



## **Pu'u Kawaiwai Ecological Study**

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### **Research Question!**

Our research question was:

“What are the ecological differences between the wet and dry forest on Pu'u Kawaiwai?”

- ✿ Made observations with 5 senses
- ✿ Discussions to pinpoint main questions and ideas
- ✿ Brainstormed ways to gather data

## Data Collected

- \* Soil composition
- \* Soil temperature
- \* Soil moisture
- \* Soil absorption and percolation
- \* Air temperature
- \* Relative humidity
- \* Survey of plants and animals



## Procedure

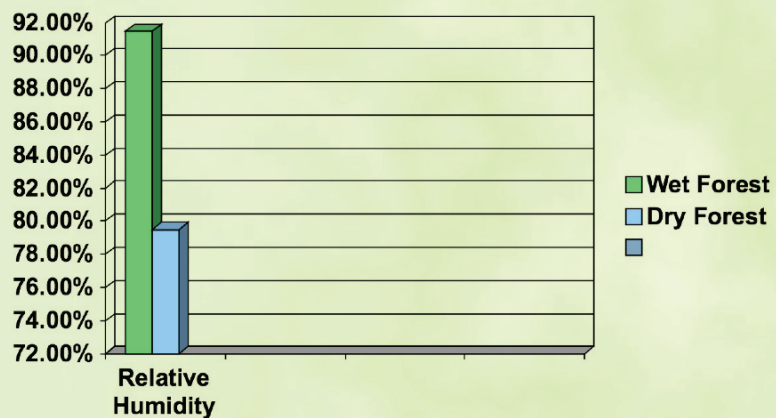
1. Transport class to Pu'u Kawaiwai
2. Split class into two groups (wet/dry)
3. Go to first location with partner and set up quadrats
4. Measure relative humidity, soil temperature, air temperature and surveyed plants and animals
5. Took measurements in three separate locations to better average the data
6. Collected soil samples to analyze back at school

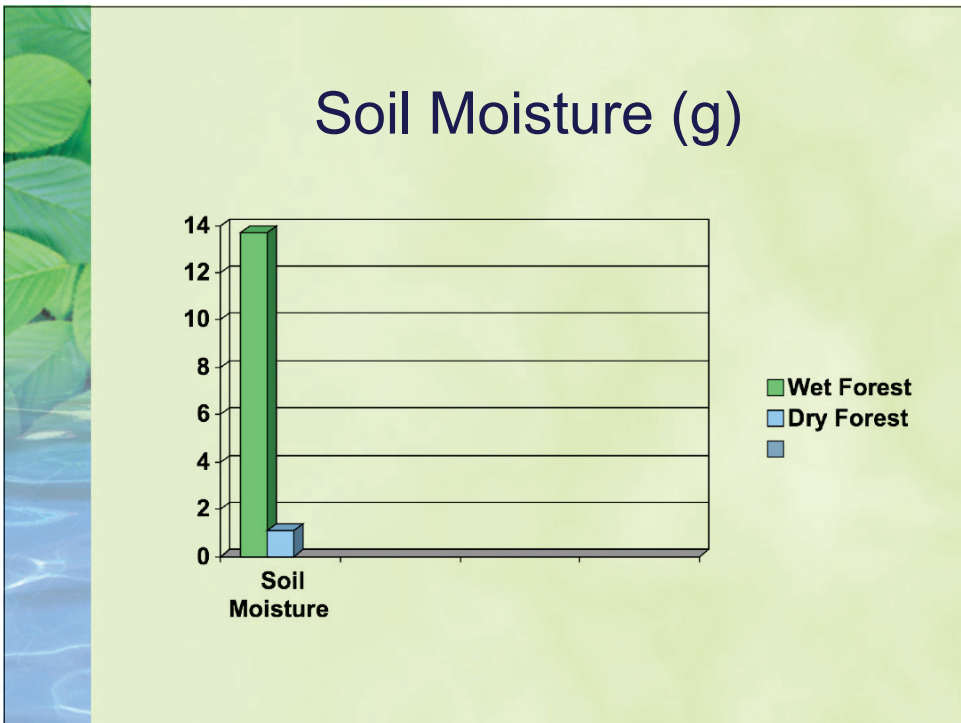
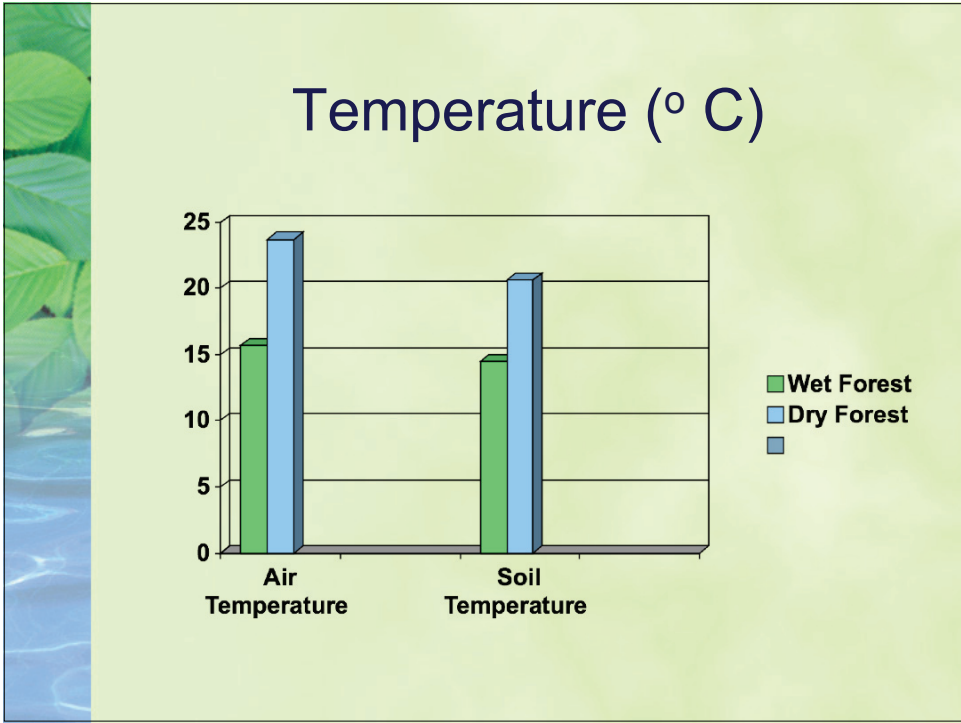
## Procedure, cont.



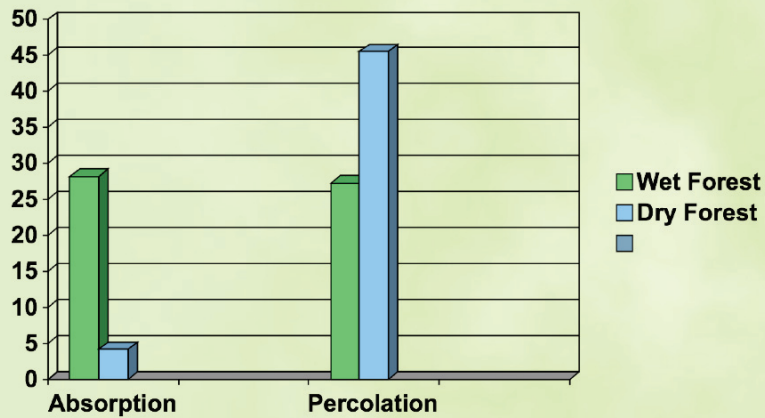
7. We averaged class data to determine more precise measurements for air temperature, soil temperature, and relative humidity.
8. Split the class into three different categories of soil analysis: absorption and percolation, composition, and soil moisture.

## % Relative Humidity





## Soil Absorption and Percolation (mL)



## Soil Composition

### Wet Forest

- \* Spongy and sticky
- \* A lot of plant debris (leaves, sticks, etc.)
- \* Small organisms
- \* Real dark brown in color
- \* Not so many layers
- \* Very few rocks
- \* Silt-like soil

### Dry Forest

- \* Powdery and smooth
- \* Light brown in color
- \* Very compact
- \* Had many small hair-like roots
- \* Very few layers
- \* Sandy feeling in some parts
- \* Hydrophobic
- \* More dense materials

# Plants

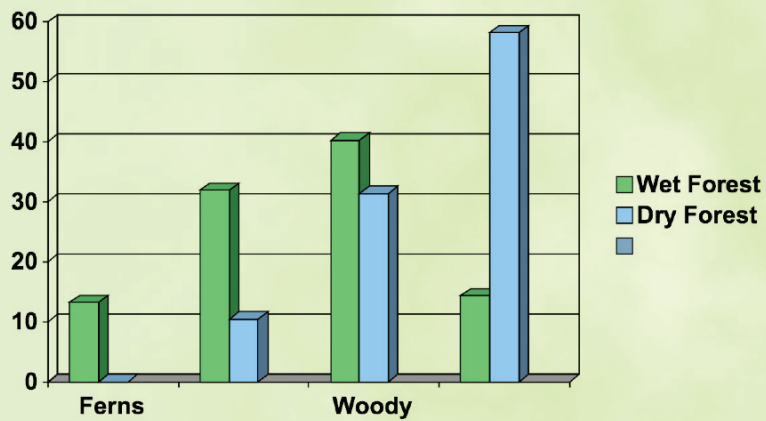
## Wet Forest

Ferns 13.2%  
Mosses 31.9%  
Herbaceous 14.3%  
Woody 40.3%

## Dry Forest

Ferns 0%  
Mosses 10.4%  
Herbaceous 58.2%  
Woody 31.3%

## Comparison of Plant Types (%)



## Evidence of Animals

### Wet Forest

- \* Beetles
- \* Apapane
- \* Amakihi
- \* Elepaio
- \* Pig Tracks

### Dry Forest

- \* Ladybugs
- \* Ants
- \* Beetles

## Conclusions

- \* Temperature was 8 °C cooler in the wet forest than it was in the dry. Probably because the higher the elevation, the cooler the temp.
- \* Relative humidity was 12% lower in the dry forest than it was in the wet. This makes sense because, the warmer the air, the more water vapor it can hold and the lower the relative humidity. Also, the weather in the wet forest was cold and misty with lots of water dripping from the leaves.



## Conclusions, cont.

- \* Soil temperature was cooler by 6 °C in the wet forest. In addition to the air being cooler, this is probably because of the high humidity, lack of sunlight, and dense covering of leaves on the forest floor that insulate the soil.
- \* Wet forest soil contained 12.6 g more moisture than the dry forest soil, most likely because water on ground is not able to evaporate as quickly due to the tree canopy and cloud cover.

## Conclusions, cont.



- \* Wet forest soil absorbed 24.1 g more water than the dry soil. The dry soil percolated 18.3 g more water than the wet soil.
- \* We noticed that the water beaded up on the dry soil. The dry soil was very powdery and fine. We think that when it rains in the dry forest the water most likely rolls right off. This may contribute to erosion during heavy rains.





## Conclusions, cont.

- ✿ Plants in the dry forest likely have very shallow roots because of the low water absorption in soil.
- ✿ Dry forest plants are likely to have fewer leaves because of the dry soil and hotter temperatures. Fewer leaves prevents evaporation.
- ✿ The dry forest area contained lots of cactus and grass, both which can grow with very little water.



## Conclusions, cont.

- ✿ Wet forest soil absorbed much more water because all the plant debris soaks it up like a sponge.
- ✿ The trees are much taller and there are many more plants in the wet forest. The roots of the trees in the wet forest are likely to be bigger and deeper.

## Student Reflection

- \* What I got out of this experience was collecting data and then averaging all the numbers to come up with a final outcome. This made me appreciate how much data goes into science.
- \* I liked observing the two different environments and then putting together our observations to come up with a final research question.
- \* I liked learning how to use new measurement tools to collect hard data in the forests that support my observations.



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