

A biodome is a large glass dome with a human-made ecosystem inside.

Biodome File 1: News Stories

Group Builds Ecosystem from Scratch

The Econauts, a local group of space fans, have built a glass dome bigger than a football field. Inside, they have installed their very own ecosystem, complete with trees, plants, and animals. The dome is completely enclosed, but the plants and animals inside should have all the air and water they need to survive. This type of enclosed ecosystem is known as a biodome.

Members of the group plan to live sealed inside this biodome for several years. Their aim is to find out whether humans could build domes like this on the Moon, Mars, or other planets, creating livable spaces and food sources out in space. The members of Econauts are not astronauts or scientists, just space fans who hope to live in space someday. Group members have varied backgrounds, including careers in business, advertising, gardening, medicine, and goat farming.

Other organizations have attempted to build biodomes in the past, with little long-term success. Ecosystems are complicated, and it's not so easy to create one that can survive in a sealed glass dome. In order to design their biodome, the Econauts group has hired expert ecologists to give their advice on what kinds of plants and animals to include, and how many of each. With the advice of these ecologists, the group members hope their constructed ecosystem will be selfsustaining, with plenty of plants for the animals to eat, plenty of sunlight and water for the plants, and plenty of air for both. The human occupants will also be eating food farmed and raised in the biodome. Econaut Sarah Willard stated, "I'm really excited to live inside this biodome and help take care of the animals and plants. It will feel like being one of the first humans to live in a colony on another planet."

Biodome Fails: Ecologists to Determine Why

Five years ago, a local group of space fans called the Econauts constructed an ecosystem sealed under glass—a biodome. Recently, the group noticed an ominous decrease in the populations of organisms: the ecosystem appeared to be in the process of collapsing. The occupants were safely removed from the biodome, but the cause of the crash is still a mystery. A group of expert ecologists has been hired to investigate the failed biodome and try to determine what went wrong. They will advise the Econaut group on how a second attempt could be improved.



The failed biodome included an ocean and an area of land with a rain forest and a living area for the Econauts. The living area had a farm, living quarters, a goat pasture, and a pit for burying all trash and dead matter.

Biodome File 2: Econaut Biographies & Job Descriptions

Each of the eight Econauts has been assigned a specific job based on his or her work and interests outside the biodome. They are expected to perform the requirements listed in the descriptions of their jobs, as well as record their activities at least once per season.

The Econauts









Why didn't they include an ecologist on the team? Ecologists understand how ecosystems work





Water Maintenance: Harrison Grant

Doctor : Ana Lopez

Goatherd: Sarah Willard

Gardener: Jeff Anderson





Groundskeeper: Keith Yoo



Harrison Grant is a 26-year-old water technician

responsibility for the Econauts' water system.

has thought a great deal about possible water

systems for use in space, though he isn't a

He has loved space since he was a little boy and



Computer System Operator: Celeste Parker

from Phoenix. Arizona, who has taken

Econaut Biographies

professional space scientist.

Erica Li is a 22-year-old college student from Kihei, Hawaii. She is working toward a career in advertising. Erica grew up hunting wild pigs with her family and getting oysters and crabs from the ocean. She learned about the biodome while taking astronomy classes in college, and she can't wait to bring her hunting and foraging skills into the dome.

Sarah Willard is a 29-year-old goat farmer from Wenatchee, Washington, and she'll be caring for the Econauts' herd of twenty goats. Sarah has been an amateur astronomer since she was a teenager, and she never expected that her goat-farming skills would help people learn how to live in space. She's looking forward to keeping the biodome goats happy and healthy.

Jeff Anderson is a 28-year-old gardener from Fort Collins, Colorado, who is responsible for growing all of the Econauts' food. Jeff became interested in space on an eighth-grade trip to the Kennedy Space Center in Florida, and has dreamed since then of contributing to the future of humans in space. He hopes his work in the biodome will help future generations learn to grow food if they settle on other planets.

Ana Lopez is a 52-year-old doctor from Greenville, South Carolina, who will provide medical care in the biodome. Ana is fascinated by the idea of living in space, and has studied the medical needs of people living in enclosed spaces so she is prepared to take great care of the Econauts during their project.

Keith Yoo is a 24-year-old banker from Pittsburgh, Pennsylvania, who will serve as the Econauts' groundskeeper. Keith has no experience with maintaining an ecosystem, but he's interested in the psychology of people living in confined spaces, so he's excited to offer his services to the team.

Gabriel Gutierrez is the Econauts' chef. He is 35 years old and comes from Oklahoma City, where he specializes in farm-to-table cooking. Gabriel works with a local university to study ways of introducing more natural food into the diets of people in space, and he is excited about the challenge of cooking good food from limited sources. Celeste Parker is a 38-year- old computer network administrator from Minneapolis, Minnesota.She has dreamed of living in space since she was a girl, and hopes to buy a ticket for one of the first commercial flights in space. She will run all of the technology required for the Econauts' biodome.

Econaut Job Assignments

Gardener: Jeff Anderson

Pick fruits and vegetables and deliver them to the chef. Make sure all plants are receiving enough water. Plant new fruits and vegetables as necessary.

Groundskeeper: Keith Yoo

Maintain biodome buildings and grounds. Rake up dead leaves, place them in sealed garbage bags, and bury them at least 6 feet underground.

Computer Systems Operator: Celeste Parker Make sure all computer equipment is working properly, and enter all biodome data for graphing.

Water Maintenance: Harrison Grant Check and maintain the water system so there is enough water available to all organisms.

Chef: Gabriel Gutierrez

Prepare breakfast, lunch, and dinner for each of the residents. Make sure food provides what the Econauts' bodies need.

Hunter: Erica Li

Hunt rabbits with bow and arrow and deliver to chef. Search for fruits and edible plants in the forest area.

Goatherd: Sarah Willard

Care for goats, making sure they have plenty to eat and drink. Milk goats and deliver milk to chef.

Doctor: Ana Lopez

Provide basic medical care and regular checkups to all biodome residents.

Burial Duty: All (this job rotates monthly) In order to keep the biodome looking orderly and full of life, we will bury any animals or plants that die. They will be placed in sealed garbage bags and buried at least 6 feet underground. We will bury all garbage as well.



The Econauts will take turns burying all dead matter, droppings, and garbage deep underground.

Biodome File 3: List of Recommended Organisms to Include in the Biodome

Producers	Primary Consumers	Secondary Consumers	Decomposers	
bananas	pygmy goats	boars	worms-	
papayas	billy goats	tilapia (fish)	soil bacteria	
sweet potatoes	chickens	spiders	soil fungus	
beets	cockroaches	snakes	pill bugs-	
peanuts	ants	oysters	heetles	
cowpea beans	bees	crabs		
rice	hummingbirds	reptiles	I wonder why they decided not to include worms. Bacteria need	
wheat	bats	seerpions-		
morning glories	moths		worms to break dead matter into smaller pieces so bacteria can feed on it.	
phytoplankton (tiny algae)	zooplankton (tiny aquatic animals)			
rubber trees	butterflies			
mosses	termites			
ferns	tartles	It's a good the they included	It's a good thing that they included producers for both land and water ecosystems.	
elodea (aquatic plant)	brine shrimp	for both lan water ecosy		
	rabbits			

Biodome File 4: Biodome Water System Diagram

Looks like the water system in the biodome was well designed. I can't see anything here that would cause the ecosystem to have problems.





Baby goats are so cute!

Biodome File 5: Goatherd's Journal

Year 1

Winter:

Today was the first day of my dream job: my first day herding goats in the Econauts' biodome! I'm so glad I got to join the team on this great adventure. I'm taking care of a herd of twenty adult goats between the ages of three and eight years. Most goats don't live longer than ten years, so I might lose a few before we leave the biodome. Still, I'm looking forward to what this experience holds for all of us.

Spring:

To keep our biodome environment neat and clean, the team is taking turns burying all trash, droppings, dead animals, and dead plant matter. Guess whose turn it is this month? Mine! I've been raking up all the dead leaves and plants I can find, putting them into garbage bags, and tying the bags tightly before I bury them deep in the ground. At least there haven't been any dead animals this month! This isn't my favorite job here in the biodome, but I guess we all have to help out.

Summer:

Summer in the biodome is beautiful! The sun is shining, the birds are singing, and the goats are enjoying all the lush, green grass they can eat. Everybody seems happy and healthy.

Fall:

It's goat-breeding season here in the biodome. Fingers crossed that we'll have baby goats we goatherds call them kids—in the spring! The vet came today for the goats' annual checkups, and said they're healthy.

Winter:

The winter days are short and cold...and the winter nights are long and cold! There isn't much food available at this time of year, so I feed the goats hay from the alfalfa we grew last summer. At least they have thick winter coats to keep them warm. Four of our female goats are pregnant and should have their kids when spring comes! Until then, we just have to bundle up and try not to freeze.

Spring:

Our kids were born last week, and they sure are cute! The kids are eating well and growing quickly. It's such a wonder to watch these new little goats every day. My job is the best!

Summer:

It's my turn to bury our dead matter again. Burying our dead matter is never my favorite job, but it's especially tough this month because one of my older goats died last week. I sealed the body in a plastic bag and buried it along with all the dead leaves and plants, droppings, and trash. At least we have kids to help keep our goat population up. Otherwise, everybody in the biodome seems to be doing well.

Fall:

It's breeding season again! The vet visited for the goats' yearly checkup and said they're in good health. Looks like we're in for another good year in the biodome.



The goats are getting a nice, healthy diet of grass here in the biodome.

Winter:

Winter again, and one of the goats died. I'm not sure what happened—she wasn't very old, and she didn't seem sick. I'm sad to have lost one of the herd. Otherwise, we're all doing pretty well and are trying to stay warm until spring.

Spring:

I love spring! The warm weather is much more comfortable, and it's good for the goats to have some fresh grass to eat. Two of my goats had kids this year. They're so cute, and I'm glad we have kids, since we lost a couple of older goats in the last year. It's my turn to bury dead matter again. It's a dirty job, but I think I'm getting used to it.

Summer:

I can't figure out why, but it seems like we've harvested less alfalfa this summer than we did in the past. That means there's less for the goats to eat now, and they'll have less hay for the winter. Nobody's sure why, since we're getting plenty of sunlight in the biodome. I guess I'll have to start feeding the goats a bit less, so we don't run out.

Fall:

Time for the goats' yearly checkup. The vet said the goats don't have any diseases, but they're looking a bit thin. I guess we're seeing the effects of this summer's alfalfa shortage. I'm not sure what to do: I don't want to use up too much hay, but I want to make sure the goats have enough to eat. Anyway, it's breeding season again. Hoping for some kids in the spring!



The goats love the alfalfa we harvested last summer!

Winter:

I'm starting to get worried. Two of my goats died this winter, and I'm not sure why. The rest of the goats look a little thin, but they eat everything in sight, and they don't have any diseases. I think we have enough hay to get us through the winter. Maybe everything will get better once the goats can eat some fresh spring grass.

Spring:

None of the goats had kids this spring. I'm so disappointed. Kid goats are so much fun, and I like to think the herd is doing well. It's my turn to gather and bury dead matter again; I raked up a lot of leaves and droppings, but at least there weren't any dead animals to bury. Looking forward to a good summer harvest for the goats.

Summer:

This year's alfalfa harvest is even smaller than last year's. I'm worried about how we're going to feed the goats enough this summer and still have enough alfalfa to make hay for the winter.

Fall:

It's breeding season again, and time for our yearly visit from the vet. She said the goats don't show any signs of disease, but that they are looking very thin. This seems to be a problem with many of the animals in the biodome: they are all getting thinner. I don't know what to do; the alfalfa crop is still producing less than in the first few years of the biodome project.

Winter:

Three more goats died this winter. I was sad to lose them, and I'm confused about what's happening to the goats. I know they're not sick, but why aren't they really healthy? Should I be doing something different? Something has to change soon.

Spring:

Another spring with no kids born. We now have fewer goats than we started with, even though six kids were born in the early years of the biodome. I don't like to see the herd getting smaller. It's my turn to gather and bury dead matter again.

Summer:

This summer's alfalfa harvest was the smallest yet. I'm not sure what the goats are going to eat this winter. They're already too thin.

Fall:

We've all been removed from the biodome. It turns out all of the populations had started to decrease, and it wasn't safe for us to stay. The vet couldn't find any signs of disease, though. I wonder what happened. I'm so sad that we won't be able to complete our mission.



I don't know why our goats are looking so thin—it's scary.