# Capstone Project Stage 2: Water, soils and crops

(Modules 4-6)

The diagram below summarizes the topics you will explore in Stage 2 for your assigned region. In Stage 2 of the capstone, you will engage in ***spatial thinking*** and ***geographic facility*** to interpret spatial data (for example annual precipitation, evapotranspiration and soils data) and interpret how multiple regional factors contribute to determining which crops are produced in your region.

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## What to do for Stage 2?

* Complete the Stage 2 worksheet table that contains a table summarizing the data you’ll need to collect to complete this stage. Remember, you need to think deeply about each response and write responses that reflect the depth of your thought as informed by your research.
* Add relevant data to your powerpoint file.
* Add questions and continue to research the questions in your worksheets.
* Continue building a CHNS diagram to illustrate the connections between the natural system and the human food systems of the region. You may decide that you need multiple diagrams.

## Capstone Project Overview: Where do you stand?

At this stage, you should have started to investigate your assigned region and have added information, maps and data to your worksheets and PowerPoint file for Stages 1 and 2.

Upon completion of stage 2, you should have at this point:

1. Continued research and data compilation in the Stages 1 and 2 tables in the associated Stages 1 and 2 worksheets.
	1. Stage 1: Regional food setting, history of regional food systems, diet/nutrition
	2. Stage 2: Water resources, soils and crops
2. Added to your powerpoint file containing the data that you are collecting about the food system of your assigned region. Information you may have:
	1. Labeled map of your region
	2. Soil map of your region
	3. Precipitation and temperature map of your region
	4. Major crops and crop families grown in your region
3. Continued to record citations for all references and resources you are using in your research. This is a critical step. Every figure, map, piece of data and bit of information you collect from the web, a book, a person, a journal or any other source must be attributed to the source.
4. Added to your list of questions you have about your region related to key course topics and initiated significant efforts to answer.
5. Revised your CHNS diagram and/or create a new one incorporating topics from Modules 4, 5 and 6.

# CHNS Diagram

Continue to populate the CHNS diagram with information from Modules 4-6. Add new lines and boxes and connections to the diagram to illustrate other components of the human-natural system and their relationships.



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| Stage 2: Water, soils and crops |
| **Region Name** | **Country** | **State/Province** |
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| Questions to Explore | Information about your regional food system(include a citation for everything you put here!) |
| Water Resources and PrecipitationDescribe the water resources available in your region and if irrigation is necessary.* What is the average annual precipitation in your assigned region?
* Is irrigation necessary in your assigned region? (Learning goal 1)

The regional climate data centers of the National Oceanic and Atmospheric Administration (NOAA) post climate data for all of the United States. Go to the following website: <http://www.wrcc.dri.edu/precip.html>. Select the state where your region is located. Identify the range of annual precipitation that your region receives from the map of annual average precipitation. |  |
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| Questions to Explore | Information about your regional food system(include a citation for everything you put here!) |
| Virtual WaterUse the website you used in the summative assessment for Module 4 to get some rough estimates of the amount of virtual water embedded in the food products of your assigned region: <http://environment.nationalgeographic.com/environment/freshwater/embedded-water/>* How much virtual water is embedded in the food products from this region? You won’t be able to come up with an exact number, but just consider the crops in your region relative to crops or foods that require high vs. low amounts of water to product
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| Water PollutionAssess water pollution issues associated with food systems in your region.Go to EPA’s surf your watershed website. <http://cfpub.epa.gov/surf/locate/index.cfm> Find your region on this site.* Are any waterways impaired by excess nutrients (or other agricultural related pollutants?) (Learning goal 2)
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| Soil Types**Describe the soil types present in your region including soil fertility.*** What soil types are present in your region, at the level of detail presented in module 5.1, i.e., age, climate that formed them, rough soil order from the USDA?
* What kind of topography (level or sloping) is in your region?
* Are the soils generally deep or shallow?
* Are the soils typically well drained or poorly drained?
* Do they tend to have high or low pH and/or fertility?

Employ ***spatial thinking*** and start with the maps provided in Module 5.1, and the ISRIC soil mapper presented in the Formative Assessment 5.1, where you can map soil properties and soil classification. See the global soil type map at the end of module 5.1 for the USDA soil orders at a global level that denote the age of soils and other key properties. These soil orders can be mapped on the ISRIC mapper in the same way that you were able to visualize soil pH in the formative assessment.In a similar way, U.S. national map of soil orders like those referred to in module 5.1 can be found at: <http://hydro_bm.esri.com/Soils/soilOrderMap1Beta.htm> The Natural Resource Conservation Service (NRCS) global map of phosphorus retention in soils that was described in module 3.1 can be found in a high resolution version at:<http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/use/?cid=nrcs142p2_054014>  |  |
| Soil Impacts**Describe the effects that the regional food system has on the soil including erosion issues and fertilizer application*** What affect does the food system in your assigned region have on soil?
	+ Topography and drainage?
	+ Erosion issues?
	+ Excess or shortage of fertility and organic matter amendments?
* Pollution of soils or waterways by industries or by agriculture itself?
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| Crops and their characteristics**Describe the main crops grown in your region and their plant families.** Use the following two websites to find the top five crops produced in your region.1. USDA CropScape website: [http://nassgeodata.gmu.edu/CropScape/](http://nassgeodata.gmu.edu/CropScape/#http://nassgeodata.gmu.edu/CropScape/)
2. USDA National Agricultural Statistics Service: <http://www.nass.usda.gov>

Go to the section labeled “**Find Data and Reports**” Begin by selecting your state, then select the link labeled the name of your State Agricultural Overview., for example “Colorado Agricultural Overview”. You can also get data by counties, which is in the link at the left of the page that says “**County Profiles**” under “**More State Features**”. The county profile will give the rank of the county in the state for production of the different crops so that you can assess its importance in producing that crop, in addition to its ranking within the region. The county profile also gives information on the range of farm sizes and farm incomes in the region, which is useful socioeconomic information in characterizing agriculture for your capstone.Questions to answer:* What are the top five crops in your region?
* Is each crop an annual or perennials?
* In what plant family is each crop? Recall that you can refer to this reference [http://pubs.ext.vt.edu/2906/2906-1393/2906-1393.html - http://pubs.ext.vt.edu/2906/2906-1393/2906-1393.html](http://pubs.ext.vt.edu/2906/2906-1393/2906-1393.html#http://pubs.ext.vt.edu/2906/2906-1393/2906-1393.html)
* Is each crop a cool season or warm season crop, a C3 or C4 plant?
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| Crops, climate, soilDiscuss the possible relationships between crops, soils and climate of this region* Would you classify the soils and climate of your region as a high resource of low resource environment?
* How might climate and soils in your region explain why these crops are produced in that region?

You may find complementary information on crops, climate, and soil at a regional level in the NRCS Major Land Use Areas publication at <http://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs142p2_050898.pdf>  |  |
| Crops & Socioeconomic Factors* What socio-economic factors might explain why these crops are produced in that region?

One major socioeconomic factor could be markets and the ability to transport the products either locally or to other areas of the U.S. or other region. Another might be the economic level and ability to invest in production by residents of the region or companies producing food there.Note that the “County Profiles” on the NASS site listed above gives farm sizes and incomes. There is also the transportation networks and geographic location you characterized in the first capstone assignment. National census data can also be used to compare the median income of your region with that nationally., google your counties with U.S. census data and try to find this data; your instructors may have other suggestions. |  |

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| Questions about your region? What additional information do you still need to find? Where have you looked or searched for this info so far? |  |
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| References and Key ResourcesInclude web links, newspaper articles, citations to primary literature, databases, personal communications, etc. to information that might be useful in the future and aren’t already cited above.  |  |
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