

Exercise walk-through

5.10

Impacts of Urbanization

AP Environmental Science

What we will cover

- 1 The tragedy of the commons
- 2 Agriculture and food
- 3 Irrigation and water
- 4 Pest control and IPM
- 5 Harvesting resources
- 6 Urbanization and sustainability



Mining



Benches cut ever wider and deeper to reach the ore

Surface (strip) mining and mountaintop removal disturb the most land. Impacts:

- habitat destruction;
- **acid mine drainage** ;
- toxic tailings polluting water.

When easy deposits run out, mining goes **subsurface** – costlier and more dangerous. Coal follows the same path.

Urbanization and sustainability

Urbanization adds
impervious surfaces :

- more runoff, less recharge;
heat island; sprawl
- fix with permeable pavement,
green roofs

An ecological footprint above
biocapacity cannot last.



Sprawl: impervious surfaces and heat islands

Exercises 2.1-2.3

2.1 What is an impervious surface?

[1]

2.2 How does paving affect runoff and infiltration?

[1]

2.3 What is the urban heat island effect?

[1]

Exercises 2.1-2.3

2.1 What is an impervious surface? [1]

2.1

- A surface (road, roof) that water cannot soak into
-

2.2 How does paving affect runoff and infiltration? [1]

2.2

- It increases runoff and reduces infiltration
-

2.3 What is the urban heat island effect? [1]

2.3

- Cities being warmer than surrounding rural areas

Exercise 3.1

3.1 Cities are often warmer than surrounding rural areas because of the

[1]

☐

A rain shadow effect

B urban heat island effect

C Coriolis effect

D greenhouse effect only

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A rain shadow effect

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3.1 B

- the urban heat island effect

Exercise 3.2 (a)

3.2 A city expands, paving over fields.

(a) Explain how this increases flooding.

[2]

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[2]

(a)

- Paving stops water soaking in, so more runs off quickly over the hard surfaces, overwhelming drainage and causing floods

Exercise 3.2 (b)

3.2 A city expands, paving over fields.

(b) Suggest one smart-growth solution.

[1]

Exercise 3.2 (b)

3.2 A city expands, paving over fields.

(b) Suggest one smart-growth solution.

[1]

(b)

- Any one: green roofs, permeable pavement, preserving green space, denser development

Exercise 3.3

3.3 Explain why the urban heat island effect occurs.

[2]

Exercise 3.3

3.3 Explain why the urban heat island effect occurs.

[2]

3.3

- Dark paved surfaces and buildings absorb and re-radiate heat, and there is little vegetation to cool the air by shade and transpiration, so cities stay hotter