



16th International Geography Olympiad

Hong Kong

30 July – 5 August 2019

Written Response Test

Question and Answer Booklet

Do NOT open the Booklet before instructed to do so by a supervisor.

Name: Team:

iGeo student number:

Instructions for Students

1. Fill in your name, team and iGeo student number on the front page of this Question and Answer Booklet.
2. Fill in your iGeo student number in the boxes on top of each of the pages in this Booklet.
3. This test consists of 6 Sections.
4. The maximum total mark is 90.
The mark for each question is given in the margin at the beginning of the question.
There is a maximum of 15 marks for each Section.
5. Answer all questions in the spaces provided in this Booklet in English.
Keep the left margin free for markers.
Please write clearly.
Please use blue (or black) pen, not pencil.
Check the backs of pages as questions are written on both sides.
6. There are blank pages which you can use as additional space for your notes.
Please cross through any notes so that we know they are not part of your answers.
If you use these pages for answers, please label them clearly with the Section and question number (e.g. A1).
7. Where appropriate, please write sentences or phrases not single words.
8. Give only the required number of answers (reasons, examples, etc.).
For instance, if the question asks for 2 reasons and you give more than 2, only the first 2 reasons will be marked.
9. The Resource Booklet contains Figures referred to in this Booklet.
Do not write any of your answers in Resource Booklet.
10. You may use a calculator during the test.
11. Students not educated in English are allowed to use bilingual dictionaries during the test.
12. Time:
180 minutes for students not educated in English (+10 minutes reading time),
150 minutes for students educated in English (+10 minutes reading time).

Good luck!

Written Response Test

Contributions from: Australia, China Taipei, Romania
Committee Convenor: Dubravka Spevec (Croatia)
Deputy: Mark Higginbottom (UK)

Director of Tests: Sue Lomas (UK)

Section A: Agriculture and Climate Change

2m

1. Study Resource Booklet Figure A1: Impact of climate change on agricultural yields between 2003 and 2080 (projections). Identify the 4 areas (major regions) that will face **the most negative impact** of climate change on its agricultural yields.

1:

2:

3:

4:

6m

2. Outline **3 effects of climate change** on agricultural yields. For each effect **fully explain** how it will impact agriculture in the future.

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1m

3. What do you understand by the term “**climate-smart agriculture**”?

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4. Discuss **3 advantages** and **3 disadvantages** of a smart agriculture.

Advantage 1:.....
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Advantage 2:.....
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Advantage 3:.....
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Disadvantage 1:.....
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Disadvantage 2:.....
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Disadvantage 3:.....
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Section B: Earthquakes

1.5m

1. a) List the **3 main types** of seismic waves.

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0.5m

b) What is the name of the **instrument** that measures these waves?

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3m

2. Outline the **differences** between the 3 main types of seismic waves.

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3m

3. Study Resource Booklet Figure B1: Ecuador earthquake on February 22nd, 2019. Suggest the reasons for the occurrence of an earthquake on February 22, 2019 in this area of Ecuador.

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Student number:

2m 4. Explain how an earthquake leads to **soil liquefaction**.

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5m 5. Using Resources Booklet Figure B1: Ecuador earthquake on February 22nd, 2019 and Figure B2: Impact of Ecuador earthquake and your own knowledge, **explain** how the impacts of the Ecuador earthquake of Feb 22, 2019 and future earthquakes in this area could be managed.

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Section C: Sand Dune Mobility and Desertification

1m 1. Study Resource Booklet Figure C1: Satellite image of sand dunes in the Arabian Desert. What is the **direction** of the prevailing wind in this area?

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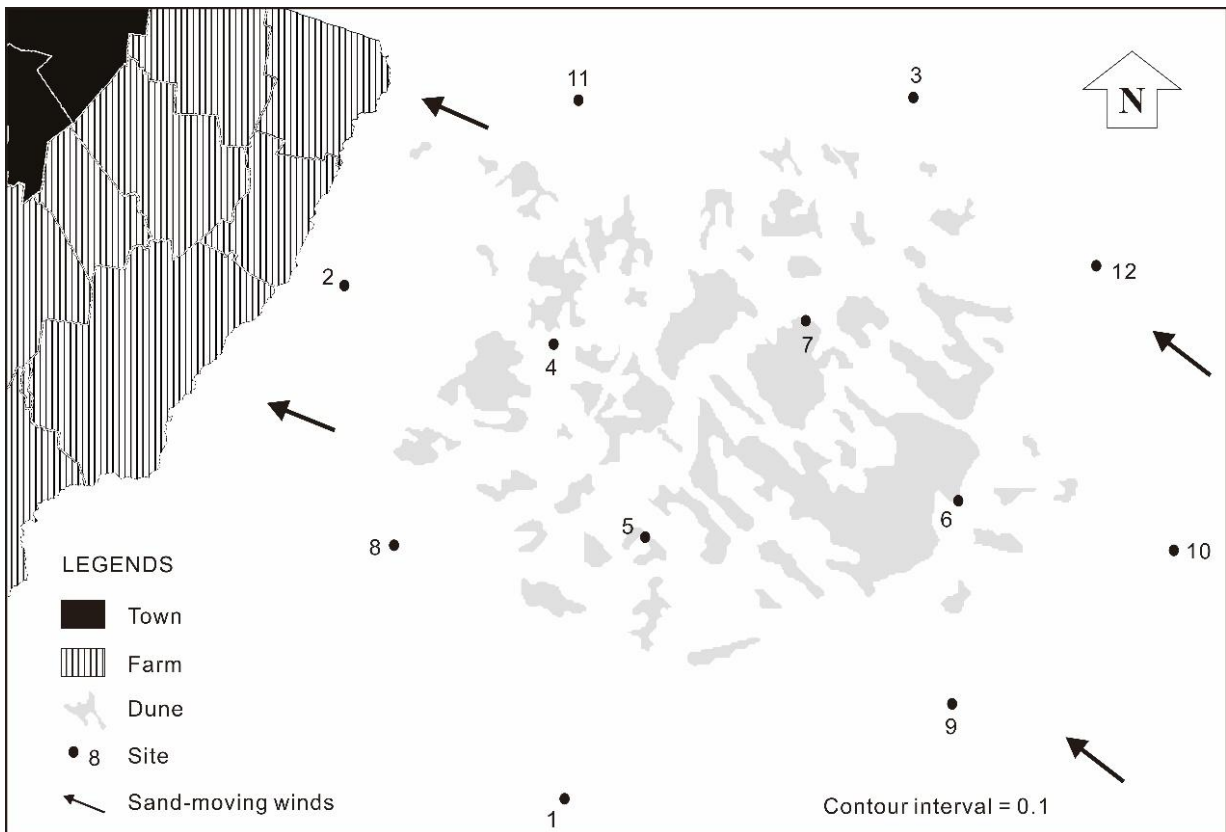
1m 2. Name 2 **natural factors** that influence sand dune mobility.

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9m 3. Following the Instructions in the Resource Booklet Section C, draw a triangulated irregular network on the map below.

Inside this network **draw contour lines** of the P/PE values from the Resource Booklet Table C1: Values of dune mobility index (M) and dune activity codes (with the contour interval 0.1) for the 12 Weather Monitoring Sites.



1m

4. Which Weather Monitoring Sites have **relatively high desertification threats**?

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3m

5. Suggest **strategies** for the local farmers and the government that could prevent the threats of desertification.

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Section D: Ocean Currents

1. Study Resources Booklet Figure D1: Part of North Atlantic Ocean current circulation and Figure D2: Water temperatures ($^{\circ}\text{C}$) and salinity (Practical Salinity Unit – PSU) in Northern Atlantic Ocean.

3m

a) Describe the pattern of **water temperature and salinity distribution** (Figure D2) for the area shown in the map (Figure D1).

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3m

b) Give reasons for the patterns you have described.

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1m

2. Based on your knowledge name the **main reasons** for the slowed and weakened North Atlantic Ocean circulation.

Reason 1:

Reason 2:

This Section continues on the next page.

4m

3. Assess the **economic and environmental impacts** a weakened circulation could cause.

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1m

4. Study Resource Booklet Figure D3: Measured number of pieces of plastic waste in the Indian Ocean gyre garbage patch.
Why is there an accumulation of plastic waste in this particular part of the Indian Ocean?

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3m

5. What are the challenges of managing the oceans in order to reduce the amount of this type of waste?

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Section E: Globalisation

2m

1. Study Resource Booklet Table E1: Growth of popular social media sites (2014–2019).

a) Identify the social media site that has experienced **the largest** absolute number of global users between 2014 and 2019.

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b) Identify the social media site that has experienced **the fastest** rate of growth in number of global users between 2014 and 2019.

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1m

2. What is meant by the term “**time-space compression**”?

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3m

3. Outline **3** factors that have resulted in global time-space compression.

Factor 1:

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Factor 2:

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Factor 3:

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This Section continues on the next page.

Student number:

2m

4. Study Resource Booklet Figure E1: The share of world exports and imports by country. Suggest **2** ways the share of world merchandise exports by country can influence flows of people.

1:

2:

3m

5. Evaluate **1** factor that might account for the spatial variations in Figure E1.

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4m

6. Identify and explain **2** reasons why the global shift of industry has had negative impacts on some people in the **developed** world.

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Section F: Water Security

1. Study Resource Booklet Figure F1: Global withdrawal and consumption of water from 1900–2025 (projected).

1.5m

a) Describe the global pattern of water consumption.

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1.5m

b) Which graph shows the most waste? Suggest a reason why this is the case.

Graph:

Reason:

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1m

2. What is meant by the term “**water insecurity**”?

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This Section continues on the next page.

4m

3. Give **4** reasons to explain why water consumption is increasing.

Reason 1:

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Reason 2:

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Reason 3:

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Reason 4:

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3m

4. Outline **3** strategies which would result in an **increased water supply** for a country.

Strategy 1:

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Strategy 2:

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Strategy 3:

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This Section continues on the next page.

4m

5. Study Resource Booklet Figure F2: Water distribution from the River Jordan.

Explain the **causes of potential conflict** in the withdrawal and consumption of water from the River Jordan.

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Student number:

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(you can use it for your notes (please cross them through afterwards) or for answers, which
are clearly labelled with the Section and question number).



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Written Response Test

Resource Booklet

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Do NOT write any of your answers in this Booklet.

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Written Response Test

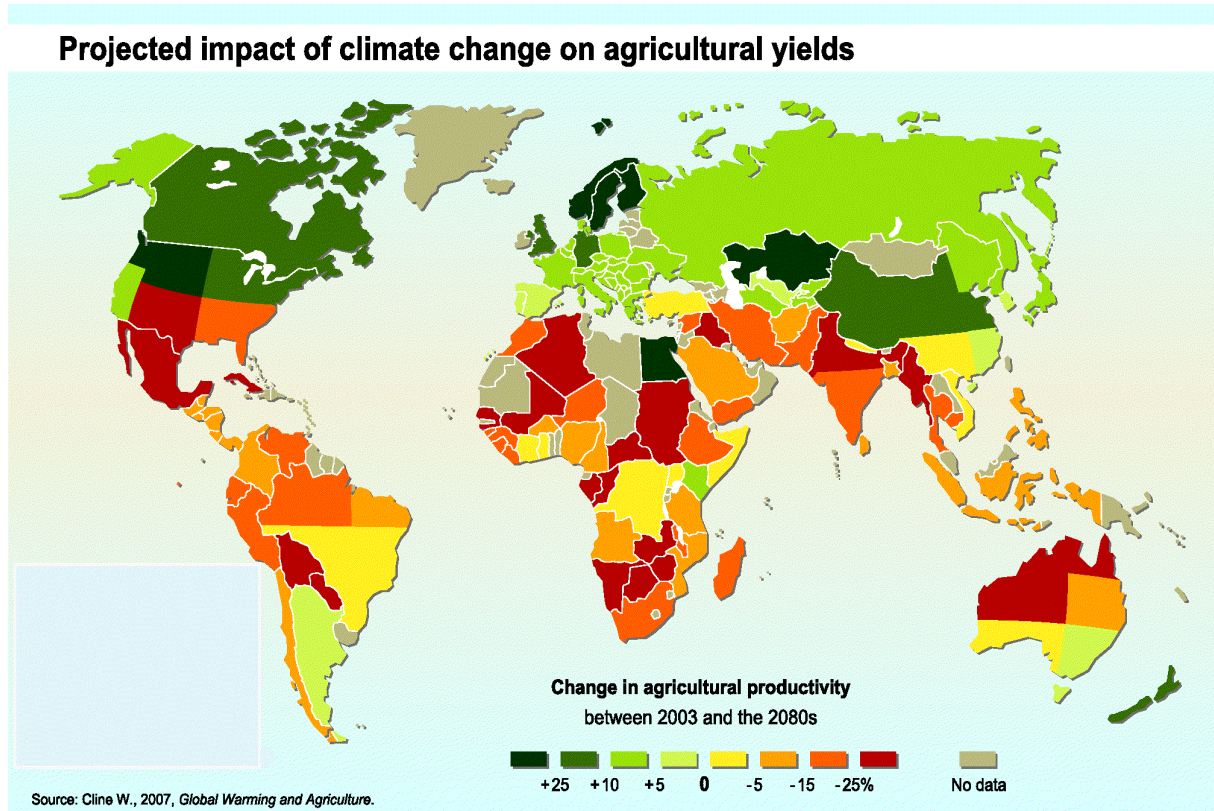
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Section A: Agriculture and Climate Change

Figure A1: Impact of climate change on agricultural yields between 2003 and 2080 (projections)

Source: <https://www.eea.europa.eu/data-and-maps/figures/projected-impact-of-climate-change>



Section B: Earthquakes

Figure B1: Ecuador earthquake on February 22nd, 2019

Source: <https://earthquake.usgs.gov/archive/product/poster/20190222/us/1553201441748/poster.jpg>

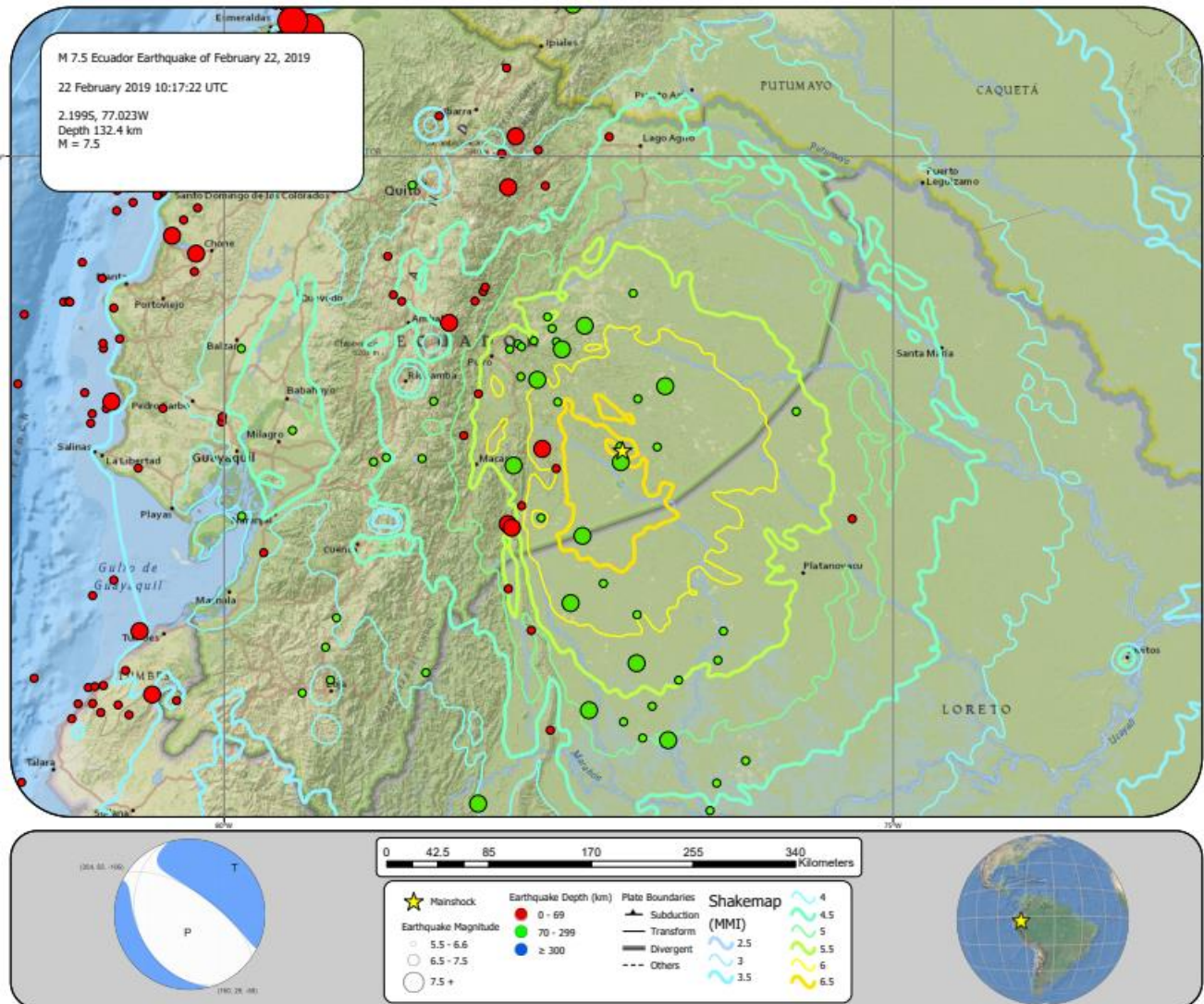
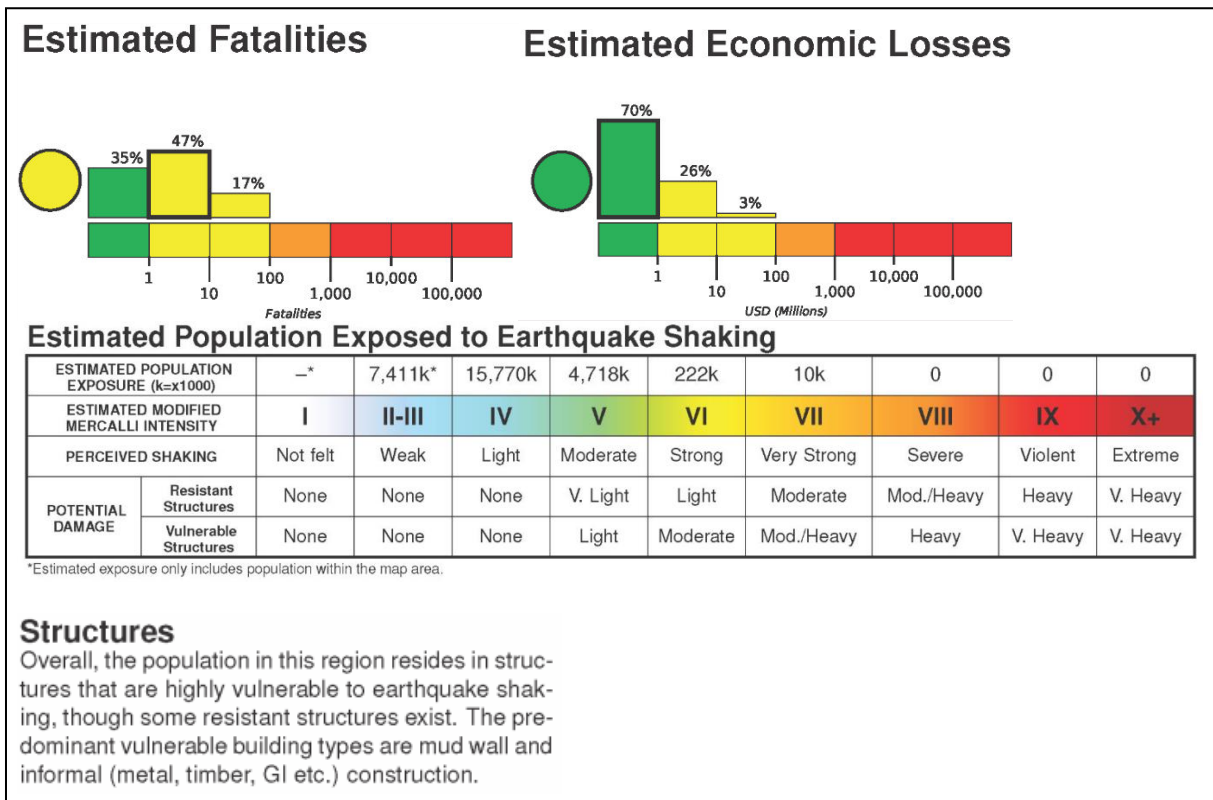


Figure B2: Impact of Ecuador earthquake

Source: <https://earthquake.usgs.gov/archive/product/poster/20190222/us/1553201441748/poster.jpg>



Section C: Sand Dune Mobility and Desertification

Figure C1: Satellite image of sand dunes in the Arabian Desert

Source: <https://www.bing.com/images>

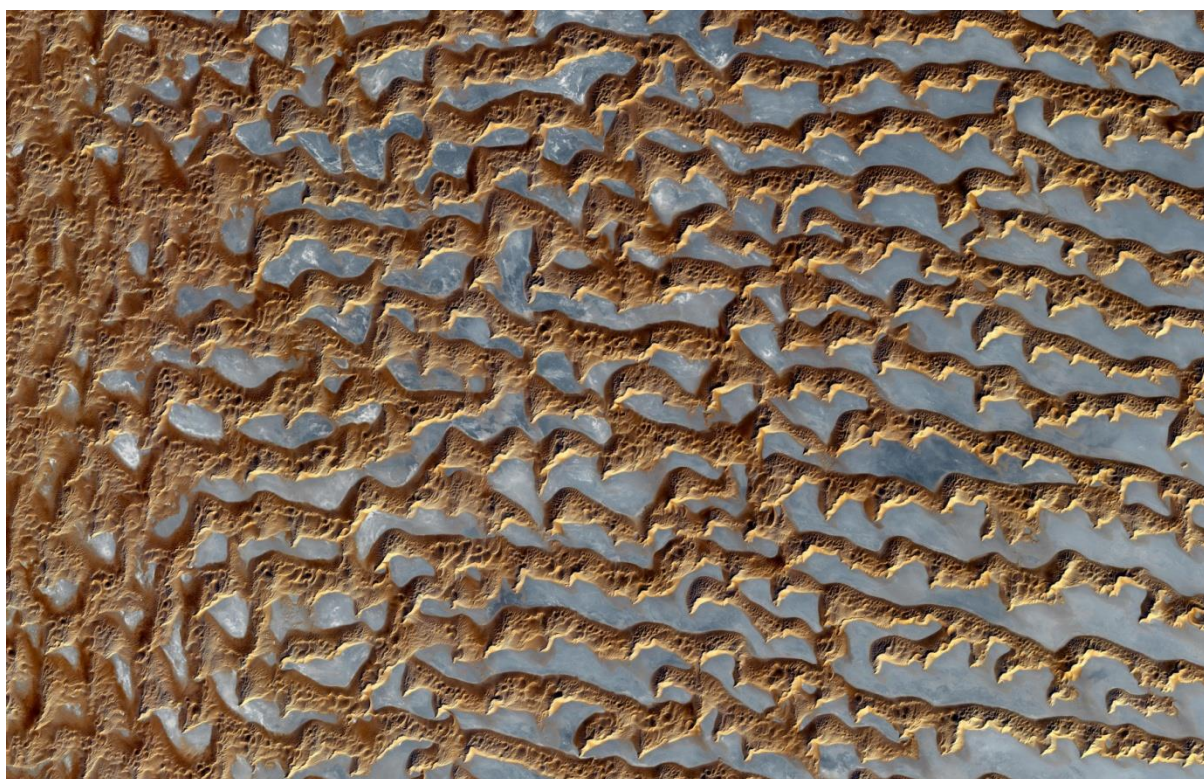


Table C1: Values of dune mobility index (M) and dune activity codes

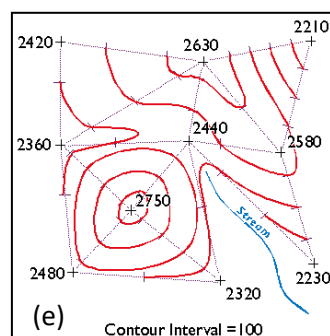
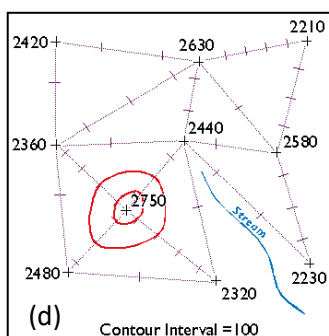
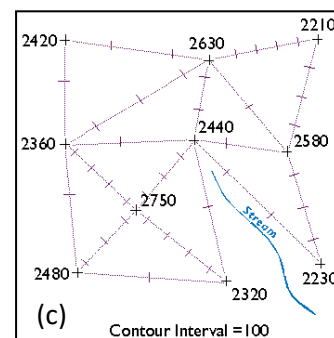
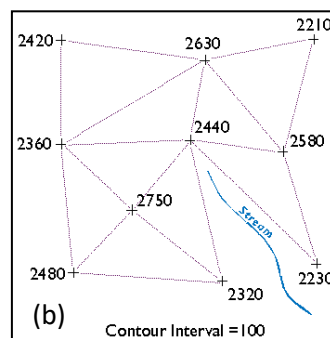
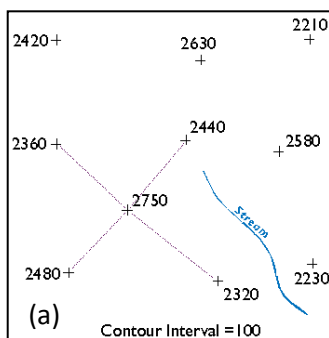
Weather monitoring site	Sand transport (%)	Precipitation (P) (cm)	Potential evapotranspiration (PE) (cm)*	P/PE	Dune Mobility Index (M)	Code**
1	10.0	1.6	2.0	0.80	12.5	IA
2	15.0	1.7	4.0	0.43	35.3	IA
3	22.0	1.9	6.0	0.32	69.5	CA
4	31.0	3.0	14.0	0.21	144.7	IS
5	46.0	3.8	30.0	0.13	363.2	AD
6	50.0	5.8	50.0	0.12	431.0	AD
7	44.0	7.8	30.0	0.26	169.2	IS
8	30.0	7.0	16.0	0.44	68.6	CA
9	49.0	5.0	8.0	0.63	78.4	CA
10	48.0	3.2	4.0	0.80	60.0	CA
11	33.0	2.5	3.0	0.83	39.6	IA
12	10.0	1.8	2.0	0.90	11.1	IA

** Dunes inactive (IA), Dune crest active (CA), Dunes active (IS), Fully active dunes (AD)

Instruction for drawing contour lines (by hand)

This instruction will walk you through a methodical approach to drawing contour lines from a range of spot elevations (Rabenhorst and McDermott, 1989).

1. Starting at the highest elevation, draw straight lines to the nearest neighbouring spot elevations (a). Once you have connected to all of the points that neighbor the highest point, begin again at the second highest elevation. (You will have to make some subjective decisions as to which points are "neighbors" and which are not.)
2. Taking care not to draw triangles across the stream, continue until the surface is completely triangulated (b). The result is a triangulated irregular network (TIN).
3. Now draw ticks to mark the points at which elevation contours intersect each triangle side (c). For instance, look at the triangle side that connects the spot elevations 2360 and 2480 in the lower left corner of Figure (c). One tick mark is drawn on the triangle where a contour representing elevation 2400 intersects. Now find the two spot elevations, 2480 and 2750, in the same lower left corner. Note that three tick marks are placed where contours representing elevations 2500, 2600, and 2700 intersect.
4. Finally, draw your contour lines. Working downslope from the highest elevation, thread contours through ticks of equal value (d).
5. Move to the next highest elevation when the surface seems ambiguous (e).



Section D: Ocean Currents

Figure D1: Part of North Atlantic Ocean current circulation

Source: <https://www.nature.com/articles/srep46192>

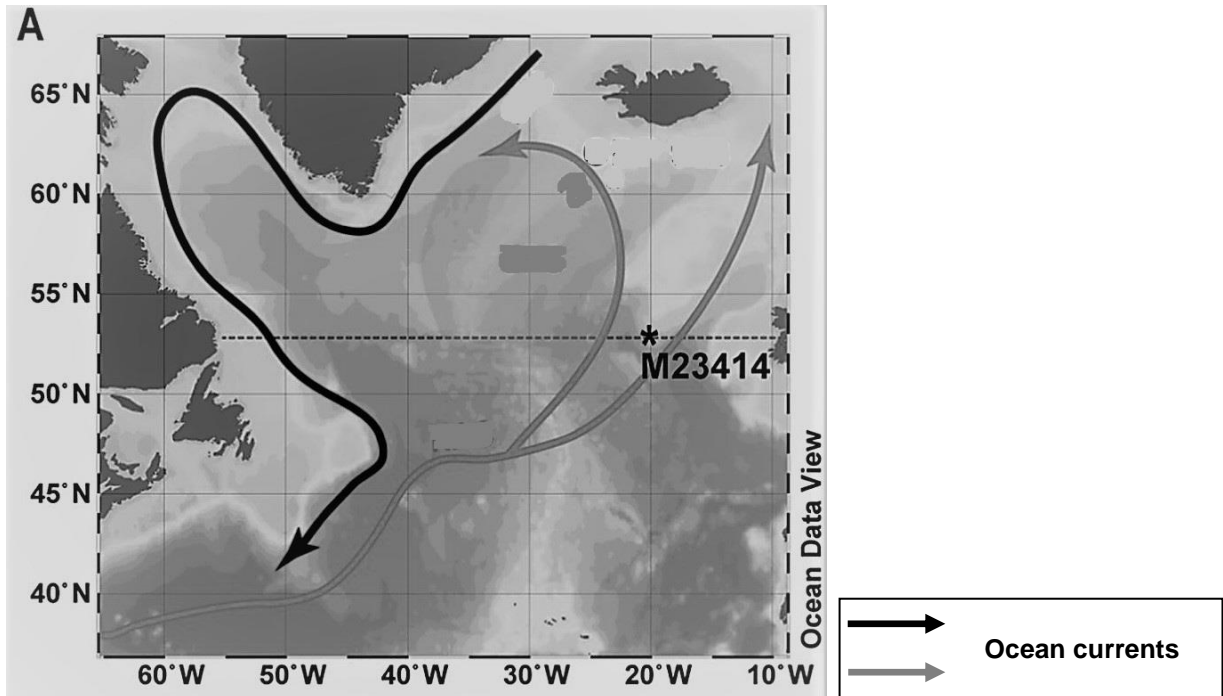


Figure D2: Water temperatures (°C) and salinity (Practical Salinity Unit – PSU) in Northern Atlantic Ocean

Source: <https://www.nature.com/articles/srep46192>

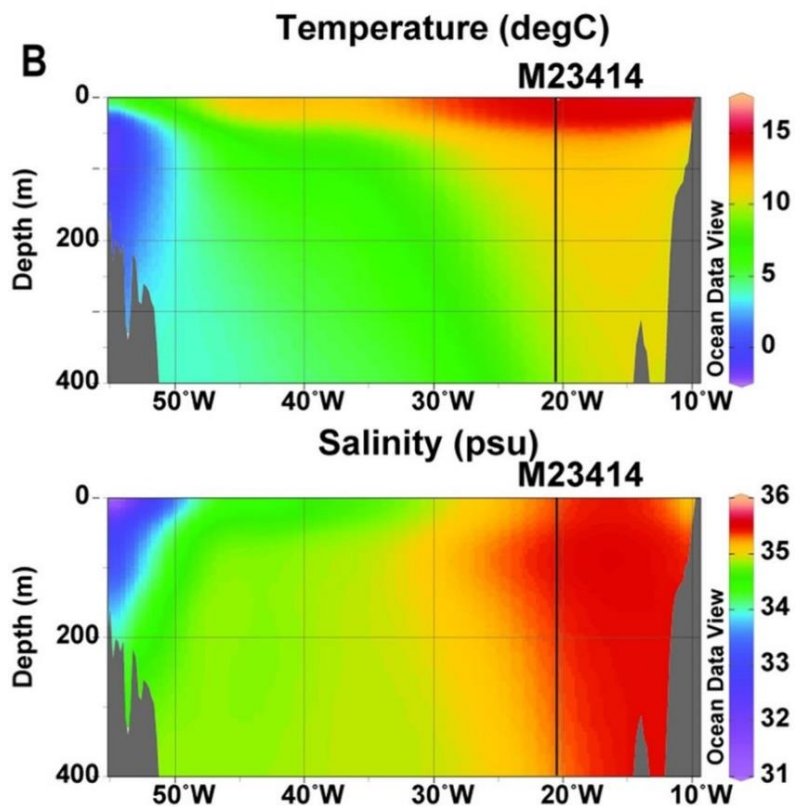
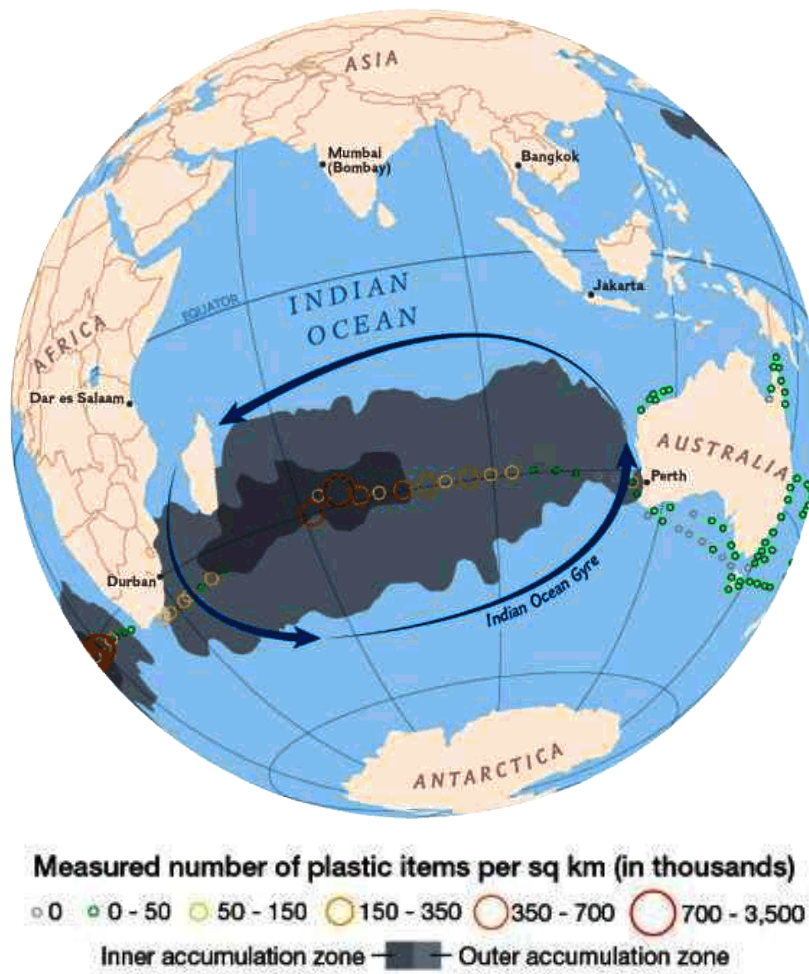


Figure D3: Measured number of pieces of plastic waste in the Indian Ocean gyre garbage patch

Source: http://www.blue-growth.org/Oceans_Rivers_Seas/Indian_Ocean_BlueGrowth_Agenda_2030.htm



Section E: Globalisation

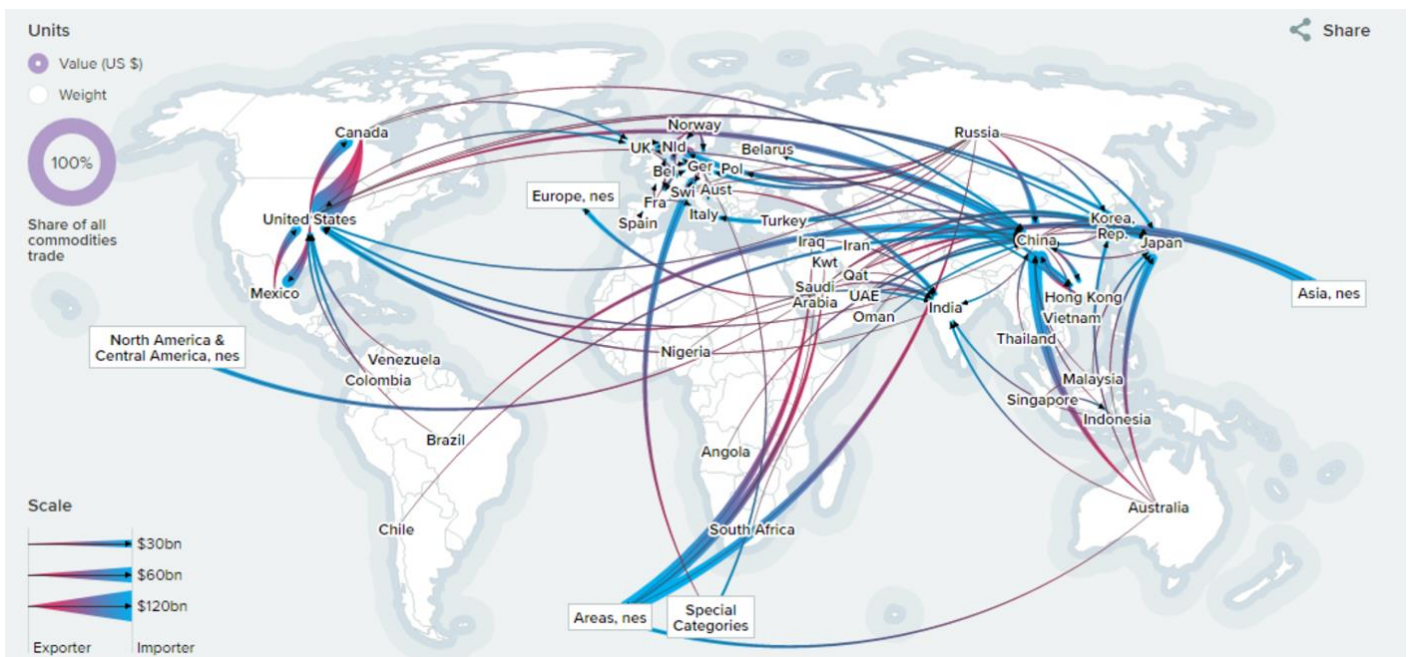
Table E1: Growth of popular social media sites (2014–2019)

Source: Statista

Number of global users in millions	2014	2015	2016	2017	2018	2019
Snapchat	46	80	122	166	191	190
Facebook	1,317	1,490	1,712	1,936	2,196	2,375
WhatsApp	430	700	1,000	1,510	1,590	1,618
Twitter	235	237	246	255	263	270

Figure E1: The share of world exports and imports by country

Source: <https://comtrade.un.org>



Section F: Water Security

Figure F1: Global withdrawal and consumption of water from 1900-2025 (projected)

Source: <https://www.bing.com/images>

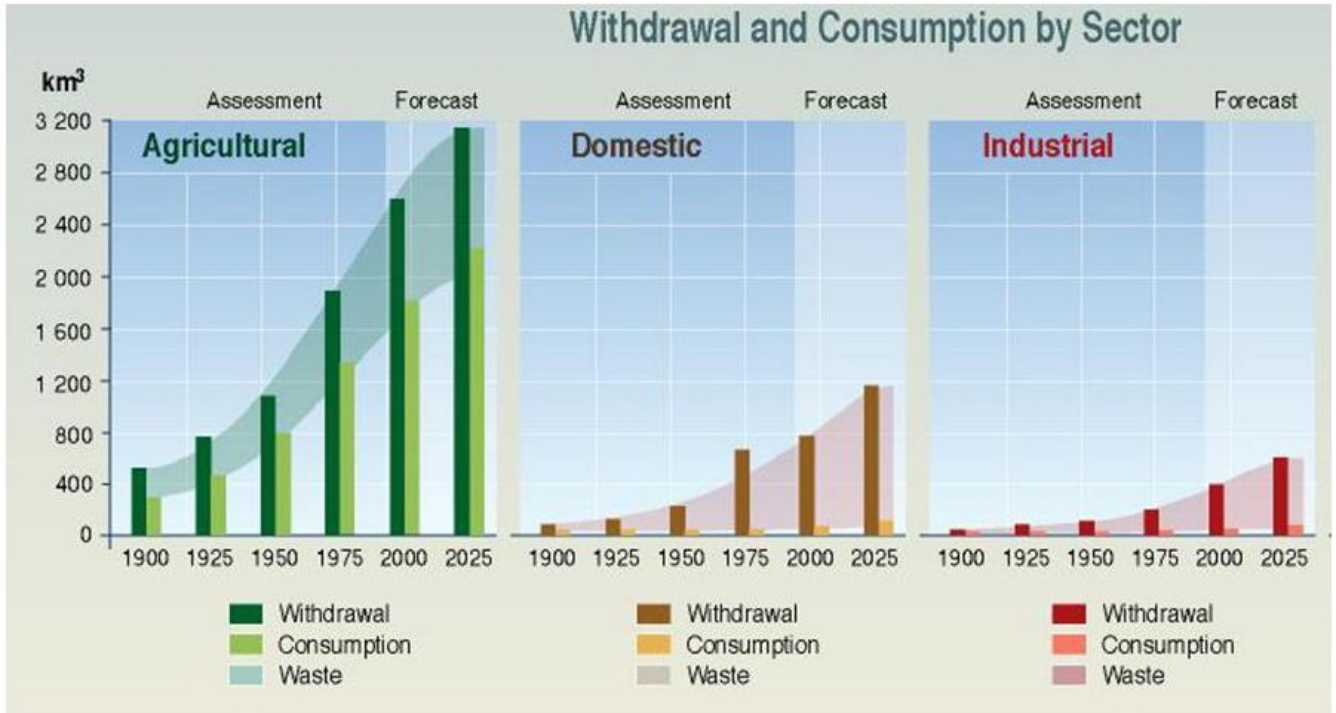


Figure F2: Water distribution from the River Jordan
 Source: <http://kanat.jsc.vsc.edu/student/conant/surface-waterIsrael.gif>

