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

Do NOT write any of your answers in this Booklet.
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Section A: Agriculture and Climate Change

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

Figure B1: Ecuador earthquake on February 22nd, 2019
Figure B2: Impact of Ecuador earthquake  

Estimated Fatalities

Estimated Economic Losses

Estimated Population Exposed to Earthquake Shaking

<table>
<thead>
<tr>
<th>Estimated Population Exposure (k=1000)</th>
<th>I</th>
<th>II-III</th>
<th>IV</th>
<th>V</th>
<th>VI</th>
<th>VII</th>
<th>VIII</th>
<th>IX</th>
<th>X+</th>
</tr>
</thead>
<tbody>
<tr>
<td>Estimated Modified Mercalli Intensity</td>
<td>7,411k*</td>
<td>15,770k</td>
<td>4,718k</td>
<td>222k</td>
<td>10k</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Perceived Shaking</td>
<td>Not felt</td>
<td>Weak</td>
<td>Light</td>
<td>Moderate</td>
<td>Strong</td>
<td>Very Strong</td>
<td>Severe</td>
<td>Violent</td>
<td>Extreme</td>
</tr>
<tr>
<td>Potential Damage</td>
<td>None</td>
<td>None</td>
<td>None</td>
<td>V. Light</td>
<td>Light</td>
<td>Moderate</td>
<td>Mod./Heavy</td>
<td>Heavy</td>
<td>V. Heavy</td>
</tr>
</tbody>
</table>

Structures

Overall, the population in this region resides in structures that are highly vulnerable to earthquake shaking, though some resistant structures exist. The predominant vulnerable building types are mud wall and informal (metal, timber, GI etc.) construction.
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

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

** 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

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

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