Coral-Algae Model V1

Part I

While the coral_algaeV1.nlogo file is loaded into the NetLogo Web browser, the following code should be pasted into the 'NetLogo Code' Tab. I've made the comments a different font for readability, but you can also paste them into the code tab as well (the semi-colon means that NetLogo won't read them as code).

;; choose initial-algae no. of random patches and make them green (set by slider)
```
to setup-algae
   ask n-of 10 patches [set pcolor green]
end
```

;; choose initial-coral no. of random patches and make them pink (set by slider)
```
to setup-coral
  ask n-of 10 patches [set pcolor pink]
end
```

;; grow coral by asking black patches next to pink patches to turn pink
```
to grow-coral
   ask patches with [pcolor = pink] [
      ask neighbors [if pcolor = black [set pcolor pink]]]
end
```

;; grow algae by asking black patches next to green patches to turn green
```
to grow-algae
   ask patches with [pcolor = green] [
      ask neighbors [if pcolor = black [set pcolor green]]]
end
```

In this section, we will start to add some realism to our model. First, lets set a 'growth rate' for algae that we represent as a probability. Here, we will let algae grow onto free space at a probability of 40/100 at every time step. Comments in red are for you to fill in!

;; grow algae by asking green patches if they are next to black patches, and if so, tell the black patches to turn green at a probability 40/100
```
to grow-algae
   if random 100 < 40 [
      ask patches with [pcolor = green] [
         ask neighbors [if pcolor = black [set pcolor green]]]
]
end
```

;; grow coral by asking pink patches if they are next to black patches, and if so, tell the black patches to turn pink a probability 30/100

;; grow algae over coral by asking green patches if they are next to pink patches, and if so, tell the pink patches to turn green a probability 20/100
;; REMEMBER TO ADD THIS NEW PROCEDURE TO YOUR HEADER (TO GO)!

Part III

In this section, we will add a parrot fish to our model! This will be our first time adding a turtle class object. Our parrotfish will get energy from eating algae, will move around randomly and will die if they reach 0 energy. Don't forget to change the header! Right now the relevant lines are commented, but we will uncomment them after we finish coding those parts.

;;UPDATED HEADER

```
breed [ parrots parrot ]
turtles-own [ energy ]

to setup
  clear-all
  setup-algae
  setup-coral
  ;setup-parrots
  reset-ticks
end


to go
  if ticks >= time-steps [ stop ] ;; stop after 1000 ticks
  grow-coral
  grow-algae
  grow-algae-coral
;ask parrots [
;    move
;    set energy energy - 1
;    eat-algae
;    death
;  ]
  tick ;; increment the tick counter and update the plot
end
```

;;PARROT PROCEDURES

```
to setup-parrots
  create-parrots 10
  [
    set shape "fish"
    set color violet
    set size 1.5 ; easier to see
    set energy random (2 * 5)
    setxy random-xcor random-ycor
  ]
end



to eat-algae   ;; parrot procedure: parrots eat algae, turn the patch black
  if pcolor = green [
    set pcolor black
    set energy energy + 5
]
end



to move   ;; parrot procedure
  rt random 50
  lt random 50
  fd 1
end



to death   ;; parrot procedure: when energy dips below zero, die
  if energy < 0 [ die ]
end
```