**Title**

[Name]

[Date]

**Identifying the Context**

*[Relevant, coherent focused research question]*

*[Discuss relevant environmental issue (either local or global) that provides context for the research question]*

*[Explain the connections between the environmental issue and the research question]*

**Planning**

*[Background Information – try to include known values/expected results from literature/websites – include citations!)*

*[Justification - justify your choice of sampling strategy or number of repeats and choice of variables – what is your range and why did you choose the range of IV? – take into consideration all significant factors that may influence the relevance, reliability, and sufficiency of collected data]*

**Hypothesis**

*[Formulate a hypothesis to predict the outcome of the experiment – should be an if….then…..statement if you are manipulating variables]*

*[Explain the rationale for your hypothesis with citations]*

**Variables**

Table 1

*Variables Selected for this Experiment*

|  |  |  |  |
| --- | --- | --- | --- |
|  | **Variable** | **Method to control** | **Possible effect on results if not controlled** |
| **Independent** | *[The variable you are manipulating]* |  |  |
| **Dependent** | *[What will be measured]* | *[How will it be measured in a consistent, controlled manner]* |  |
| **Controlled** | *[External variables that need to be kept constant]* |  |  |
| **Controlled** |  |  |  |
| **Controlled** |  |  |  |
| **Uncontrolled** | *[Usually climate factors that you try to keep the same for each sample]* | *[If it cannot be controlled, state this and describe how you will minimize or monitor the variable]* |  |
| **Uncontrolled** | *[You can add or delete rows as needed]* |  |  |

**Safety, ethical or environmental issues**

*[Safety concerns listed with precautions that will be taken (How might you or someone else be injured during the course of your data collection?)Refers to the*animal experimentation policy*if an experiment or data privacy if a survey (what steps are you going to take to make sure that you will fully respect animal life and health) Environmental issues explained with methods for overcoming them (how will you minimize/eliminate any negative effects?)]*

**Materials**

*[list all the materials you will use, including sizes/concentrations/quantities/brand (ex: 2 500 mL beakers, 100 cm ruler)]*

**Method**

*[Can be paragraph or numbered list, use enough detail that it can be replicated, use at least 5 measurements of an IV with 3 repeats for each, include how and when to collect data, including units]*

*[describe why you chose this method—what makes it ideal for answering the research question?]*

**Results, Analysis and Conclusion**

**Data Collection and Processing**

Table 2

*Title of data table [should include independent and dependent variables]*

|  |  |  |
| --- | --- | --- |
| *[Headings should include units and uncertainties]* | *[Recorded Data]* | *[Processed Data]* |
| *[Values of IV should go in this column]* | *[Values of DV should go in this column]* |  |
|  | *[sig figs are consistent and reflect precision of the instrument]* |  |
|  |  |  |
|  |  |  |

*[Sample calculations for each type of processed data including formulas]*

*[Qualitative observations—this can also be another column added to the data table]*

*[A lack of primary data could be supplemented by the use of secondary data to provide sufficient material for analysis]*

**Presenting Processed Data**

*[insert graph, flow chart, etc.]*

*[Graphs are usually most appropriate for showing a relationship between parameters, IV on x-axis and DV on y-axis, each labelled with units and uncertainties. Error bars included if possible]*

*[Make sure to include the figure number and a title with a legend and caption BELOW the graph or diagram]*

*Figure 1.* Seed production as a function of plant biomass in waterlilies (*Nuphar luteum*) harvested from Great Works Pond in Northern Maine in August, 2016.

**Analysis**

*[interpret trends, patterns or relationships in the processed data—constantly support anything you write with numbers from your graph]*

*[If you use standard deviation or error bars—explain the size and link it to how significant your data is, explain error bar source]*

**Conclusion**

*[State a conclusion, with justification, based on a reasonable interpretation of the data—make sure the relationship between the variables is correctly stated]*

*[Refer to trends and patterns discussed in analysis to support conclusions—use specific data in conclusion statements]*

*[Justify your conclusion and note any systematic or unforeseen random uncertainties or outliers]*

*[Connect to the research question and hypothesis—indicate level of support (strong, weak, no support, inconclusive, etc.)]*

*[Discuss how well you can answer your research question with your data]*

**Discussion and Evaluation**

**Discussion**

*[Evaluate the conclusion in the context of the environmental issue—how do your findings relate to the environmental issue that you wrote about in your context]*

**Strengths of the Investigation**

*[Discuss strengths of your method used—this could include how well you controlled your variables or how your method produced sufficient data to answer your research question]*

**Weaknesses and Limitations of the Investigation**

*[Discuss weaknesses and limitations within the method used—this could include anything that affected your results, point out any weakness in the experimental design that became obvious when carrying out the study]*

*[Explain how the limitations of your method affected your data and conclusions—what is the significance of each weakness]*

**Improvements**

*[How could you change your method so your data is more reliable? Specifically address one or more of the weaknesses/limitations you listed above]*

**Applications**

*[Justify one potential application and/or solution to the environmental issue that has been discussed in the context, based on the findings of the study]*

*[Evaluate relevant strengths, weaknesses and limitations of this solution—what are potential benefits to society, what would make it difficult to implement this solution]*

References

*[Start the reference list on a new page and alphabetize the entries. Do not underline or italicize the title. Double-space all entries. Every source mentioned in the paper should have an entry. You should have at LEAST 3 sources.]*

*[use the link below for everything you ever wanted to know and more about APA format, references and in-text citations]*

<https://owl.english.purdue.edu/owl/resource/560/01/>