esri Australia

GIS For Schools

Slowing malaria

Lesson Map: http://esriaustralia.com.au/education/SpatialActivity6

Engage

Who is at risk of malaria?

➔ Click on the lesson map link above to commence the lesson.

– The shaded regions show there the 41 species of Anopheles mosquito can survive. This is the vector responsible for spreading malaria.

? Based on the map, what conditions can we assume the Anopheles mosquito needs to survive? *[Warm temperature, humidity, rainfall, water etc.]*

– Over 3.2 billion people live in areas where Anopheles mosquitos can survive.

? With approximately 7.1 billion people on earth, what percentage of the world is at risk of malaria? *[45%]*

Explore

Which countries have the highest malaria-related death toll?

➔ In the 'details' pane to the left of the map, click the button to 'show contents of map.'

➔ Tick the checkbox to turn on the layer called 'P.falciparum distribution.' Turn off all other data layers.

– This layer shows plasmodium falciparum distribution. This is the parasite that causes malaria in humans.

? What environmental conditions does p.falciparum need to survive? *[30°S to 30°N; warm ambient temperatures and adequate rainfall]*

? Which region has the highest endemicity (disease intensity)? *[Sub-Saharan Africa]*

➔ Using the search bar in the top right corner of the map, locate and zoom in on Kenya.

? Why are some areas malaria free? Add the 'world relief' base map to guide your

Download student worksheet here.

Time
20 minutes

Activity
Investigate the reason for global patterns of malaria, and the effectiveness of methods to reduce malaria-related deaths.

Learning Outcome
Students will be able to:

- Understand the relationship between environmental features and malaria cases
- Interpret the effectiveness of malaria control methods over time
- Propose a suitable timeline for malaria-reducing strategies

ACARA Curriculum Link

Year 10 Geography- Unit 2: Geographies of human wellbeing

ACHGK076 | ACHGK077 | ACHGK078 | ACHGS078 | ACHGS080

Senior secondary Curriculum – Biology – Unit 4: Maintaining the internal environment

ACSBL117 | ACSBL118 | ACSBL098 | ACSBL103 | ACSBL106

Senior secondary Curriculum – Geography – Unit 1: Natural and ecological hazards

ACHGE022 | ACHGE023 | ACHGE024 | ACHGE025 | ACHGE026 | ACHGE027 | ACHGE009

answer. *[High altitudes prevent mosquito survival]*

Explain

How is Africa reducing malaria?

- → Turn on the 2 layers called 'endemic African' for 2005 and 2015. Zoom out to view Africa, and alternate between these two layers by switching them on and off.
- → Turn on the legend to better understand map symbology. Do this by clicking the 'legend' icon to the left of the map.
- ? What progress was made from 2000 to 2015? *[40% decrease in malaria incidents]*
- − The use of Insecticide-Treated Bed Nets (ITN's) is the most important factor in preventing malaria in children.
- → Click on several countries to compare the relationship between ITN's and malaria decrease. Press the 'next feature' window within each country window to compare the 2005 and 2015 incidence rates.

Extend

How effective are ITN's?

- − Models predict that ITN's are effective at eliminating malaria, if the country has an endemicity of less than 40% of the population, without any external sources of infection.
- → Click several countries to predict whether they will need additional control measures, based on the percentage of p. falciparum.
- − Optional: Students can propose the most suitable African nations to target with ITN's based on 2015 p.Falciparum rates.

Next Steps:

Request a free ArcGIS Online Account for your school:

Acknowledgements:

This lesson map uses data sourced from an Esri GeoInquiry.

Accompanying lesson material has been amended to align with the Australian National Curriculum.

Teacher Feedback:

To share your feedback on this, or any Spatial Activity, please contact education@esriaustralia.com.au

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