

Mrs. Beam's Practical Guide to Science Writing

As in all forms of writing, science writing is something of an art. The good thing about this form of communication is that if you follow the steps and a few rules, anyone can become a proficient successful science writer! While we will not all be great creative writers, novelists or classical poets, we can all become good science writers by adhering to some simple guidelines, organizational techniques and writing principles.

Why should you WANT to get good at this? Well, when you go off to college, this will be one of the most common forms of writing you are asked to do- basically organizing facts and data to make a compelling, informed argument. In life, as a business person, you might be asked to write a proposal or a summary, to detail and explain data and results of your business. This is a critical skill for educated professionals and one that you want to master now, to give you a competitive edge later.

Here we go!!

Where to Start?

Often overlooked is a critical evaluation of the prompt you are writing for! You must carefully and deliberately consider the question(s) being asked or you will end up on the wrong track. Let's consider an essay writing prompt:

1. You have just been given an opportunity to buy a section of beautiful beach property. Cool. However, you are concerned about beach erosion. First, discuss the natural processes that control inputs, outputs and movement of sediments over the course of a year along the beach. Then, describe some (at least three) of the coastal modifications that may occur (your neighbors may try these to prevent erosion) and their potential effect on your beach. (this a real test question from [academics.eckerd.edu/.](http://academics.eckerd.edu/))

As you dissect this prompt, you can see that you have multiple questions to address:

- a. First, **discuss the natural processes that control** *inputs, outputs and movement of sediments over the course of a year* along the beach.

*this is a big job! you have to address where sediments comes from, where it goes and how it moves **and** you have to include how that changes with the seasons.*

- b. Then, **describe** some (**at least three**) of the **coastal modifications** that may occur (your neighbors may try these to prevent erosion) **and their potential effect on your beach**

*Now you have to think of **no less than 3** types of erosion controls **and** describe how they work **and** with each you should include the effects on the beach, which are usually some positive and some negative.*

Here's how I would answer this.

As a new beachfront property owner, I really need to understand the dynamic system I am embracing. In coastal systems, sediments are cycled through the beach in response to seasonal forcing. Sediments can be input into the system from reservoirs of sand in nearshore shoals and sandbars and then transported into the active beach system. Seasonally, the calmer winds and weather of the summer months tend to deposit sediments onshore and build a gently sloping beachface. Conversely, sediment can be lost from the system by erosion during strong hurricanes and Nor'easters, storms which tend to occur in late fall and winter. The winter beach profile is a steeper beachface, where active erosion works to advect sand offshore. In a balanced system, this seasonal movement of sediment onshore in the warmer months and offshore in the winter results in no net loss of sediment.

However, in a regime of rising sea level, most beaches are experiencing net sand loss. Coastal engineering modifications can mitigate the losses, but not without consequences. Groins are a solution that involves building a wall that juts out into the water, where sand can accumulate using the sediment carried in longshore transport. This can have negative effects of starving the beaches downstream of the groin and worsening erosion of your neighbor's beach. Jetties are large-scale engineering modifications that stabilize inlets by hardening the shoreline with rock or concrete. Similarly these features have "winners" where sediments are deposited, and "losers" where sediment starvation occurs. A third modification is a breakwater, which is a structure built offshore of the beach, designed to dampen wave energy offshore, minimizing its erosive effects onshore. Breakwaters have fewer negative effects in terms of property owners on the beach, but they are expensive and difficult to implement. As a new property owner, I would see what engineering structures are in place now, and try to talk to my neighbors about the best solutions to preserve all our properties and minimize negative effects on one another.

This is an example from an exam essay question, let's move on now to writing a science essay paper.

So How Do You Write a Paper?

First, as mentioned above, you need to carefully consider the prompt or subject your writing about.

Next, once you have figured out what you are being asked to do, you need to research. This means finding reputable information that relates to your topic, reading articles and becoming knowledgeable. A smart writer spends most of his time in learning the topic, jotting down notes, finding resources that he can cite in his paper. ***All good science papers need to have researched information to use for examples and support of your argument!***

Now, you understand your question and you have become knowledgeable, time to get organized to write. You find a block of time when you can sit and write without interruption or distraction, TV off, texter off, Brahms lullaby softly playing in the background....

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Marine and Environmental Science I

Instructor: Sara Chaves Bean

You sit at your desk, with your paper, computer, sharpened pencils, your notes from your research and your works cited. YOU START WRITING BY MAKING AN OUTLINE.

This is a critical step. You organize your thoughts and plan your attack. If you DO NOT do this, you are wasting your time! It takes twice as long to write, your writing is not focused and you do not use your examples and research effectively.

AFTER MAKING AN OUTLINE, you start to write your paper. You follow your outline and you should be able to write fairly quickly and efficiently because: a. you are organized b. you are knowledgeable and c. you are focused.

Now for the actual writing! In scientific writing, we almost never use personal pronouns and specifically the word *I* is verboten! In science, the subject is the study, the information, the data, it is not about YOU! You need to learn how to write in the 3rd person, passive voice. For example, "The fish were caught using a cast net, identified to species, measured and weighed and returned to the creek alive", or "these data indicate a relationship between the salinity and the temperature which affect the density of the water column".

Some other general tips:

- Do not use don't. Contractions are inappropriate in formal writing do not do this!
- We are scientists, we love numbers, so use them. Here's how: Use numerals for data, use words for amounts under ten. For example, "In this experiment, three trials were conducted using 26 fish and 52 shrimp" or "the change over time represented a 0.09% increase in the overall abundance of grey trout in the estuary". Use the symbols (%) and the numbers and always state a decimal in the 0.00 format.
- Always use the metric system.
- Always italicize scientific names as *Genus species*. *Crassostrea virginica*
- Check you subject-verb agreement! *The data were collected, the fish were caught, the experiment was repeated three times.*
- Do not use slang or sayings ie. "Nowadays"

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Yay! You have written the essay. You feel good. It's done. Time to go have a snack and watch cartoons.

Now I am going to turn this thing in, right? **WRONG.** ☹ Every single thing you ever write for any assignment anywhere **MUST BE EDITED**. Editing ensures that you have a mistake-free, fluid, grammatically correct product that sounds good to you and me.

The Editing Process:

1. Spell check and Grammar check. Nothing makes you look worse in a teacher's eyes than not doing the most basic self-correcting, which is easily accomplished by pressing a few buttons, so do it!!!
2. Read your paper **OUT LOUD**, to yourself. If it sounds funky to you out loud, something needs to be reworded. Does it sound affected, convoluted or awkward? Is it wordy, fluffy, do all of your sentences have meaning? **NO filler, NO fluff, no words you**

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do not really understand. Write in a clear straightforward manner. Get your thesaurus out!

Works Cited:

Did you cite your sources? All of your examples and sources must be cited in text, using parenthetical citations like this (Beam, 2012) after the **first** piece of information you use from the source. This is called the Author-Date style and is widely accepted in scientific writing and will work for you in college. We will not use any other citation style in our class! Then you include the full citation at the end of your essay and arrange them in alphabetical order by author's last name. For example:

Chaves Beam, Sara 2012. "How to write a good science article", Journal of Amazing Marine Scientists, volume 12 pp. 1-5.

For multiple authors we use (Beam *et al.*, 2012), *et al.* is Latin and must be italicized, it stands for *et alia* which means "and others". You will include all of the authors in your official citation at the end.

Here are a couple of helpful websites from prominent colleges:

<http://classweb.gmu.edu/biologyresources/writingguide/PracticalTips.htm>

<http://faculty.uca.edu/march/bio1/sciwriting/writtips.htm>