

What is Sustainability?

Sustainability is the idea that with special actions, a place can become more developed without destroying the natural landscape and beauty of its surroundings. In good examples of [sustainable development](#) the natural landscape may even be enhanced by development.

What is sustainable development?

We normally think of development as sustainable when the needs of the people, the needs of the environment and the needs of the [economy](#) are all in balance with each other. It can be very difficult to act sustainably all the time because the conditions and place a person is working in can change. Also, what is sustainable in one place, might be [unsustainable](#) in another.











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What are the different parts that make up sustainability?

There are many different parts to sustainability and in order to make the Galapagos Islands truly sustainable, each of these strands need to work in harmony with each other.



Galapagos carpenter bees help to show the relationship between all these different factors and sustainable development © Galapagos Conservation Trust

-  Population: How the make-up and numbers of people in a place change.
-  Energy: How fuels are found and used in various ways.
-  Industry: How people are able to make and spend money.
-  Conflict: How people with different political agendas live with one another.
-  Food: How it is grown and in what quantities.
-  Resources: How natural reserves of things like fossil fuels and water are used.
-  Ecosystems: How animals and plants interact with one another.
-  Urban Spaces: How cities change and adapt to social change.

A Sustainable Environment

A sustainable environment is one where the land, the plants and the animals (together known as an ecosystem) are able to live in a balanced way.

How can we become more environmentally sustainable?

Natural resources, such as wood, can be used by human beings in order to build homes and other structures. In Galapagos, if people were to keep chopping down trees for wood until all the trees in the area were gone, we would call this behaviour 'unsustainable'. If the people wanted to act in a 'sustainable' way, they could think about only cutting down mature (adult) trees, and every time a tree is removed, at least one more could be planted. This would mean that in the future, the new trees will have grown and will also be able to provide the people with wood. The people could also make sure they only cut down the trees that are needed, instead of cutting down every tree and then deciding what to do with the wood. This way the animals and birds of Galapagos (such as Darwin's finches) that rely on the trees for shelter and food can continue to thrive.

Electricity is an important necessity for homes in this day and age. To reduce the amount of damage we cause to the environment, we can aim to generate electricity in ways that work with nature rather than against it. For example, we could invest in new renewable energy sources such as [solar](#) or [hydroelectric power](#) rather than rely on fossil fuels that release harmful [greenhouse gases](#) into the atmosphere. All these damaging fossil fuels also need to be transported to the Islands, meaning a risk of oil spills into the fragile marine ecosystem.

Why is Environmental Sustainability important?

If we don't think about the environment when we make decisions, it might become so damaged that it would be impossible to repair and restore. In Galapagos, the [scalesia](#) forests help to absorb harmful carbon dioxide from the atmosphere. We also have to consider that if we continue to damage the Islands, would tourists still want to visit? This could affect the businesses of people who rely on tourists coming to the Islands (such as hotels, restaurants and tour guides).

Case Study: The Scalesia Forests of Santa Cruz, the Galapagos Islands

The unique nature of the Galapagos Islands means that their environment is highly vulnerable to the unsustainable actions of human beings. One example of this happened on the island of Santa Cruz, at the centre of the Archipelago.

In the early 1970s, Santa Cruz had a forest dominated by Scalesia, a type of tree that can only be found in Galapagos (they are [endemic](#)). There are fifteen different types of Scalesia that can be found in Galapagos and these trees can grow to be around 12 metres in height. They create a thick canopy which shades the lower forest levels from light, heat and heavy rainfall, protecting the soil from erosion.



Scalesia pedunculata © Patricia Jaramillo and Charles Darwin Foundation

In 1982, there was very harsh weather in the Galapagos Islands caused by what is known as an [El Niño](#) event. For eight months, heavy rains fell on Santa Cruz and almost all the adult Scalesia trees died. In the following two years, Santa Cruz experienced the opposite weather conditions, known as [La Niña](#), with drought and poor rainfall. There was little sign of the forest making a recovery back to its condition back in the 1970s.

With little competition, the space left by the trees became a new home for introduced species. The Common Guava, *Psidium guajava*, was introduced to the Galapagos Islands in 1870 for food. Around the same time, Spanish Cedar, *Cedrela odorata* was planted as a source of timber. Both have now spread throughout the Islands, taking over the Scalesia forest areas.

By 2007, very few Scalesia trees remained in the forest of Santa Cruz. Now, new species such as [Himalayan Hill Raspberry](#) are making their way into the forest and changing the [ecosystem](#) again. Although human beings could not control the timings of the El Niño and La Niña extreme weather events, the impacts on the Scalesia forest were made worse by the unsustainable actions of people who brought the introduced species to the Islands, leaving the Scalesia forest with little chance to grow back naturally.

Conservation projects are now at work to reforest areas of the Galapagos Islands with their native Scalesia trees.



Himalayan Hill Raspberry © Galapagos Conservation Trust

A Sustainable Society

A sustainable society is where groups of people work well together to create a good quality of life for everyone.

What makes a sustainable society?

For a society to be sustainable, we could say that everyone should be equal regardless of their ethnicity, religion, gender, age or how much money they have. This is called equality. This could mean that everyone has the right to vote for their community leaders (such as the mayor), or that they get fair wages.

When we think about what makes a sustainable society, we sometimes think of education and healthcare as being amongst the most important parts. If it is hard for children to get an education (the nearest school is too far away) and there is no access to doctors when people are unwell, this could lead to problems for the future of the community.

Case Study: Art and Recycling on Galapagos

If a community can meet their basic needs (such as access to schools and medicines), art and music are able to flourish and evolve, creating a society which not only survives, but is also enjoyable and inspiring to live in. We spoke with Charlotte Moreton about art, sustainability and, of course, her favourite Galapagos species!



The artist Charlotte Moreton and Valeria Tamayo © Charlotte Moreton

Q: What first inspired you to want to visit the Islands?

I have been mesmerised by the Islands and their story since childhood, and I read [The Origin of Species](#) at an early age. Darwin and David Attenborough have both had a huge influence on my thinking, and I am not alone in that! A living laboratory, an unspoilt (mostly) wilderness so very different to any other, tame and abundant wildlife, gems of idiosyncratic evolution! I had thought it was a place that ordinary folks couldn't, or shouldn't, go to – the visitor's footprint is too heavy, and it's expensive, and 7,000 miles away from home – so I somewhat surprised myself with the decision to go. I wanted to make the most of it – to gather enough inspiration for a lifetime and to give something back. I was advised by a sculptor friend that the first thing I should do was to join the GCT – what a great move that was!

Q: How did you become an artist?

I have always been an artist, so it wasn't a conscious decision. It is my way of trying to make sense of the world, and finding out how things work; and when looking at something amazing, to fix it in my mind. Once you have drawn something, and studied it for as long as that takes, you don't forget it. Even more so when making a sculpture starting with a skeleton that articulates in the right way. And it's a terrific way of communicating ideas to any audience. While studying and working in Ecology, I was pursuing the same line – making sense of the natural world I love so much – and now use them together – still trying to understand more and to help others in their understanding of our natural world, and how we interact with it. I am now mostly a sculptor, using a huge range of media (bronze, steel, plaster, clay, willow, wire, even paper) and scaled from tiny to huge via life-sized, and also draw continually, and paint a bit. Print making is something I'm starting to look into in greater depth. Many artists focus on one medium, but I still find I want to express different things about what I see in many different ways, and shall keep learning for ever. I started to teach art through necessity, only to find that I adore it – enabling others to make extraordinary things and really understand creatures from the inside out, and why each is so amazing in its own way.



Art materials come in all shapes and sizes © Charlotte Moreton

Q: Tell us more about your project.

Rubbish disposal is a problem everywhere, especially on islands where there is no “away” to throw things into. The Galapagos National Park (GNP) are working to raise awareness of this. The collection of recyclable rubbish is very good, however, so this was an obvious material to work with. We were using material that was pausing on its journey to be recycled, and doing something useful on the way. The taxi driver, the recycling centre and the school were all quite surprised when I turned up with a pile of metal scrap. I had taken a roll of copper wire and pliers with me to the Islands, just in case, but there were lots of useful bits and pieces to work with. Galapagos Conservation Trust put me in touch with a school in Bellavista, Santa Cruz, and we arranged a few after-school sessions. The children were very enthusiastic, and were quick to pick up ideas, creating their own inventions after a demonstration. We made life-sized sculptures of tortoises and a flamingo, and on another day we made tiny wire animals using fine wire. At the end of each session there were always many more children than at the beginning, and they were sad when the sessions came to an end. All good indications!

I also joined GNP’s Environmental Management trainees (aged 15/16) for a session of rubbish-gathering from the edge of the protected zone. 300 people collected 4 tonnes of rubbish in a day, and I made a sculpture from some of it. Again, adding a joyful stop on the journey to be recycled. The youngsters thought this was great, if unexpected!

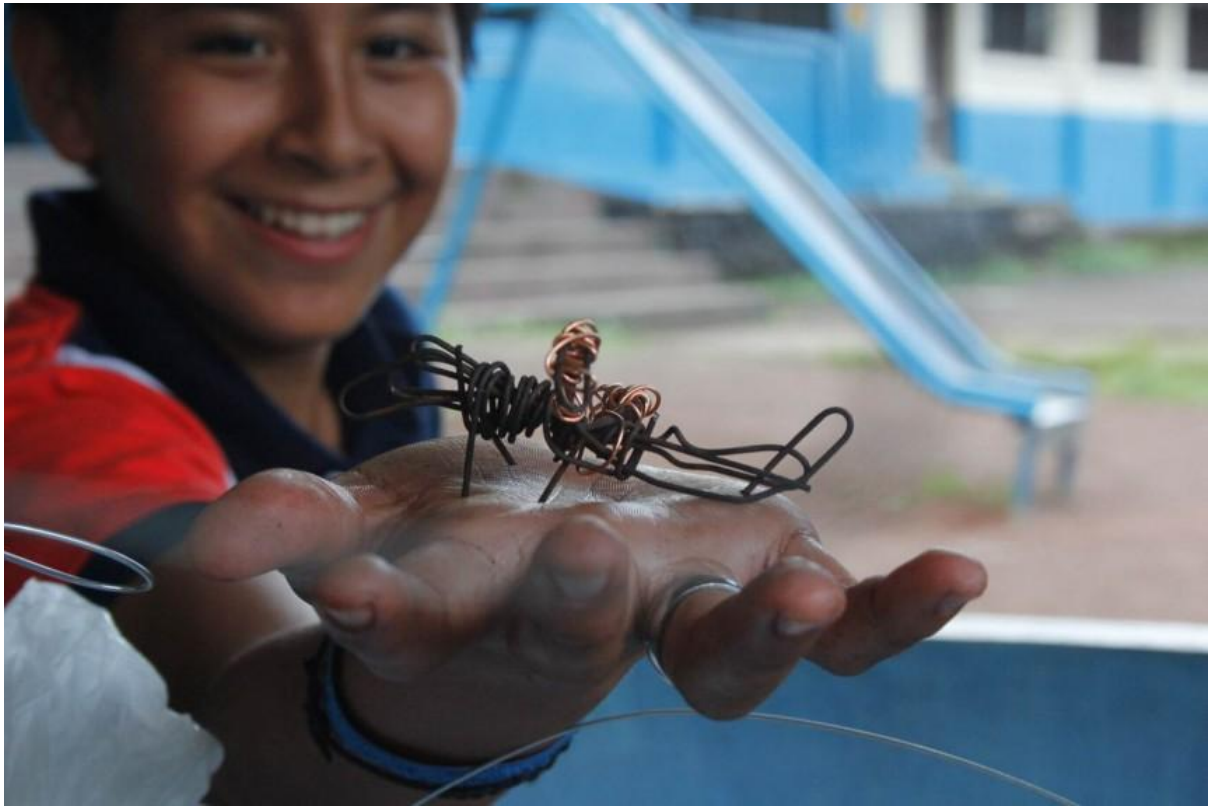
Q: What would you like to do in the future?

How long have you got? Art in general is a fantastic way to foster creative thinking in all walks of life. It is a brilliant tool for communication and to really understand in depth the structure of things (wildlife, landscapes, human impact) and how they interact. The time taken to create art, and deep thought required, results in a greater understanding of the subject matter, and often an emotional bond, which opens the door for conservation effort, both for the artists and their audience. The dexterity developed in making art also comes in very handy for everyone.

Q: Now the question everyone has been waiting for, what is your favourite Galapagos species?

It has to be the [waved albatross](#), though the [flightless cormorant](#) comes a close second, and all the rest crowd in closely behind! That is why I chose to visit in June. Coleridge started the line of thought: harming the albatross is a deeply terrible thing to do! As the late Sir Terry Pratchett once said, “Once you have had that look, you are theirs ‘til the end of time”. (Actually he was talking about the orangutans that held a similar position in his heart). They look you in the eye, and you immediately become their slave. Perfection of design: a sleek, beautiful gliding machine in the air and endearingly clumsy on land, neatly folding away the long long strappy wings. They are great dancers, chat and mate for life. Vulnerable, too – there is much we can do to protect their future, starting with communicating their case.

You can learn more about Charlotte’s work by [visiting her website](#).



A sculpture made from scrap metal © Charlotte Moreto

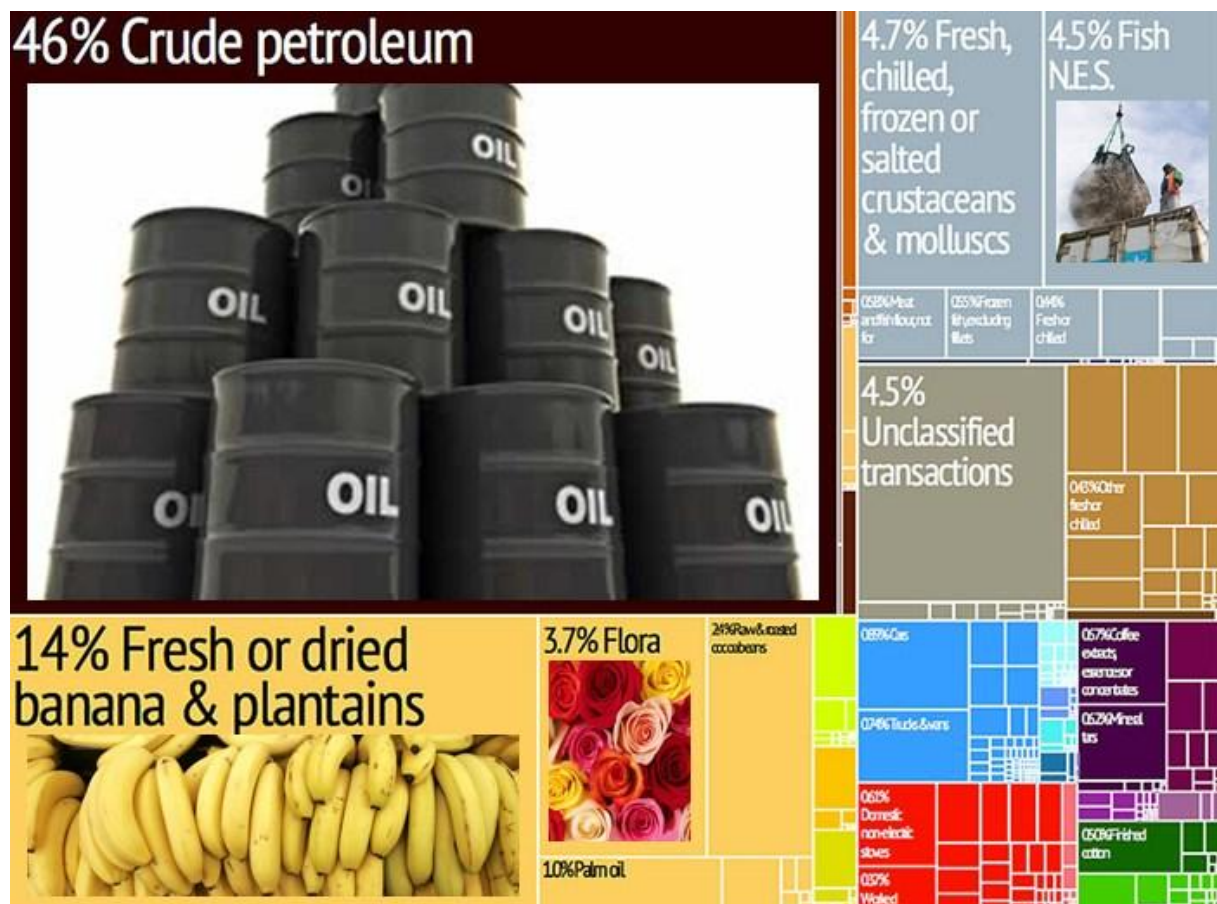
A Sustainable Economy

An economically sustainable society is one where fair and efficient use of resources means people can earn money. It means the economy of the country, region or town will be able to support itself and people within that society will experience neither extremes of poverty or wealth.

What is the economy and why is it important?

In Galapagos, each year hundreds of thousands of tourists from around the world visit. When they visit they pay money for food and for services (such as a hotel where to sleep or tour guide). On the Islands, many people have jobs in the tourism industry. The tourists bring money to the islands to spend. The people on the Islands then use the money to buy other goods (like food) and services. This exchange of money for goods and services is called the [economy](#).

The Galapagos Islands are a part of the Republic of Ecuador. Ecuador is a country in South America that is neighboured by Colombia and Peru. While the majority of Ecuador's money is made by selling goods such as oil, in Galapagos, tourism generates more than half of all money in Galapagos and nearly half of the population work in the tourism industry.



The Ecuadorian economy (adapted from Haussmann & Hidalgo et al., 2011)

What is economic sustainability?

So far, we have been talking about sustainability in terms of making sure that people are able to have a good quality of life without negatively affecting the environment (which could stop future generations from also having a good quality of life). Economic sustainability also has future generations in mind. At the moment, a lot of the industry in western countries is based on consumption of goods. Factories often aim to produce as many products as they can as cheaply as possible without considering what happens to the products when they are no longer useful. To make our electricity, the majority of countries still rely on burning coal which releases poisonous chemicals into the air. Once all the coal is gone, it will not be possible to generate electricity in that way, therefore it is not sustainable. A sustainable economy is one that is based on re-using materials rather than relying on sourcing new materials (such as mining coal from the ground or using oil to make plastic).

What is a circular economy?

A circular economy is another way of thinking about how we can create a more sustainable economy. In a circular economy, recycled resources are put back into the manufacturing process. In this way, we can avoid harming the environment (where the raw materials come from) and this can also be a way for companies to save money too.

Case Study: Alberto Granja – Recycling in the Galapagos Islands

After being a fisherman for twenty five years, Alberto Granja began to find that marine pollution was starting to affect the size and number of fish he was catching. Most of the pollution was oil from the ships visiting Galapagos. At the time, oil was commonly found in the waters around the Islands, as there was no way of preventing its spread or stopping it leaking into the sea (or being dumped there).

Herbert Frei, the founder of Pikaia Lodge, had also noticed the negative effect pollution was having on his business and on wildlife. Together, the two men developed a project where the oil was scooped off the surface of the water, burnt at high temperatures and then used to make new fuels. With the support of the Galapagos National Park, the World Wide Fund for Nature and the Charles Darwin Foundation, Granja started to collect oil from the ocean surface using a motorboat and his family home as a storage facility.



Alberto Granja © James Frankham (WWF-Canon)

The scheme became very successful. The Galapagos National Park made it compulsory for all vessels to recycle their oil with Alberto rather than dump it. This meant that Alberto would need to process around 16 thousands litres of used oil each month. Granja had to move his company to a new warehouse and began transporting the oil to a glass-making factory on the mainland in Ecuador. As of 2014, Alberto has collected over two million litres of oil and has helped to reduce the marine pollution in the area.



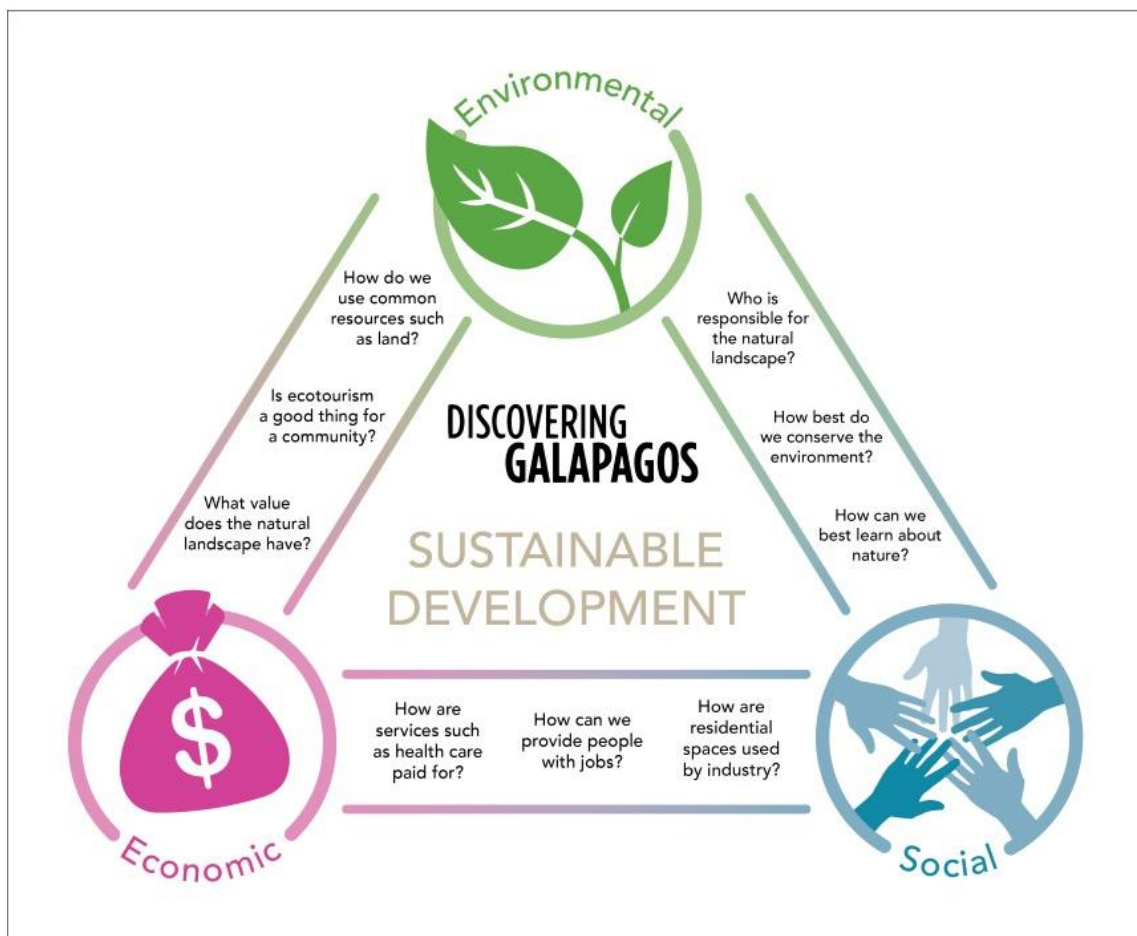
Oil recycling on the docks © Relugal

Environment, Society and Economics

It is easy to see how each part of sustainable development works on its own. We should also remember however that the environment, the society and the economy of a place work together at the same time.

Interactions between the environment, society and economics

When we think of a problem that the Galapagos Islands face, we can normally see that it combines elements of the economy, society and the environment. For example the dumping of household waste into the ocean is easy to recognise as an environmental problem; it is possible that wildlife will be negatively affected by the waste. To find a sustainable solution, we have to think about how much a recycling scheme would cost the authorities (economic) and whether local people would benefit from the scheme (social). To find a sustainable solution to a problem, we need to balance all three parts of sustainability at the same time.



This diagram shows the relationship between the environment, economy and society © GCT

A Future for Galapagos

The Galapagos Islands are rapidly changing and it is becoming more important that sustainable solutions to the issues that these changes raise are found.

Land zoning in Galapagos

Isolation is the key to the special nature of the Galapagos archipelago. Because human colonisation in Galapagos did not occur until relatively recently compared to the majority of the rest of the world, the unique ecosystems have been preserved and species have survived. However, population increase and urban expansion means that land zoning of areas for human use and rules for the use of the zones has become necessary.

Prior to 1959, the protected areas and unprotected areas were considered to be completely separate and not connected. There was no real difference in the management of the human and natural space. When the [Galapagos National Park](#) was established in 1959, 97% of the Islands were declared protected natural areas. The remaining 3% of the land is used by Galapagos communities (both rural and urban). The new zoning model recognises that hazards such as invasive species and pollution come from populated areas and that the populated areas depend on the unique ecosystems and their conservation, demonstrating the interconnectedness of the zones.

Why do small islands face unique challenges?

The Galapagos Islands share common problems with many other islands around the world. One of these problems for the future is climate change. Locations like Galapagos are more vulnerable to climate change due to their isolation, their reliance on the sea for income and the shape of their land which can be low-lying and susceptible to rising sea levels. There are a number of ways that locations like Galapagos can try to protect themselves from such issues:



Mitigation is where action is taken that will make an outcome less severe. For example, in a residential area that may be affected by rising sea levels, a sea wall or permanent fixture might be built to protect the homes from floods.



Adaptation is where change might be unstoppable, but action is taken to help us survive the change. For example in the same residential area affected by rising sea levels, homes can be raised up on 'stilts' so that flood water does not damage people's homes.



Houses on stilts in Nueva Venecia, Colombia © Augusto Sisa

Case Study: The Galapagos and Climate Change

An impact assessment carried out by the Galapagos National Park and a variety of NGOs found that there were six ways in which the Galapagos Islands would be vulnerable to climate change in the future:

1. Warmer sea temperatures.
2. Greater intensity of [El Niño](#) and [La Niña](#) events (more extreme weather).
3. A rise in sea level.
4. Increased precipitation.
5. A more acidic ocean.
6. A reduction in the cold water current upwelling which brings nutrients to the ocean surface.