Anita Roddick, Founder, The Body Shop
Two hundred million people depend on fish directly or indirectly for their jobs, and typically up to 90% of some fish populations are caught each year. On one estimate 70% of world stocks now urgently need management.

Hidden beneath the waves fisheries, marine habitats, the entire ocean ecology are vulnerable because they’re out of sight and easily exploited.

Narrator
Almeria Province, Spain. Location of Europe’s only desert.

Offshore this area of the Mediterranean known as the Alboran Sea is home to a wide variety of sea life including dolphins and turtles.

But these populations are under threat from indiscriminate fishing practices, but now Alnitak, the project based on an historic ship, is giving researchers and members of the public a chance to get close to these creatures and use high tech methods to find out more about their habits and behaviour.

It’s seven a.m. and Captain Ric is taking the research ship, Toftevague, out to sea. On board are three researchers and seven volunteers with the Earth Watch Programme. They’ll be helping them discover more about dolphins and sea turtles living in the Mediterranean.

The volunteers have paid to be aboard as a working holiday.

Ric Sagarminaga
Science at sea is expensive and long-term monitoring is only economically feasible through projects like Earth Watch.

Narrator
The routine on board ship means a rotation of watches as the crew takes turn on look-out duty and at the wheel.

With sighting or no sighting every twenty minutes a log is made of the location, water temperature and other environmental factors as well as the number of other ships nearby.

The project is part of a European life nature project to make the conservation plans for sea turtles and bottle-nosed dolphins and it’s a little bit of a challenge because it’s like a very experimental project.

That’s why we are working together with the scientific community of experts, institutions and also marine protected area management to come up with feasible and cost-efficient ways of monitoring these animals that occupy these huge areas.

Narrator
The excitement of the sighting makes up for hours scanning the seas.

Ric Sagarminaga
The first phase is going to be measuring her, take all the photographs of different parts of her. She’s really small so we’re are going to put one of the smaller satellite tags and then
take a blood sample, a skin sample for genetics so we'll split up in three teams so everyone gets a chance to work on her.

**Narrator**
This logger head turtle, nicknamed Georgie after the volunteer who spotted it, is having a satellite tracking device fitted after a DNA sample and vital statistics have been recorded.

Worth around six thousand dollars it’s essential the transmitter is firmly fixed and that it doesn’t bother the turtle too much.

After being attached the transmitter is painted dark blue so it doesn’t make the turtle more obvious to sharks.

It’s set up to transmit information to the satellite when the turtle is on the surface.

Now the glue has dried, it’s time to send the turtle on its way.

During the next twelve months the researchers on board Toftevague will receive a message every day from the satellite transmitter with information on the turtle’s location and how much time it’s spent at different depths.

In the bowels of the ship, the high speed wireless internet connection supplied by a Vodafone Group foundation grant means Ric can track the progress of Georgie and the other turtles he’s tagged.

**Ric Sagarminaga**
Every day we get a mapping of the turtles, where they are. This is a map where you get them all together, this is not the last, latest one.

**Narrator**
Another sighting, this time it’s a group of pilot whales, technically a species of dolphin. The researchers use digital photography to identify individual animals. In between sightings the volunteers learn how to take DNA samples from a moving dolphin using a scouring pad on the end of a pole.

A group of common dolphins, one of the main research species, gives the team a chance to see how it’s done.

**Ric Sagarminaga**
Now one of the main reasons is to see if there are populations that we have left in the Mediterranean that are genetically isolated. Some of them could be risking such an extreme isolation that they would be you know extinct a few years from now.

**Narrator**
At the end of each day it’s back to port for a welcome rest for the crew. The data collected is part of Alnitak’s work on a management plan that’ll be good news for the turtles, dolphins and fishermen of the Mediterranean.
Early morning, Lagos Bay. Fishermen are returning with the day’s catch. It's just enough to feed the local community. Stocks in the bay and further out can no longer meet the country’s needs. Nigeria has to import fish to make up the shortfall in its domestic catch.

But now there’s a solution in the heart of downtown Lagos.

Catfish or African Lungfish is a freshwater fish found wild all over Nigeria. It's also one of the easiest fish species to farm. Doctor Olajide Ayinla’s team have been working with the UK Department for International Development to promote small-scale catfish farms in Lagos.

**Dr Olajide Ayinla, Nigerian Institute for Ocean & Marine Research**

Catfish can withstand extremes of condition, a temperature can be extreme,

It can withstand rough handling, it can travel long distance and still remains alive unlike other fishes.

**Narrator**

State of the art imported systems like this rely on continually re-circulating the fish tank water through a series of filters. This increases the amount of dissolved oxygen and makes possible intensive farming and huge yields but for most Nigerians the costs are prohibitive.

Instead they’ve adapted the technology using local materials.

One advantage of catfish farming is you don’t need much space. Often a garden may be enough land to create a profitable catfish farm.

Drilling a well provides a ready supply of water.

In the simplest flow-through tank system, this is constantly piped to the fish kept in breeze block tanks.

The fish are fed twice a day. They eat about a kilo and a half of fish feed to grow to adulthood. Most farmers can cut feed costs in half by making their own.

The catfish grow from juveniles to market size in four or five months. This is the basic system many use to get started.

Five years ago Babatunde Akiode was drifting between jobs and struggling to make a living for his family.

When he heard what catfish cultivation could offer, he tried to convince his wife who runs a beauty salon from home.

**Bola Akiode, OMAP Farms & Consult**

I’m a beautician. I have my salon so now asking me to come and be a fish farmer you understand eh?

**Babatunde Akiode**

It is beautiful working with fish, very very beautiful.
Bola Akiode
You know when you sow the eggs then maybe after three days you see the little babies coming up. I enjoy this so after I don’t have any choice that to support him.

Narrator
They started off with two ponds and little practical experience. Ninety percent of his first stock died but after the first year, business took off and it’s taken over his backyard. Cat fish farming is now all the rage and Babatunde runs starter courses for would-be farmers.

Demand for fresh fish is key to business success. Fresh cat fish is now on sale three times a week and invariably sells out by the end of the day.

But for fish that grow this fast, the quality of juveniles supplied is crucial.

And many established farmers are now moving into the lucrative hatchery business.

Yumi Alabi has run a catfish farm for five years. His cheap local version of a re-circulated water system gave him an annual production of four tons of fish but these are the last of his adult stock. Now he’s entering the highly technical world of fish breeding.

Yumi Alabi, Alabi Farms
It is artificial insemination and not many people can actually keep to the water quality parameters that are needed.

Narrator
The hatchlings and juveniles need to be kept in semi-darkness and as they grow bigger, they are moved to nurseries in the yard in front of the house where they will be kept until they’re ready for sale at around two months old.

There’s enough capacity for forty thousand juveniles per batch.

Yumi Alabi
Forty thousand juveniles should fetch me about a million naira.

Narrator
That’s four times what he used to earn. These new small-scale farms are a step towards guaranteeing healthy food supplies for the ever-growing city. It’s also a way for people to escape the cutthroat job market and, thanks to catfish farms, Nigerians may soon be self-sufficient in fish.

Babatunde
I bet you in the next ten years that Nigeria will be one of the largest exporters of fish in this world.

Narrator
The palm-fringed beaches of Ceara Brazil. For the people who live in this remote coastal region, life revolves around the sea, battling with the elements for their daily survival. Seaweed collection has been a vital source of income for the past thirty years, but over-collection of seaweed has caused stocks to diminish and damage the coral reef. Not only was the environment suffering, so were people’s livelihoods.
Over two million tons of seaweed are sold around the world every year, yet Brazil in spite of its considerable coastal resources imports 90% of the seaweed it uses.

**Edivan Santos Viara**
When we discovered the damage we realised the seaweed was disappearing along with some species of fish and lobster.

We were concerned to create a new culture for the people to start to cultivate the seaweed. We realised that we have to do a more organised collection for the natural environment.

**Narrator**
To guarantee both production and sales, twelve families set up a cooperative to cultivate, dry and commercialise seaweed.

To grow the seaweed, cuttings are tied to ropes which are then placed in the sea.

**Raimundo Nonato Nunez**
We put the date on the bottle. Then we put the rope with the seed in the sea and then we keep an eye on it. We clean the seaweed regularly and then after sixty days we check the size and collect it.

**Narrator**
Before the seaweed is sold, it must be dried. Traditionally this has been done using simple drying racks but it takes time, and the quality is unreliable.

The Institute for Sustainable Development and Renewable Energy, IDER, helped design an appropriate technology for the drying process: a solar drier.

The seaweed is washed in clean water and hung on the drying racks to allow the free flow of air. The racks are then covered with plastic which traps the sun’s heat. A solar panel generated electricity to power the fans and circulate the hot air to dry the seaweed.

**Raimundo Nonato Nunez**
Before we used to place it in the simple drier and it used to take two days to dry. Sometimes when it rained and got wet we had to start again, so with this new drier we put it in and after an hour and a half it’s already dry.

**Gina Rodolico, E & Co**
Enterprises have the potential to solve energy problems because they can meet the demand that’s generated in the local community.

They can assess whether a specific technology will be more appropriate, and they will have a better understanding of the customers that are being served and most importantly is they are there for the long term so they will be able to resolve any problems that arise.

**Narrator**
The cooperative has applied to Brazil Renewable Energy Enterprise Development, BEREED, for a loan of $18,000 to buy more solar driers, a safer boat and other equipment.
to streamline the production process, but they have to be sure of their market to know they can pay back the loan.

**Sulamita Holanda de Sousa, Executive Director, IDER**
Doing a business plan we are going to understand strategies, the need to improve the final product and to find the market for it and how to find the right price for a product.

**Narrator**
Seaweed is believed to have many health benefits and is popular in alternative remedies. It's also a tasty addition to many recipes and popular with customers. The producers’ group has turned their attention to this potential market to find regular customers and be sure they can always sell the seaweed they produce.

**Santos**
If we can produce seaweed of good quality and introduce it into the market, then the whole community gains. This achievement belongs to everyone in the community.

**Narrator**
Fish is a favourite on dinner tables in the Philippines and tilapia, a fish introduced from Africa, is one of the most popular.

But until recently, locally farmed tilapia was hard to come by because Asian stocks proved difficult to manage. They took a long time to grow, died easily and were often under weight.

In 1992 a ground-breaking programme began to turn this situation around. The results have been spectacular.

Enjoying a tilapia lunch are the team who tackled the problem - Dr Tereso Abella, academic director for the programme, Marietta de Vera, breeding project manager, Dr Melchor Tayamen, spin doctor, charged with getting the message out to farmers and Edna Delico, chief of the hatchery.

At first the list of problems seemed insurmountable.

**Melchor Tayamen, National Fishwater Fisheries Technology Centre**
We had deterioration of the stocks, quality was inferior and then farmers were growing more than a year before they can harvest the fish.

So that’s a big problem of the industry.

**Narrator**
Scientists have been able to breed better chickens, cows, even salmon, so why couldn’t the same be done for tilapia?

The team set up a selective breeding programme called GIFT. The answer lay in Africa.

**Dr Tereso Abella, Freshwater Aquaculture Centre**
The unanimous choice is to get stocks from Africa because this is the origin, the place of origin of the tilapia in the world.
Narrator
The scientists brought back better-performing African stocks to mate with local fish in the hope of passing on their characteristics. They looked for fish that would speed up the farming cycle.

Dr Tereso Abella
When we decided to do, to embark on a long-term selection programme, we have really identified that we will zero in on growth rate since this is the main thing in the tilapia aquaculture.

Narrator
To keep track, each fish is anaesthetised and tagged. Five minutes later the revived the fish are paired up and put into individual nets and left to mate. Taking the best ten percent of the offspring and mating them together again, the team found the fish were becoming stronger from one generation to the next.

Marietta de Vera, GIFT Breeding Programme
With the selective breeding programme, we were able to improve the genetic make-up of the fish in terms of the growth performance.

So within a period of seven generations of selection we were able to improve the fish.

Narrator
In fact the GIFT tilapia were 60% faster growing and the adults 60% heavier than the original Asian fish stocks. Better suited to local conditions, the GIFT tilapia supported by the Consultative Group on International Agricultural Research, CGIAR has revolutionised the Philippines’ fish industry.

Dr Tereso Abella
In 1980s we were only getting 18, 16,000 metric tons of tilapia but with the improvement in the quality of fingerlings of tilapia now, plus improved management practices, we have increased this to 122,000 metric tons.

Narrator
To ensure the quality of the fish stock, the GIFT team started supplying the country’s fish farms. Bred under controlled conditions the fish are grown until they are a few centimetres long. Fish for delivery to farmers are given a well-oxygenated bath before their journey.

The GIFT team are delivering 120,000 fingerlings to Angelina Sampson. Until five years ago she was a rice farmer. Then she started an experimental three hectares of tilapia fish pans. Business was so successful she’s now switched completely and has twenty hectares given over to raising fish.

Angelina Samson
The fingerlings’ performance survived very well. I can get about fifteen tons from these hundred thousand fingerlings.
Narrator
Angelina is typical of hundreds of farmers who've discovered that, when managed properly, growing fish can be far more profitable than rice and there's another big plus. More tilapia means a more reliable source of protein for sale across the country.

Armenia. Surrounded by mountains, it straddles eastern and western cultures, the first country to officially adopt Christianity. It may have no sea but at its heart is Lake Sevan, a potential treasure trove for a couple whose craving for crayfish has opened up a market they could never have dreamt of during the communist era.

Communism didn’t just stifle entrepreneurial spirit. Its mammoth hydro-electric schemes caused the level of the lake to drop, but while stocks suffered, the abundance of crayfish - the fresh water cousin of the lobster - was unaffected.

Noune and her husband Sarko have long been fans of this delicacy and in 1991 when the Soviet era collapsed, they turned their hobby into an international business.

Narrator
But even in the capital city, Yerevan, the market for crayfish is small.

Noune Gyunashan, Aquatic
When I and my husband married, we were poor students, so as one of my husband’s hobbies was fishing he decided to catch crayfishes. During the night he’d catch the crayfishes.

During the morning I boiled, cooked these crayfishes and delivered it to markets, little shops in Yerevan.

Narrator
It is export sales to Europe that have had the biggest boost. The delicacy is particularly popular in Sweden.

Carl Bergstrom, Bergstrom
My opinion was absolutely clear.

This was the best quality crawfish in the market place.

Narrator
Their company, Aquatic, now has a base on the shore of Lake Sevan and employs over twenty local people. Here the wild crayfish are kept in holding tanks until a big order comes in. This consignment is headed for Paris.

Noune Gyunashan:
Our workers, they are sorting the crayfishes by three sizes: small, middle and big.

Narrator
To keep the business sustainable, young crayfish are put back into the lake.

Noune Gyunashan
They are very small and then we catch these crayfishes next year.
Narrator
The others are weighed and packed for airfreight. Because EU standards differ from Soviet ones used in Armenia, Aquatic can only export live crayfish.

But with a brand new automatic crayfish cooking plant built to exacting EU standards, it’s hoped Brussels will soon allow Aquatic to export cooked crayfish to the lucrative European market and the government is backing the introduction of EU standards.

Vladimir Davidyonos, Ministry of Health
We want to invite in Armenia different kind of experts to help us to create European standard system.

Narrator
And Europeans are keen to get their hands on Sevan crayfish.

Carl Bergstrom
In Sweden when we eat crawfish we sing a lot and we drink a lot, so it’s quite funny.

Narrator
Every year two-thirds of Bangladesh is submerged by monsoon floodwater.

Crops, houses and lives are all at risk and peoples’ reliance on protein-rich wild fish that find their way into the paddy fields during floods is critical.

But increased use of pesticides has cut stocks of wild fish and added to the vulnerability of poor families who rely on them to survive. There could be an answer, a new project to cultivate fingerlings in the paddies.

Anton Immink, DFID Agriculture Research Programme
Conventional aquaculture relies on hatchery-produced stock which are transported long distances across Bangladesh and arrive very often stressed and in poor condition.

The projects that we have been doing here in Bangladesh are looking at locally produced fingerlings that arrive not stressed, can be sold locally, produced locally and most importantly the poorest farmers can reproduce them in their own systems.

Narrator
Farmers in the north-west region were first to trial fingerling production. Now there are over a thousand farmers breeding fish in their paddies. Mohammad Altaf Hossain started with just twelve female and six male tilapia fingerlings in 1999. He now regularly employs up to ten fishermen to cope with demand from travelling fish traders, sometimes up to twenty-five a day.

Mohammad also encourages other farmers to follow his lead. As an incentive he offers them seed fish from his original stock at knock-down prices.
farm tilapia fish in the rice fields. As a result there is enough supply of fish and fingerlings in the market and our profit has also gone up.

**Narrator**
Mohammad sells about a hundred kilos of fish a month and once he’s paid his fishermen he clears around 3,300 taka a month, about two and a half dollars a day. It may seem little but in Bangladesh that’s roughly twice the average income.

As for traders who have bought the fish at seventy taka a kilo, they’ll make thirty taka more when it’s sold on.

The main attraction of tilapia is their very low maintenance. They flourish on a daily diet of either rice, bran or diluted manure and thrive in fresh, brackish or salt water. Importantly they have a high resistance to disease but they do like warm water.

The project has joined forces with the Intermediate Technology Development Group, ITDG, to advise farmers on integrating wild fish with cultivated fish stocks, reducing pesticides on their rice fields and building appropriate technologies like this simple system to maintain optimum water levels.

Islam

From a nutritional point of view the wild fish is very important because they consume it.

But recently the market survey shows that the price is increasing because of scarcity so as well as they are getting, the poorer people are getting income and consumption from these wild fishes.

**Narrator**
The Department of Fisheries and scientific research institutes say wild fish should be removed from rice fields and ponds so they don’t compete with farmed species. But the farmers prefer the variety.

**Anton Immink**
These, these wild fish that have been caught from farmers’ systems rather than being caught at this stage when water is declining in farmers’ fields could have been conserved in some deeper areas in ditches and rice fields which would have enabled them to breed, cos they're full of eggs and then they would have been able to produce more fish earlier in the season.

**Farmer**
I’m going to put this fish in my pond for better production.