*Water, Agriculture and Sustainability Module*

Unit 1.1 > Activity 1.1b

**Group Work: Analyze/Display Water-related Statistics**

Activity by Robert Turner – 2016

Summary

This document provides context, guidance, and worksheets for the Activity 1.1b – Group Work: Analyze/Display Water-related Statistics. The purpose is to get students to work with and discuss water-related statistics, absorbing them more deeply than they would if they simply skimmed over them in a reading. As they review the statistics in small groups, they are asked to do the following:

* *Identify a common theme for your water statistics.*
* *Decide which statistics you think are most important to share with the rest of the class.*
* *Collaborate in making a poster that illustrates the story or stories you wish to tell with these statistics.*
* *Make graphical representations of the quantitative data. Provide each graph or figure with a title and a caption. Cite the source of the information.*

Each group gets a different set of statistics centered around a different theme. By graphically illustrating some of their statistics and sharing them with each other, the entire class will learn more about our global and national level water issues. This activity sets up a discussion about the state of water resources around the world and impacts of water problems on people and ecosystem. The entire in-class activity will take 60 minutes.

Context

The activity is designed to enhance the critical thinking, numeracy, and communication skills of the students and helps them to evaluate the big question of the sub-unit – Are We Sliding Into a Water Crisis? It impresses upon them how dire the situation already is in many regions of the world, and how the problems are not limited to remote areas.

Learning Goals

Participation in Activity 1.1b should help students advance in achievement of the following learning objectives:

1. Provide supported explanations of how variability in water availability and current water use and management practices threaten ecological integrity, human health, and security.
2. Evaluate the case for a global water crisis.
3. Demonstrate facility in working with student partners in equitable and inclusive collaboration.
4. Demonstrate improved ability to organize and present quantitative information.

Activity 1.1b Instructions for Instructors – (60-90 minutes in class)

A. In advance of the class, you should acquire some large flip charts or butcher paper (paper > 3’ by 3’) and an assortment of colored makers. The activity will have students working in small groups. Part of their work will consist of graphically illustrating some water statistics. Each group will need a big sheet of paper and 3-4 different colored markers.

B. In advance of the class print out the following 12 pages of handouts (pages 4-15) double-sided, but not stapled. Print enough duplicates of the document so that every student in class will get ***one*** double-sided sheet.

C. In class, distribute the handout, then have students get into one of the 6 groups indicated on the sheet they have received. For classes with more than 30 students, you can have two Group 1s, two Group 2s, two Group 3s, etc., so the group sizes don’t get too large. For classes with 7-12 students, you can have them work in pairs. If you have <7 students, they will each get their own water statistics handout to digest and illustrate.

D. When students are in their groups, go over the instructions in the first paragraph of each handout. In addition, encourage the students to make progress in the learning objectives listed above. As they work, circulate throughout the room to encourage participation and answer questions. Provide pointers on graphical representation of quantitative information, especially large bold engaging titles and axis labels. Give the students 25-40 minutes to complete the activity.

E. When all groups are ready, have representatives of each group hold up their posters and explain them. Give each group only up to 5 minutes to present their poster. ~30 minutes.

Alternatively, you can have groups swap posters and have each group try to understand what the other group has produced. Then have each group present another group’s poster. If you go with this alternative, allow an additional 10-15 minutes for each group to interpret another group’s graphic.

F. Take a break after all groups have presented a poster. Following the break, progress to a discussion of what was learned by doing the Activity 1.1a readings and conducting Activity 1.1b. Given sufficient time, the discussion can be followed with a presentation using the PowerPoint file provided.

G. At the end of class, collect the posters and markers. You can give points or some other form of credit to groups for their posters if you like.

**Water Statistics Activity -** Group 1

What follows is a list of water statistics. Review these with your group. Identify a common theme for your water statistics. Decide which statistics you think are most important to share with the rest of the class. Collaborate in making a poster that illustrates the story or stories you wish to tell with these statistics. Make graphical representations of the quantitative data with the paper and markers. Provide each graph or figure with a title and a caption. Cite the source of the information. Provide an overall title for your poster and include your names and a date.

Per capita use of water (cubic meters per year)1

Mali – 4

China – 32

India – 52

Egypt – 77

France – 106

USA – 215

An American who takes a five-minute shower uses more water than the average person in a developing country slum uses for an entire day.2

World average water use breakdown3

Domestic use = 8%

Industrial use = 22%

Agricultural use = 70%

High-income countries water use breakdown3

Domestic use = 11%

Industrial use = 59%

Agricultural use = 30%

Low-income countries water use breakdown 3

Domestic use = 8%

Industrial use = 10%

Agricultural use = 82%

Globally, irrigated areas represent 17 percent of the cultivated area, but account for 40 percent of food production.1

In India, districts with little ir­rigation have a poverty incidence 2.5 higher than those with substantial irrigation.1

In the U.S., water withdrawals have fallen by more than 20 percent from their peak in 1980.4

**References Cited**

1. United Nations Millennium Project (2005). Health, Dignity, and Development: What Will It Take? Task Force on Water and Sanitation. <http://www.unmillenniumproject.org/documents/WaterComplete-lowres.pdf>
2. Water.org (2016). Facts About Water and Sanitation. <http://water.org/water-crisis/water-sanitation-facts/>
3. Fry, A, Martin, R, Haden, E and Martin, M (2009). Water Facts and Trends. World Business Council for Sustainable Development. 16 p. <http://www.wbcsd.org/Pages/EDocument/EDocumentDetails.aspx?ID=137>
4. Gleick, P (2001). Making Every Drop Count. Scientific American. <http://www.geo.brown.edu/research/Hydrology/SoilWater/SoilWaterInformation/Scientific%20American%20Feature%20Article%20Making%20Every%20Drop%20Count%20February%202001.htm>

**Water Statistics Activity** - Group 2

What follows is a list of water statistics. Review these with your group. Identify a common theme for your water statistics. Decide which statistics you think are most important to share with the rest of the class. Collaborate in making a poster that illustrates the story or stories you wish to tell with these statistics. Make graphical representations of the quantitative data with the paper and markers. Provide each graph or figure with a title and a caption. Cite the source of the information. Provide an overall title for your poster and include your names and a date.

In 2002, about 1.1 billion people of the world’s 6.2 bil­lion population (18 percent) lacked access to improved water supply1

Women spend 200 million hours a day collecting water2

A fifth of the world’s people, more than 1.2 billion, live in areas of *physical* water scarcity, where there is simply not enough water to meet all demands, including environmental flows.

More than 1.2 billion people live in areas of *economic* water scarcity, where human capacity or financial resources are likely to be insufficient to provide adequate water resources.3

|  |  |  |  |
| --- | --- | --- | --- |
|  | **Living in low-income countries** | **Living in middle-income countries** | **Total** |
| **Living below the poverty line** | 320 | 96 | 416 |
| **Living above the poverty line** | 30 | 259 | 289 |
| **Total** | 350 | 355 | 705 |

Table 1. Distribution of the global population without access to safe water supply. Values in millions.1

|  |  |  |  |
| --- | --- | --- | --- |
| **Region** | **Number of people in region lacking access (millions)** | **Share of regional population lacking access (percent)** | **Share of all unserved living in indicated region (percent)** |
| **Eastern Asia** | 303 | 22% | 28% |
| **Sub-Saharan Africa** | 288 | 42% | 27% |
| **South Asia** | 234 | 16% | 2% |
| **Southeast Asia** | 115 | 21% | 11% |
| **Latin America & Caribbean** | 60 | 11% | 6% |
| **Western Asia** | 23 | 12% | 2% |
| **Eurasia** | 20 | 7% | 2% |
| **Northern Africa** | 15 | 10% | 1% |
| **Developed economies** | 15 | 2% | 1% |
| **Oceania** | 3 | 48% | <1% |
| **TOTAL** | 1,076 | na | 100% |

Table 2. Access to improved drinking water sources by region, 2002.1

70% of rural residents and 92 percent of ur­ban residents use improved water supplies in developing countries. This disparity is greatest in Sub-Saharan Africa, where only 45 percent of rural residents have access to improved water supply, compared with 82 percent of ur­ban residents.1

Fewer than 10 countries possess 60% of the world’s available freshwater supply: Brazil, Russia, China, Canada, Indonesia, U.S., India, Columbia and the Democratic Republic of Congo.3

**References Cited**

1. United Nations Millennium Project (2005). Health, Dignity, and Development: What Will It Take? Task Force on Water and Sanitation. <http://www.unmillenniumproject.org/documents/WaterComplete-lowres.pdf>
2. Water.Org (2016). Facts About Water and Sanitation. <http://water.org/water-crisis/water-sanitation-facts/>
3. Fry, A, Martin, R, Haden, E and Martin, M (2009). Water Facts and Trends. World Business Council for Sustainable Development. 16p. <http://www.wbcsd.org/Pages/EDocument/EDocumentDetails.aspx?ID=137>

**Water Statistics Activity** - Group 3

What follows is a list of water statistics. Review these with your group. Identify a common theme for your water statistics. Decide which statistics you think are most important to share with the rest of the class. Collaborate in making a poster that illustrates the story or stories you wish to tell with these statistics. Make graphical representations of the quantitative data with the paper and markers. Provide each graph or figure with a title and a caption. Cite the source of the information. Provide an overall title for your poster and include your names and a date.

About 2.6 billion people (42 percent) have no access to even the most basic forms of improved sanitation.3 They are forced to defecate in plastic bags, buckets, open pits, agricultural fields, and public areas in their communities.1

More people have a mobile phone than a toilet.2

|  |  |  |  |
| --- | --- | --- | --- |
| **Region** | **Number of people in region lacking access (millions)** | **Share of regional population lacking access (percent)** | **Share of all unserved living in indicated region (percent)** |
| **South Asia** | 938 | 63% | 36% |
| **Eastern Asia** | 779 | 55% | 29% |
| **Sub-Saharan Africa** | 437 | 64% | 17% |
| **Southeast Asia** | 208 | 39% | 8% |
| **Latin America & Caribbean** | 137 | 25% | 5% |
| **Eurasia** | 50 | 17% | 2% |
| **Northern Africa** | 40 | 27% | 2% |
| **Western Asia** | 38 | 21% | 1% |
| **Developed economies** | 20 | 2% | 1% |
| **Oceania** | 3 | 45% | <1% |
| **TOTAL**  | 2,620 |  | 100% |

Table 1. Access to improved sanitation by region, 20021

Of the 60 million people added to the world's towns and cities every year, most move to informal settlements (i.e. slums) with no sanitation facilities.2

In the US every year wastewater collection systems experience some 75,000 sanitary sewer overflows, discharging 3-10 billion gallons of untreated wastewater into the environment.3

**References Cited**

1. United Nations Millennium Project (2005). Health, Dignity, and Development: What Will It Take? Task Force on Water and Sanitation. <http://www.unmillenniumproject.org/documents/WaterComplete-lowres.pdf>
2. Water.Org (2016). Facts About Water and Sanitation. <http://water.org/water-crisis/water-sanitation-facts/>
3. Fry, A, Martin, R, Haden, E and Martin, M (2009). Water Facts and Trends. World Business Council for Sustainable Development. 16p. <http://www.wbcsd.org/Pages/EDocument/EDocumentDetails.aspx?ID=137>

**Water Statistics Activity** - Group 4

What follows is a list of water statistics. Review these with your group. Identify a common theme for your water statistics. Decide which statistics you think are most important to share with the rest of the class. Collaborate in making a poster that illustrates the story or stories you wish to tell with these statistics. Make graphical representations of the quantitative data with the paper and markers. Provide each graph or figure with a title and a caption. Cite the source of the information. Provide an overall title for your poster and include your names and a date.

More than half the hospital beds in the world are filled with people suffering from water-re­lated diseases.1

The majority of illness is caused by fecal matter.2

3.4 million people die each year from a water-related disease.2

Half the people in the developing world are suffer­ing from one or more of the main diseases associated with inadequate provision of water supply and sanitation services: diarrhea, ascaris, dracunculiasis (guinea worm), hookworm, schisto­somiasis (bilharzias, or snail fever), and trachoma.1

Some 6 million people worldwide are blind because of trachoma, and more than 150 million people are in need of treatment. It is the leading cause of preventable blindness. The disease is strongly related to overcrowding and the absence of nearby sources of safe water for washing the face and hands.1

Diseases transmitted through water or human excrement are the second-leading cause of death among children worldwide, after respiratory diseases. 1

According to the World Health Organization, each and every day some 3,900 children die because of dirty water or poor hygiene.1

Lack of access to clean water and sanitation kills children at a rate equivalent of a jumbo jet crashing every four hours. Every 21 seconds, a child dies from a water-related illness.2

Im­proved water supply reduces diarrhea morbidity by 21 percent; but the simple act of washing hands at critical times can reduce the number of diarrheal cases by up to 35 percent, and additional improvements of drinking-water quality, such as point-of-use disinfection and safe storage, would lead to a reduction of diarrhea episodes of 45 percent.1

**References Cited**

1. United Nations Millennium Project (2005). Health, Dignity, and Development: What Will It Take? Task Force on Water and Sanitation. <http://www.unmillenniumproject.org/documents/WaterComplete-lowres.pdf>
2. Water.Org (2016). Facts About Water and Sanitation. <http://water.org/water-crisis/water-sanitation-facts/>

**Water Statistics Activity** - Group 5

What follows is a list of water statistics. Review these with your group. Identify a common theme for your water statistics. Decide which statistics you think are most important to share with the rest of the class. Collaborate in making a poster that illustrates the story or stories you wish to tell with these statistics. Make graphical representations of the quantitative data with the paper and markers. Provide each graph or figure with a title and a caption. Cite the source of the information. Provide an overall title for your poster and include your names and a date.

Official development assistance for water and sanitation fluctuated between $18 billion in 1996, $13.5 billion in 1999, and $16 billion in 2002.1

The estimated total spending, excluding program costs, required in developing countries to meet the water component of the Millenium Development Goals target is US $42 billion, while for sanitation it is US $142 billion. When including maintaining and replacing existing infrastructure and facilities and extending coverage to existing and future increases in population, spending on water and sanitation is roughly equal at US $360 billion each, or US$36 billion each annually from 2005 to 2014.2

What Europe and the United States spend annually on pet food = $17 billion.2

Protecting one hectare of a wetland for source water protection may yield a primary benefit of over US $4,000 annually in avoided treatment costs, and an additional US $10,000 annually in other ecosystem services.1

If the global water and sanitation target of the UN Millenium Development Goals is met, the health-related costs avoided would reach $7.3 billion per year, and the annual global value of adult working days gained because of less illness would rise to almost $750 million. Better services resulting from the relocation of a well or borehole to a site closer to user communities, the installation of piped water supply in houses, and latrines closer to home yield significant time savings. The annual value of these time savings would amount to $64 billion if the target is met.1

Shifting where people use water can also lead to tremendous gains in efficiency. Supporting 100,000 high-tech California jobs requires some 250 million gallons of water a year; the same amount of water used in the agricultural sector sustains fewer than 10 jobs.3

**References Cited**

1. United Nations Millennium Project (2005). Health, Dignity, and Development: What Will It Take? Task Force on Water and Sanitation. <http://www.unmillenniumproject.org/documents/WaterComplete-lowres.pdf>
2. Fry, A, Martin, R, Haden, E and Martin, M (2009). Water Facts and Trends. World Business Council for Sustainable Development. 16p. <http://www.wbcsd.org/Pages/EDocument/EDocumentDetails.aspx?ID=137>
3. Gleick, P (2001). Making Every Drop Count. Scientific American. <http://www.geo.brown.edu/research/Hydrology/SoilWater/SoilWaterInformation/Scientific%20American%20Feature%20Article%20Making%20Every%20Drop%20Count%20February%202001.htm>

**Water Statistics Activity** - Group 6

What follows is a list of water statistics. Review these with your group. Identify a common theme for your water statistics. Decide which statistics you think are most important to share with the rest of the class. Collaborate in making a poster that illustrates the story or stories you wish to tell with these statistics. Make graphical representations of the quantitative data with the paper and markers. Provide each graph or figure with a title and a caption. Cite the source of the information. Provide an overall title for your poster and include your names and a date.

Almost 2 billion people were affected by natural disasters in the last decade of the twentieth cen­tury, 86 percent of them by floods and droughts.1

Droughts and floods have broad economic impact: the Zimbabwe drought of the early 1990s was associated with an 11 percent decline in GDP; the recent floods in Mozambique led to a 23 per­cent reduction in GDP; and the drought of 2000 in Brazil cut projected economic growth in half. 1

Tens of millions of people have been forced to move from their homes--often with little warning or compensation--to make way for the reservoirs behind dams.2

15-35% of irrigation withdrawals are estimated to be unsustainable. 1

More than 1.4 billion people already live in river basins where high water-use levels threaten freshwater ecosystems (Smakhtin and others 2004). Other studies have shown that in order to sustain ecosystems, irrigation withdrawals—vitally needed to meet the hunger Goals—will need to be reduced by 7 percent by 2025, in comparison with 1995 levels.1

Half of the world’s wetlands have disappeared over the last century, with some rivers now no longer reaching the sea, and over 20% of the estimated 10,000 freshwater fish species are now endangered or extinct.2

By 2015, the U.S. government has estimated, perhaps 40 percent of the world’s population, or about 3 billion people, will live in countries where water will be in short supply. By the middle of the century that number could climb to 7 billion in 60 countries – more people than live in the world today. 3

By 2050, at least one in four people is likely to live in a country affected by chronic or recurring shortages of freshwater1

**References Cited**

1. United Nations Millennium Project (2005). Health, Dignity, and Development: What Will It Take? Task Force on Water and Sanitation. <http://www.unmillenniumproject.org/documents/WaterComplete-lowres.pdf>
2. Gleick, P (2001). Making Every Drop Count. Scientific American. <http://www.geo.brown.edu/research/Hydrology/SoilWater/SoilWaterInformation/Scientific%20American%20Feature%20Article%20Making%20Every%20Drop%20Count%20February%202001.htm>
3. Jehl, D (2010). Introduction, *in* McDonald, B and Jehl, D, eds., Whose Water Is It? The Unquenchable Thirst of a Water-Hungry World. National Geographic Society. Pp. xi-xx