

With today's technology, should humankind colonise other worlds?

Today, humans have developed amazing technologies allowing us to do many things that we once thought impossible. We have networked millions of computers world wide to share knowledge, created powerful weapons and even landed man on the moon. With today's technologies, it would be possible to sustain a colony on another planet, but why would we bother? The task would be extremely expensive, with a high chance of failure and loss of human life.

Why we should do it

In these modern times, more babies are being born; people are living to be healthier and older, leading to a huge increase in global population.

The earth currently has a population of over 6 billion people. This number of people on such a small planet is quite unsustainable, with huge shortages in food and clean water in many parts of the world. It has even been predicted that in about forty years, the human genetic strain will initiate a "self destruct" mechanism to decrease the population. At the current rate, the population will keep increasing, until there are so many people and not enough natural resources that we may all end up starving to death.

A possibility in the reduction of population would be to transfer many people to another planet. By creating a new colony, it increases the space per person, allowing more natural resources to be spent per person. More food would be produced, more fresh-water available and more space for each person to live in. We can even out the populations between these two planets, reducing the strain on each, and sharing it between the two. If excess resources exist in one place, they can be exported back to the other.

At such times as we live in today, there is the ever present threat of war. Wars have the potential to wipe out huge numbers of people, and with such weapons of mass destruction, the complete extinction of the human race is quite possible. There are enough nuclear weapons stockpiled on the earth to destroy it 70 times over. In the chance that a war does happen and these weapons are fired, the human race may cease to exist. However if we have a second colony on another planet, this would be able to continue to function independent of Earth, thus doubling the chance of our survival as a species. Another possibility is an "Armageddon" style asteroid on a collision course with Earth. This could also destroy all life on the planet. By diversifying the places we live, we increase the chance of the ultimate survival of our species.

As a species, we are using up much of our natural resources faster than they can be replaced. Such resources include forests, clean water and oil reserves. By colonizing another planet, we expand the range of resources we have available. We will be able to export oil and wood from new planets back to Earth, to allow us to maintain our lifestyle. We could just change our lifestyle to be friendlier to the environment, but I feel that it is even less probably than it would be to colonise another world.

Colonising another planet may seem like short term solution. As in another few hundred years, that new planet will be running short on natural resources and overpopulated. However this is a good reason of why we should not stop at colonising just one planet, but a whole range of planets.

As you can see, we should colonise another planet, for the benefit of the human race. If we want the human race to prosper throughout the years, we need additional room, additional resources and a second colony to ensure we live on. By diversifying the planets we live on, we can explore more of the universe, get an unlimited supply of resources and increase our chance of survival.

The space ship

One of the major problems that we have for interstellar space travel is the speed we are capable of. We have the technology to travel thousands of kilometers per hour in space, however when the distances to new solar systems are so great, these speeds we are capable of appear like as a snails pace. At our present speeds, it takes us nine months to reach Mars, which is only a few million kilometers away. The nearest solar system to us, Alpha Centauri is 39,900,000,000,000 km away from us, which is about 4.35 light years. Some of the fastest speeds we are currently able to get are extremely slow compared to the speed of light. A chemical propulsion drive can only induce a speed which is close to the ejection speed of the exhaust. The Galileo spacecraft has managed to attain speeds of about 100,000km/h by using a slingshot action with the Jupiter. Standard propulsion systems, such as those used on Galileo, can only give us speeds of a few thousand km/h.

Our latest propulsion drive system is the ion engine. Instead of a combustion reaction being used to create the thrust, a nuclear reactor is used which has particles traveling at the speed of light. These particles are ejected out of the spacecraft at just under the speed of light. This will eventually give the spacecraft the possibility to reach velocities near to the speed of light. The ion drive is also able to last for the time that the nuclear reaction lasts, which can be many years. The main problem with the ion drive is its slow acceleration rate. By ejecting tiny particles out of the drive, even at high speeds, they only have a small momentum. Therefore the acceleration on such a drive is very small, so it will take many years to reach such high speeds with this form of engine.

So even if we were to build a ship fitted with ion drive engines, it would still take about five years at full speed to reach Alpha Centauri. With our standard chemical propulsion engines it will take us 45500 years to get there, assuming a slingshot action off Jupiter is used. Considering this, it is really not that feasible to start colonising different worlds when it will take us thousands of years to get there.

There is also the possibility that if we sent off a colony ship to Alpha Centauri today, we may come up with faster-than-light technologies, allowing us to travel to Alpha Centauri in a couple of years, or even months. Then by the time the first colony ship arrived, Alpha Centauri could be a hugely populated system, with no room left for these first

colonists. Is it worth the risk of sending away colonists now, when we could possibly overtake them in a couple of years?

Another setback we would have to overcome would be the supplies. Either we have the choice of cryogenically freezing thousands of colonists for thousands of years, or we have to outfit the spacecraft with millions of tonnes of supplies. Such supplies would mainly be water and breathable air. We would be able to grow enough crops using hydroponics to feed the people provided that the hydroponics area was large enough. However water is a limited resource, with each person requiring at least four litres of water per day just for drinking. There is the option of recycling water; however it isn't a very appealing idea, to be drinking recycled water. The other limited resource is breathable air. Unless we find a way of easily producing or recycling air to get breathable air, it is also preventing us from undertaking such a mission. One way to dispose of all the resources required for the upkeep of life on this very long journey would be to cryogenically freeze all the colonists until they reached the planet. However there is currently no method available to "unfreeze" somebody who has been frozen.

A possible power source for the ship would be using a fuel cell. This combines hydrogen and oxygen gas to provide electricity and pure water. All electrical demands by the space ship could be satisfied with a fuel cell, however huge amounts of the two gasses would be required to power a ship for such a long time and also to provide enough water for the colonists.

The other possibilities for powering a ship for the duration of the trip would be a nuclear reactor and/or solar panels. A nuclear reactor could provide sufficient electricity and also propulsion (for an ion drive), however a large enough source of fissionable material is required. Solar panels would be quite useless when the space ship is not near any star, as the power they collected would be minimal. However at the new planet, they could be used immediately to provide electricity, without damaging the new environment.

To produce such a large spaceship capable of this sort of task would require huge amounts of natural resources. Enormous quantities of metals, plastics and electricity to produce the ship would drain the Earth of much of its limited supply. The aim of this mission would be to save the Earth and its people, however by creating such a ship, we could be taking away all the resources needed by the residents of the Earth. Since we would not get any return on this "investment" for about possibly thousands of years, it is an investment most people will not be willing to make. If a benefit could be gained within a couple of years, there would be a much higher push for such a mission. However with the already high degree of failure (not being able to find a suitable planet) and time taken, it is probably best to save the resources on the Earth for a better option.

Once we get there

After spending thousands of years on a space ship, there is also the possibility of arriving at Alpha Centauri and finding that the planet is not similar in any way to earth. It could have no atmosphere, no breathable air, and no water; the possibilities are endless. The colonization process would be made millions of times easier if the colonists selected a

planet that has similar conditions to Earth. That is, it has an oxygen/nitrogen atmosphere, liquid water and a reasonable temperature. If the planet has different conditions, colonies must be made inside sealed environments. Then a separate source of food, oxygen and water will be required.

If a colony with a separate environment to the planet is created, essential resources such as air, water and food will have to be shipped in from Earth, until the colony can be self-sustainable. Food supplies can eventually be self sufficient on the colony, however without advances in technology, breathable air and drinkable water cannot. They could be produced by a chemical reaction by natural resources on the planet, but that may take many years to develop. So until the colony can become self sufficient, frequent resupply trips must be made to the colony just to keep the colonists alive.

If the planet is capable of supporting human life, in that there is breathable air and clean water, the process of colonization would be made much easier. The colonists would be able to become self sufficient in much less time. They will be able to move freely about the planet collecting resources required to build shelter and irrigate the land to produce food. No resupply trips would need to be made, and the spaceship required to get there could be taken apart, and its materials used in the construction of further buildings on the planet. Unfortunately the chance of stumbling upon such a planet are quite remote, we would most likely have to take the first option and create a colony with an Earthlike environment to survive.

Considering the time that a colony ship would take to get to a planet and also the time that the colony would be unsustainable, the amount of supplies from Earth required would be enormous. To keep thousands so colonists alive during their transit to the new planet would require millions of tones of supplies. It would also take even more to get the colony to a self sustainable stage. These supplies must be taken from Earth and there would not be enough to keep both the people on Earth and the colonists satisfied. There is also the possibility that the colony fails, in which case such a huge amount of resources have been wasted on the attempt. The fuel required for the spaceship would also put a strain on our supplies. The ship could be powered by nuclear energy, which would require a large amount of pure uranium to be onboard the ship. There would also need to be a large amount of other fossil fuels available to power smaller machines.

In attempting a mission like this, we could possibly endanger all the other people on Earth by removing all the resources they need to survive.

As we develop more technologies, we could terraform the planet. This would be a long term proposal where an inhospitable planet is changed into having Earthlike conditions. This would make colonization much easier; however it would take hundreds of years to perform, killing any pre-existing life forms on the planet.

Conclusion

I think that we should not attempt such a mission to colonise another planet. Once we have developed our technologies a little more, such a mission could become more realistic. Such technologies would revolve around cryogenic freezing, as it would be too wasteful to have thousands of colonists living together for thousands of years till they arrive. By cryogenically freezing all but a skeleton crew, resources would be kept to a bare minimum, with little consumption of food, water and breathable air.

Assuming we have found no great advancement in propulsion systems, we should combine a few sources. By combining a standard chemical propulsion system with an ion drive, we have the advantage of a more maneuverable ship, with faster acceleration slowly building up to a large speed. Power would be derived from a hydrogen-oxygen combustion process, a nuclear reactor for the ion drive, and also hydrogen fuel cells, for electricity and pure water. A large portion of the ship would be dedicated for supplies, so the colony will be able to be self sufficient should it reach a planet with Earth like conditions.

Before we spend all our resources on a mission, shot blindly into space, we should scan all neighboring star systems to find a planet which has Earthlike conditions. Only once we know exactly where one is should we attempt such a mission.

Because of the huge risks and expenses required for such a mission, only once we are sure of a suitable place, and have better technologies should we even attempt it. Until this happens, a closer colony, on Mars for example would be a much more feasible attempt at this point in time. Then we can practice our skills, make sure everything works and only then try a colony in another solar system.
