ASSUMPTIONS AND LIMITATIONS Assumptions

•Water at the four localities has same pH

•20 minutes is representative enough for counting populations of animals at a selected area

Limitations

•The investigation was carried out at a specific time slot (daytime, winter), it may not represent the overall situation

•Apparatus not sensitive enough

oE.g. water flow meter

 Some animals were irritated during the investigation and escaped from the quadrat



LOCALITY	A (FAST)	B (MODERATE)	C (SLOW)	D (VERY SLOW)
WATER FLOW RATE (M/S)	0.49	0.20	0.10	0.04
RIVER BED SUBSTRATE COMPOSITION	PEBBLES	PEBBLES	PEBBLES	PEBBLES
TEMPERATURE (°C)	18.3	18.4	18.6	18.5
LIGHT INTENSITY (LUX)	16010	16400	16000	16210
WATER DEPTH (CM)	7.0	8.0	7.5	7.6

Locality	A (Fast)	b (Moderate)	C (Slow)	d (Very slow)
large stream snail	7	9	7	3
Mayfly Nymph	0	2	2	3
water Skater	0	3	1	1
pond snail	0	0	1	0
water penny	1	3	0	0
Bee shrimp	0	0	0	2
Goby	0	0	0	1
Number of animals	8	17	11	10
Number of species	2	4	4	5

•Consider area A,

•A total of 8 animals, consist of 2 species.

•Large stream snails consist of 87.5%



- •Consider area B,
- •A total of 17 animals, consist of 4 species.
- •Large stream snails consist of 52.9%



- •Consider area C,
- •A total of 11 animals, consist of 4 species.
- •Large stream snails consist of 64%



- •Consider area D,
- •A total of 10 animals, consist of 5 species.
- •Large stream snails consist of 30%





Number of animal species observed decreases with increasing water flow rate.



- Number of animal species observed decreases with increasing water flow rate
- Possible reasons:

- various difficulties — difficult to capture fast-moving microorganisms, easily shoved by water current to other regions, etc.



- some have adaptive features for the fast, turbulent water



- some have adaptive features for the fast, turbulent water

- others can hardly compete with these animals



- some have adaptive features for the fast, turbulent water

- others can hardly compete with these animals

-> <u>only animals with specific</u> <u>adaptive features survive in</u> <u>region with high water flow rate,</u> <u>leading to a smaller number of</u> <u>animal species present</u>



Adaptive features	streamlined or flattened body	Smooth body surface	muscular body or fins	with sucker- life structure	equipped with hooks	hiding under shelters	
large stream snail	V	\checkmark	×	V	×	\checkmark	
mayfly nymph	√	\checkmark	×	×	\checkmark	V	Al ARA
Water skater	×	X	X	×	X	X	
Pond snail	V	\checkmark	×	V	X	\checkmark	
Water penny	V	\checkmark	×	V	X	\checkmark	
Bee shrimp	×	\checkmark	×	×	X	\checkmark	
Goby	√	\checkmark	\checkmark	X	X	X	

Number of animals increases by 112.5% from A to B, then decreases by 41.2% from B to D.



Number of animals increases by 112.5% from A to B, then decreases by 41.2% from B to D.

•A (0.04m/s) to B (0.1m/s)

- hard to settle down in region with fast water flow

 Difficulties in obtaining food + resisting turbulence causes animals to be washed



Number of animals increases by 112.5% from A to B, then decreases by 41.2% from B to D.

•A (0.04m/s) to B (0.1m/s)

- hard to settle down in region with fast water flow

- Difficulties in obtaining food + resisting turbulence causes animals to be washed

-> reduces number of animals in region A, and increases number of animals in region B.



Form B to D

-Region B 's river flow rate > region C & D



Form B to D

-Region B 's river flow rate > region C & D

-Region B = a more favourable micro-habitat for animals & adaptive features for fastmoving water.



Form B to D

-Region B 's river flow rate > region C & D

-Region B = a more favourable micro-habitat for animals & adaptive features for fastmoving water.

-Larger animals ~ weaker against strong water flow

-Animals with the adaptive features can live in the region with moderate water flow without being preyed or washed away.

-Their population then becomes larger



1) slow water facilitates the growth of algae

2) bacteria on algae consume oxygen to decompose dead body of algae

3) some algae can be toxic

4) organic waste cannot be removed effectively

Result: smaller population of animals in regions C and D.



CONCLUSION

While the most number of animal species populate in very slow running water (region D), region with moderate water flow (region B) has the largest number of animals.

A number of adaptive features are observed, allowing some animals to flourish in areas with fast and moderate water flow.

Actually, these observations are not solely caused by water flow, but many other interdependent variables, such as distribution of nutrients, presence of predator, etc.

O&ASESSION

This is the end of our presentation. Thank you for listening.

