

New Mexico SuperComputing Challenge  
Final Report April 2021



**Team Number: 45**

**School Name(s): Harrison Middle School**

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**Sponsor(s): Ryan Palmer, Caia Brown, Rebeca Campbell**

**Project Mentor: Jack Ingalls**

## **Executive Summary**

The Ocean Team is devoted to helping reduce plastic ending up in the ocean and hurting sea animals. We have decided to start on a smaller project first and we are now working on Acequia since it's the same problem but smaller. Ways we have thought of fixing this problem is a team to pick up floating pollution. We also are working on a machine to trap floating pollution.

## **Problem Statement**

100 million marine animals die each year from plastic waste alone. Humans use a lot of plastic, metal, and oil and we are running out of space to put it in, then some of it goes into acequia and eventually into the ocean and after a while it starts affecting ocean life and acequia life. We are using Netlogo to build a model that will show how humans littering and run off spilling affects acequia life then after while ocean life. How much, how often and how far a human litters. We have done some research to find websites that might have info for us. We have looked at NetLogo models and picked one to use as a base for our own model. We expect that human pollution will be worse than run off pollution and will affect acequia life more.

### **Description Problem Solving Method**

In order to help ocean/acequias our first step was to find an existing model that was similar to the one we wanted to build. We chose the original model “Urban Suite Pollution” because it was suitable for our project, we decided it would be the best model to modify. It was suitable because it had pollution and humans already in it. Next, we started making changes to that model.

The first change that we made was that we added water. In order to make this change, we needed to make a percentage of the screen blue and restrict the fish to only move in the blue area. We added water so the fish can move and die like the model is supposed to be like

The second change that we made was that we added land. We had to make a percentage of the screen green to represent land and restrict the humans movement to the green area. To make only a percentage of the screen green we had a piece of code that added coordinates so it would only make it green there We added land so that the humans can make pollution to spread to the water.

## **Discussion of how you Verified and Validated your Model**

We believe that our model is valid or good because it shows what happens if we don't resolve the pollution ending up in Acequias. We used data to support this claim. For example, in our code after a while all fish die, this is already happening. “The Yangtze finless porpoise lives in the Yangtze River, the longest river in Asia. At one point, this porpoise shared the waters with the Baiji dolphin”

**Code to Date** (and any other software, references, tables, and other products of your work)

NetLogo link: <https://www.netlogoweb.org/launch#Load>

Link to types of fish:

<https://www.wildmesquite.org/what-we-do/desert-waters/rio-grande/native-fish>

Source 1:

<https://www.condorferries.co.uk/marine-ocean-pollution-statistics-facts>

## **The Results of Your Study**

### **The Conclusions you Reached by Analyzing your Results**

Because of our model and research, we have found that running off like car oil you spill on the street will make it to the ocean one day. Another conclusion that we reached was most pollution that ends up in acequia and eventually in the ocean is not plastic pollution.

Future research could make code modifications more advanced.

### **Most Significant Achievement on the Project**

The most significant achievement on the project was finding a suitable code to modify that could help the pollution problem.

## **Acknowledgment of the People and Organizations that Helped You**

We are grateful to Netlogo for giving us codes to modify and help with our project. We would like to thank SuperComputing Challenge for teaching us and giving us an opportunity to learn how to code and problem solve.

**What our code looks like:**

**breed [ people person ]**

**breed [ trees tree ]**

**breed [ pescados pescado ]**

**turtles-own [health ]**

**patches-own [**

**pollution**

**is-power-plant?**

**]**

**to setup**

**clear-all**

**set-default-shape people "person"**

**set-default-shape pescados "fish"**

**ask patches [**

**set pollution 0**

**set is-power-plant? false**

**set pcolor blue**

**if pxcor < -20 [set pcolor green]**

**]**

**create-power-plants**

**;ask patches [ pollute ]**

**create-people initial-population [**

**set health 5**

**set color black**

**set size 2**

**let tempx random-xcor ;; place the people on land**

**while [ tempx > -20 ] [ set tempx random-xcor ]**

**setxy tempx random-pycor**

**]**

**create-pescados 10 [**

**set color orange**

**set size 3**

**let tempx random-xcor ;; place the fish in the water**

**while [ tempx < -20 ] [ set tempx random-xcor ]**

**setxy tempx random-pycor**

**]**

**reset-ticks**

**end**

**to go**



**if not any? people [ stop ]**

**ask people [**

**wander**

**;reproduce**

**eat-pollution**

**maybe-die**

**litter**

**]**

**ask pescados [**

**pescados-nadar**

**]**

**diffuse-pollution**

```
; ask patches [ pollute ]
```

```
tick
```

```
end
```

```
to diffuse-pollution
```

```
ask patches [
```

```
if pcolor = blue [
```

```
let mypollution pollution
```

```
ask neighbors [
```

```
set pollution pollution + mypollution / 16
```

```
]
```

```
set pollution pollution / 2
```

```
]
```

```
if pcolor = green [
```

```
let mypollution pollution
```

```
ask patch (pxcor + 1) pycor [
```

```
set pollution pollution + mypollution / 2
```

```
]
```

```
    set pollution pollution / 2  
  ]  
]  
end
```

```
to create-power-plants
```

```
  ask n-of power-plants patches [  
    set is-power-plant? true  
  ]  
end
```

```
;to pollute ;; patch procedure
```

```
  ;if is-power-plant? [  
    ;set pcolor red  
    ;set pollution polluting-rate  
  ;]  
  ; set pcolor scale-color red (pollution - .1) 5 0  
;end
```

```
to litter ;; patch procedure
```

```
  ask patch-here [  
    ;set litter 1  
  ]  
end
```

```
set pollution ( pollution + polluting-rate / 10)
```

```
set pcolor scale-color red (pollution - .1) 5 0 ]
```

```
end
```

```
;; to do create a wander just fish ( -20 35 ) and people ( -35 -20 )
```

```
to pescados-nadar ;; pescados procedure
```

```
rt random-float 47
```

```
lt random-float 37
```

```
if not (pcolor = blue ) [ set heading heading + 180 ]
```

```
;if xcor < -20 [set heading heading + 180 ]
```

```
; if xcor > -35 [ set heading heading + 180 ]
```

```
fd 1
```

```
; set health health - 0.1
```

```
end
```

```
to wander ;; person procedure
```

**rt random-float 47**

**lt random-float 37**

**if not (pcolor = green ) [ set heading heading + 180 ]**

**;if xcor > -20 [set heading heading + 180 ]**

**;if xcor < -35 [ set heading heading + 180 ]**

**fd 1**

**; set health health - 0.1**

**end**

**to reproduce ;; person procedure**

**if health > 4 and random-float 1 < birth-rate [**

**hatch-people 1 [**

**set health 5**

**]**

**]**

**end**

**to eat-pollution ;; person procedure**

**if pollution > 0.5 [**

**set health (health - (pollution / 10))**

]

end

to maybe-die ;; die if you run out of health

if health <= 0 [ die ]

end

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