Instructor Answer Key or Rubric

Exercise #1

Question 1: What is the JMP and what does it measure?

- The JMP is a joint program through the WHO and UNICEF, that monitors and reports on WASH progress. In addition, the JMP produces estimates for a total of 26 indicators related to water, sanitation and hygiene.

Question 2: How does the JMP collect water data for each country?

- The JMP collects water data through a variety of methods including household surveys, census and administrative datasets. Other regional and international datasets, including the IB-NET may also be included.

Question 3: What does improved drinking water sources mean?

- Improved drinking water sources refers to water piped, packaged, and delivered water through a variety of methods including tap water, groundwater and rainwater harvesting. Unprotected springs and wells, as well as surface water are not considered improved.

Question 4: In thinking about how we measure access to water, what are some of the elements that these indicators don't take into consideration? Where could measurements be improved?

- As mentioned in the chapter, our measures of water access do not sufficiently address the affordability of water and seasonal changes to water sources and quality. In addition, current measures of water access only focus on household access and excludes homeless and intra household inequalities to water access. We will need more frequent and disaggregated data to address these concerns.

Exercise #2

Question 1: What are your initial thoughts on this data set? What questions or concerns do you have after overviewing the data?

- Sample answer: This dataset appears to be very robust and comprehensive.
- Sample questions:
    a. Why is 2017 the most recent data?
    b. How do I access data for years other than 2017?
    c. Why is there so much missing data for safely managed drinking water access?

Question 2: What country has the lowest proportion of the population with access to at least basic drinking water? Why do you think this country's water delivery is so low? Reflect on the political, geographical, and technical conditions which hinder water delivery.

- Chad has the lowest proportion of the population with access to at least basic drinking water. There are a number of considerations which can impact Chad's ability to deliver water. Importantly, Chad is a landlocked country and Lake Chad, the country's main supply of freshwater resources has decreased in size. Climate variabilities and droughts have exacerbated these concerns. In addition, violent conflicts and terrorist concerns have displaced many communities and hindered water resource management.

Question 3: The dash symbol indicates that the JMP does not have data for these countries. What countries have no data on basic drinking water? What about safely managed drinking water? Explain why these numbers differ.

- There are eleven countries without data on basic drinking water access, while there are over 100 countries (115 countries in total) without data on access to safely managed drinking water. This is because safely managed is a more comprehensive measure than basic drinking water. Therefore measuring the quality, accessibility, and reliability of water coverage requires more tools and national data.

Exercise #3

Question 1: What are the individual indicators that make up the index?

- There are 13 individual indicators which make up this index, they include: baseline water stress, baseline water depletion, interannual variability, seasonal variability, groundwater table decline, riverine flood risk, coastal flood, drought risk, untreated connected wastewater, coastal eutrophication potential, unimproved/no drinking water, unimproved/no sanitation, and peak RepRisk country ESG risk index.

Question 2: Consider the three elements of risk, do you agree with the risk element assigned to the baseline water stress indicator? Do you think any of the other two elements (exposure and vulnerability) correspond to baseline water stress?

- This is an opinion based question, Students should consider the elements which can be affected by baseline water stress (i.e population, natural habitats) and the vulnerability aspect and decide whether there is strong enough evidence to support including more risk elements for this indicator. Students should give sound reasoning for their answers.

Question 3: Page 35 provides an industry specific weighting scheme for the indicators, seasonal variability for the agricultural industry is weighted as 0.5. Do you agree or disagree with this rating?

- It is not clear if irrigation was considered when providing weights for the agricultural industry. However, given the large dependence on irrigation technology to grow and

harvest crops we would expect seasonal variability to be weighted much higher. While there are technological advances which allow for crops to grow in different seasons the need for consistent water resources is still likely to be a strong consideration.

Question 4: Name 2-3 ways this dataset differs from the JMP?

- This dataset differs from JMP in many ways, however one of the main ways it differs is that WRI measures water risk while JMP measures water coverage. WRI index is holistic in that it considers the climatic and temporal conditions which impact water resources. In addition, WRI considers water for productive, agricultural, and domestic purposes. While the JMP measure focuses on drinking water.

Exercise #4

Question 1: Which country did you choose in step 19? Do all the provinces in your selected countries have a low risk?

- Answers will vary

Question 2: Explain in simple terms why risks can vary for each province.

- Answer subject to vary. In general risks can vary by province due to geological and climatic concerns. Other factors to consider include depleting transboundary water resources and water management.

Exercise #5

Question 1: Take a look at each map you have created. Looking at the WRI country map, what areas have the greatest water risk? How does the story change when you look closely at the disaggregated map of water risk by province?

- From observing the map, we can see that areas in the Middle East extending to India have the greater water risks. For India the province level map shows that water risks are extremely high in the northern western region while water risks are less high in the eastern region.

Question 2: Looking at the JMP map, are there any countries or regions that stand out to you for having a high or low proportion of their population with access to basic drinking water?

- Countries may vary by students
- Yes, there is a clear divide in water access between northern and Sub-Saharan Africa. Traveling from Ethiopia to Egypt we can observe a trend where the percent of the population with access to basic drinking water is much lower than Sudan. While the

percent of the population with access to basic drinking water is also lower in Sudan than in Egypt.

Question 3: Pick a country and compare the WRI Aqueduct ranking to the percentage of people with access to basic drinking water. Are these concepts in conflict or does the data support the conclusion in each?

- Answers will vary by student. Answers should consider whether countries have high access to drinking water and high water risks. Differences in JMP and WRI data can indicate future water risks or the need for further water management.

Question 4: Imagine you are tasked with communicating what water access looks like in India to your boss. Which of these maps would you use and why? Under what circumstances would you be more likely to show the WRI map over the JMP?

- The JMP map is great for illustrating drinking water access, as the indicators used in the JMP methodology focus specifically on water coverage. Alternatively, the WRI serves to call attention to water risks in India. The JMP map paints a positive picture of water access in India while the WRI illustrates the constraints and water risks India is facing. It is more useful to use the WRI map when discussing water resources more broadly and when considering water coverage from an industry perspective.
- Students can also choose both maps to show a more holistic picture of access

Question 5: Reflect on the cleaning and visualization process in this data module, at any point did the exercises feel biased? Think about our decision to only map access to basic drinking water from the JMP, do you think that was a good choice?

- The JMP indicator responsible for measuring safe drinking water is the “proportion of the population using safely managed drinking water.” Our decision to map basic drinking water does not help to understand access to safe drinking water and positively skewed the JMP map.
- Students may also provide a map of the proportion of the population using safely managed drinking water to compare their current maps