

Bruno Pinto - Penim Loureiro - Quico Nogueira

# SPECIAL

## ADAPTATION TO CLIMATE CHANGE IN PORTUGAL

# REPORT



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## Special Report

### Adaptation to climate change in Portugal

1st Edition – November 2016

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The ClimAdaPT.Local project is integrated into the AdaPT program, run by the Portuguese Environment Agency, IP (APA IP) while managing the Portuguese Carbon Fund (FPC), totaling EUR 1.5 million co-financed 85% by the EEA Grants and 15% by the FPC. The project benefits from support of 1,270 million euros from Iceland, Liechtenstein and Norway through the EEA Grants program, and 224,000 euros through the FPC.

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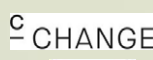
Note: This book is based on real facts. Some names and identifying details have been changed to protect the privacy of individuals.



**FCT** Fundação para a Ciência e a Tecnologia  
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Norwegian  
Directorate for  
Civil Protection



FACULDADE DE  
CIÊNCIAS E TECNOLOGIA  
UNIVERSIDADE NOVA DE LISBOA



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# FOREWORD

## André Jol

Head of group climate change impacts, vulnerability and adaptation  
European Environment Agency

Climate change is a reality and the extent and speed of change is becoming ever more evident, throughout Europe: temperatures are rising; rainfall patterns are shifting; sea ice, glaciers and snow are melting, and sea level is rising. Many of these changes also occur in Portugal, leading to increases in heat waves, droughts, forest fires, storms and floods. They negatively affect ecosystems, economic sectors, infrastructure and human health and well-being.

The global climate agreement of 2015 is a major step forward, aiming to keep the increase in global average temperature to well below 2 °C and requiring substantial reductions in global greenhouse gas emissions. However it is clear that complementary actions to adapt to the changes are also required, to prevent or minimise the impacts. Strategies and actions are taken at EU level, supported by the European Commission, especially for transboundary and common issues across countries. Many countries, including Portugal, and cities have started to act, as clearly shown by the ClimAdaPT.Local project.

Measures have in the past often included engineering solutions, such as flood defences. These are important and will also be needed in future. However in



addition there is a need for behavioural changes, better planning and so-called ecosystem-based measures, which have multiple benefits, such as enhancing biodiversity and quality of life.

In 2016 the European Environment Agency published a report on urban adaptation including an overview of actions that an increasing number of cities across Europe have taken so far. However there is certainly scope for more cities to take action. Some cities have recently started a wider more 'systemic' approach to adaptation. This includes for example better urban planning, with more green areas that can retain excess rainwater or cool built-up city centres in the summer, or preventing the construction of houses in flood-prone areas. The aim is to transform cities into much more attractive, climate-resilient and sustainable places.

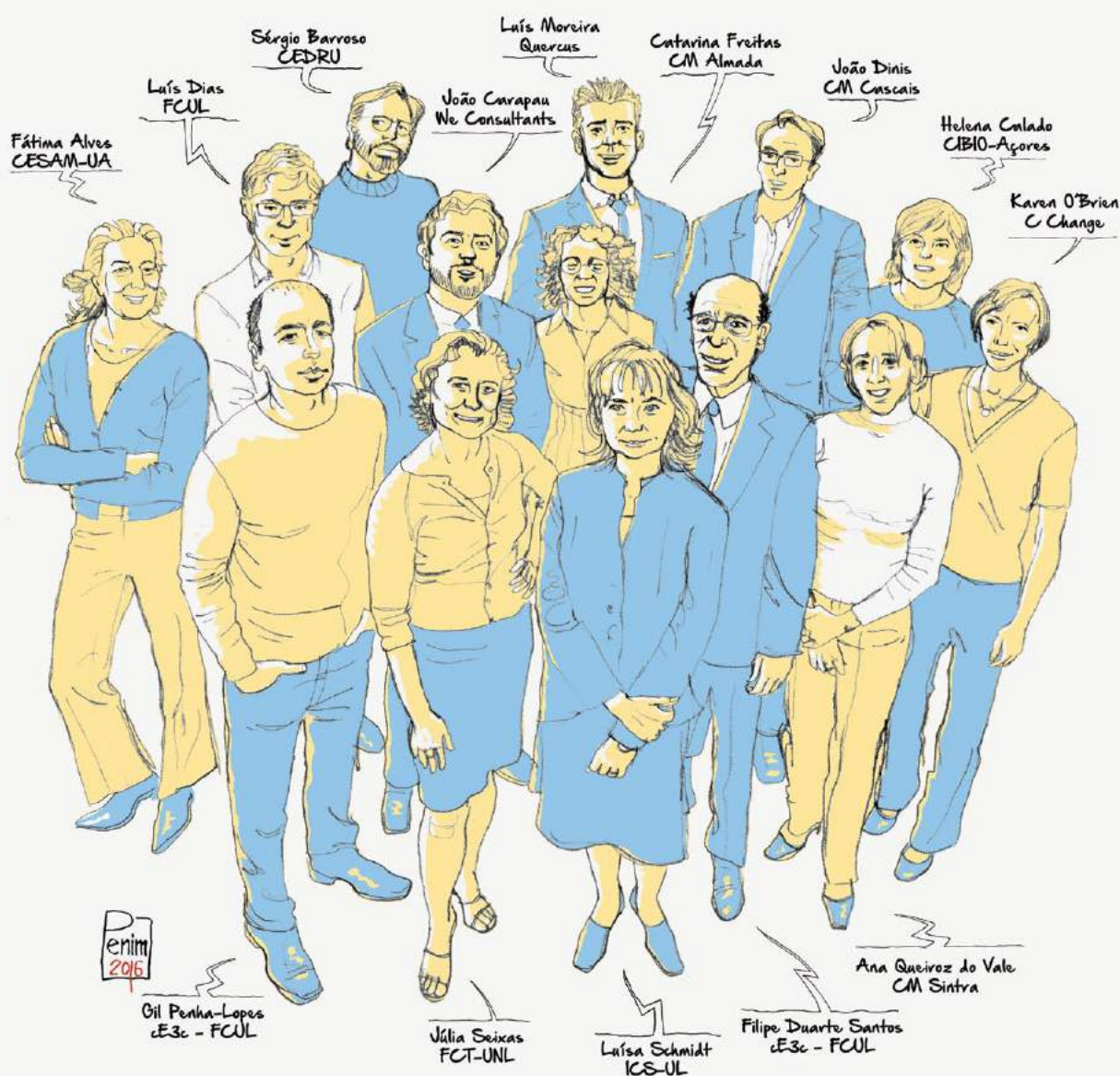
This comic book presents climate change in Portugal and in particular the ClimAdaPT.Local project in a very nice and innovative way by an easily understandable storyline. It shows the main issues and also possible solutions. Hopefully this can inspire municipalities and citizens throughout the country to share experiences and learn from each other. This can help to make adaptation to climate change easier and more effective. The book can be very useful for people inside and outside of Portugal that are interested in climate change adaptation and the innovative way it is presented.



## ABOUT THE BOOK

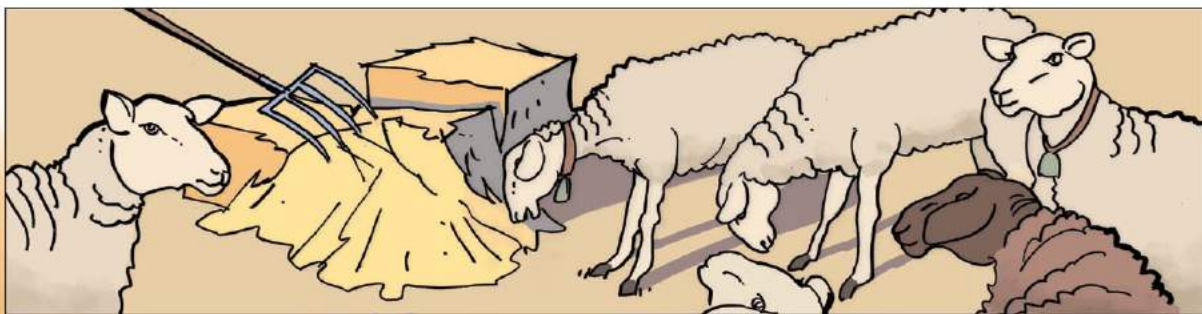
It is part of the ClimAdaPT.Local project (<http://climadapt-local.pt/en/>), financed by EEA Grants and the Portuguese Carbon Fund. This project intends to start in Portugal the elaboration of Municipal Adaptation Strategies for Climate Change and their integration into municipal planning. It involves 26 municipalities in the mainland, Azores and Madeira, and the training of 52 municipal technicians. It is expected that these and other national municipalities can exchange experiences and work in a network, thus making adaptation to climate change easier and more effective at national level.

## THE TEAM



# 1 METEOROLOGY



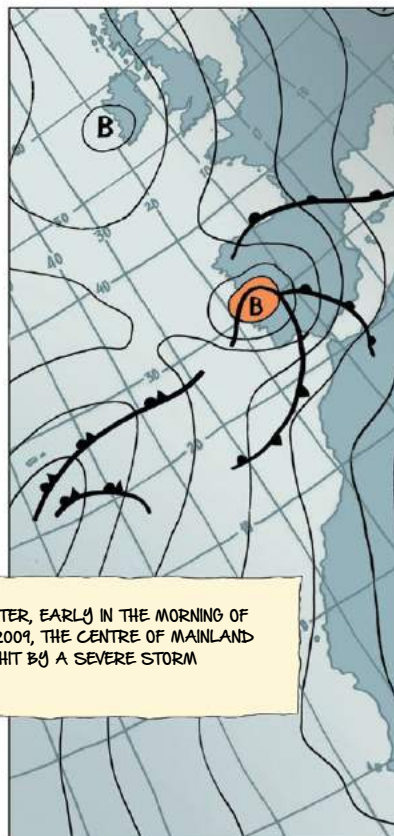
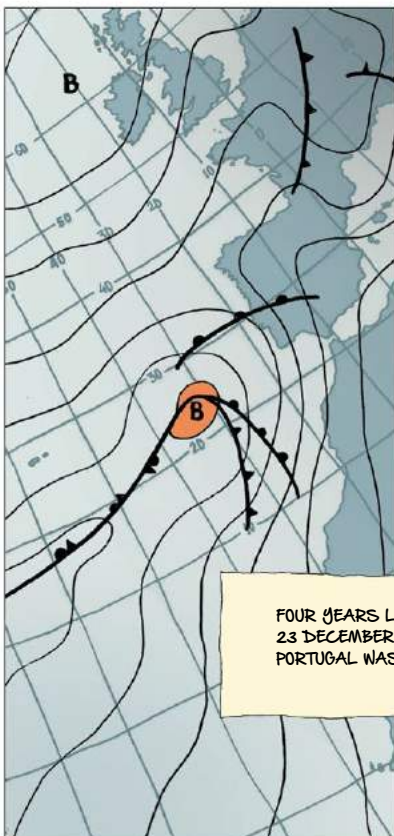




THE WATER SCARCITY ALSO CONTRIBUTED TO AN INCREASE OF FOREST FIRES



THIS DROUGHT WAS THE WORST OF THE LAST 60 YEARS. THE CONSEQUENT PORTUGAL ECONOMIC LOSS EXCEEDED 286 MILLION



FOUR YEARS LATER, EARLY IN THE MORNING OF 23 DECEMBER 2009, THE CENTRE OF MAINLAND PORTUGAL WAS HIT BY A SEVERE STORM

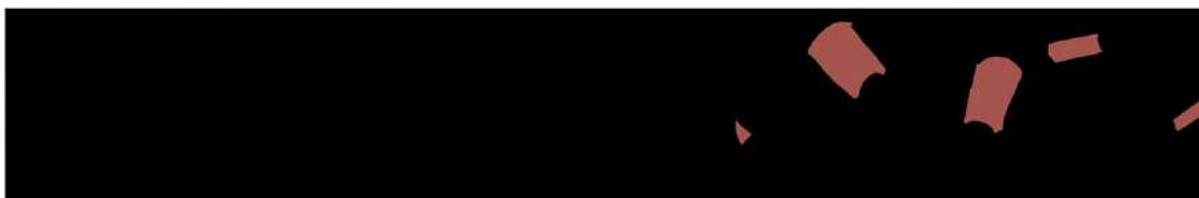




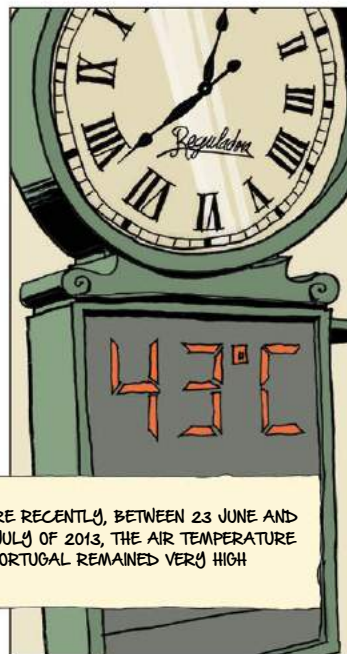
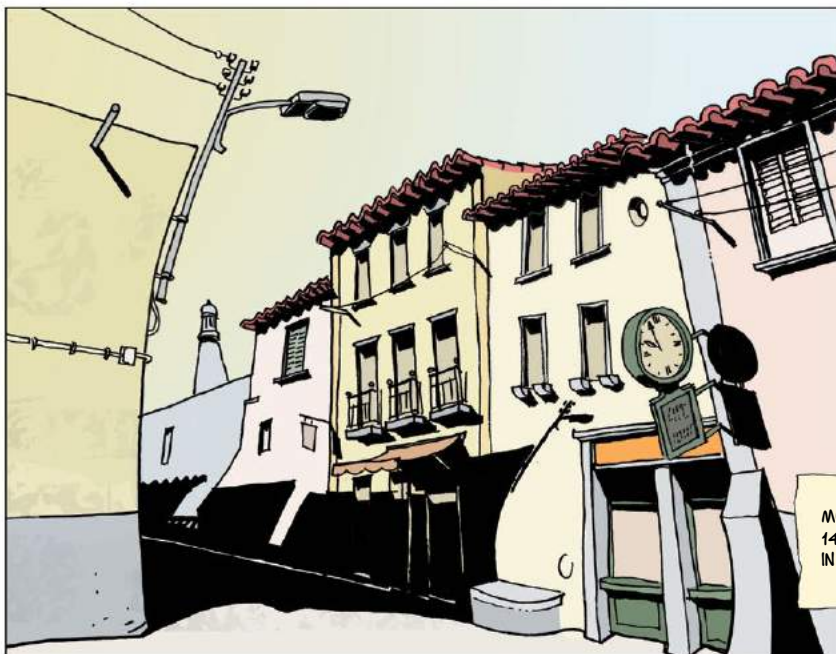
AGRICULTURAL GREENHOUSES WERE DESTROYED, BUILDINGS WERE DAMAGED, AND MANY FAMILIES LOST THEIR HOUSES...



A CAMPING SITE NEAR THE CITY OF TORRES VEDRAS WAS HEAVILY DAMAGED

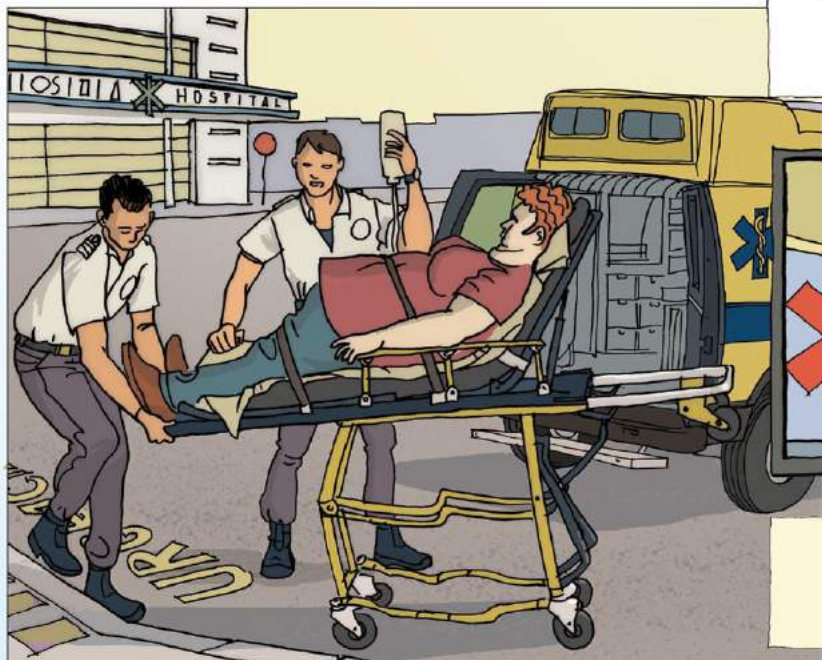


AND MORE THAN 40 000 PEOPLE SPENT CHRISTMAS EVE WITHOUT ELECTRICITY



MORE RECENTLY, BETWEEN 23 JUNE AND 14 JULY OF 2013, THE AIR TEMPERATURE IN PORTUGAL REMAINED VERY HIGH





THE EMERGENCY SERVICES ASSISTED MANY CASES OF DEHYDRATION, FAINTING, AND BREATHING PROBLEMS

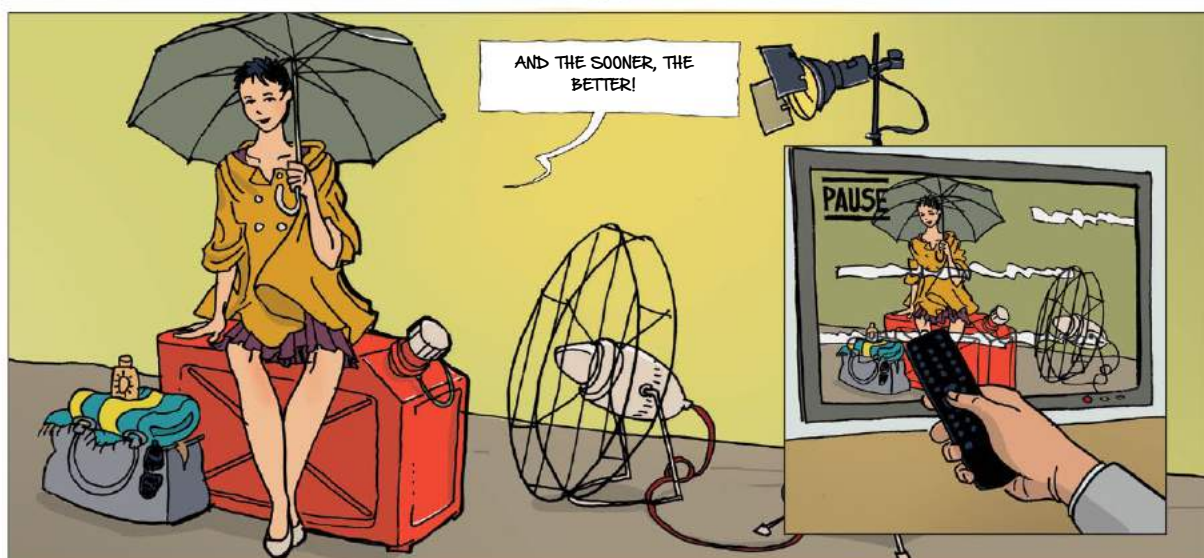
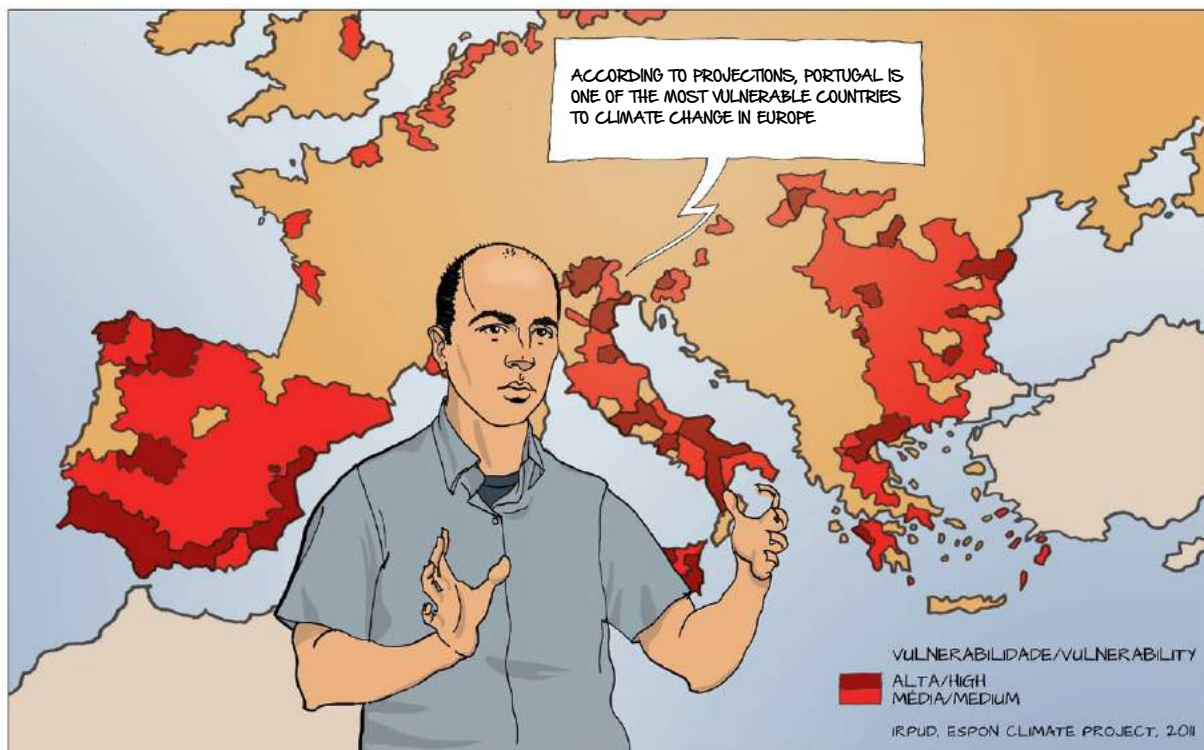


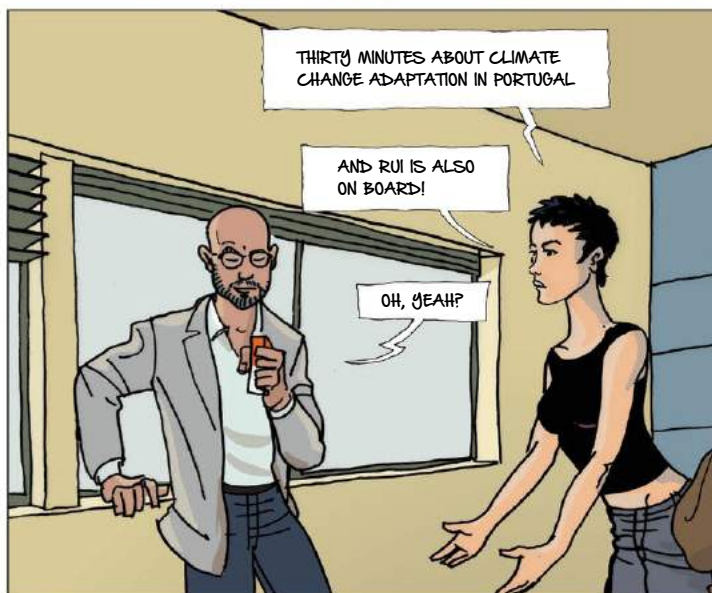
PART OF THESE REQUESTS RESULTED IN DEATHS: MORE THAN 1684 DIED IN PORTUGAL DURING THIS TIME OF THE YEAR THAN IS NORMALLY THE CASE



MOST OF THESE WERE OLD PEOPLE, WHO ARE CONSIDERED AT RISK DURING HEAT WAVES









WHAT DO YOU MEAN BY ADAPTATION?

WELL, IT IS EXPECTED THAT THESE  
EXTREME EVENTS WILL BECOME  
MORE FREQUENT WITH CLIMATE  
CHANGE. DROUGHTS, HEAT WAVES,  
BIG STORMS...

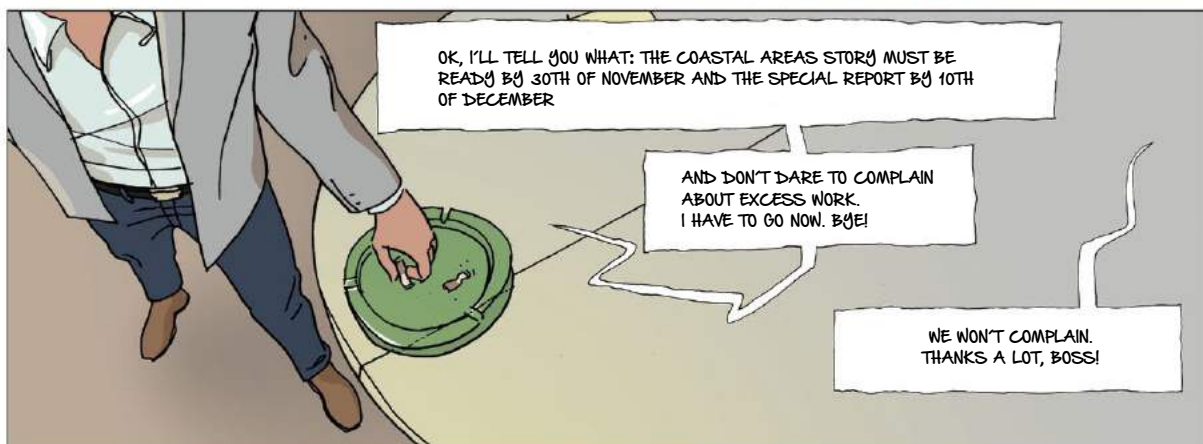
BUT WE CAN STILL  
DODGE THEM, RIGHT?

SURE! ALL WE NEED IS A  
GIANT METEOR OR A NASTY  
DISEASE THAT WILL WIPE  
US OFF THE PLANET AND  
WE CAN AVOID IT!

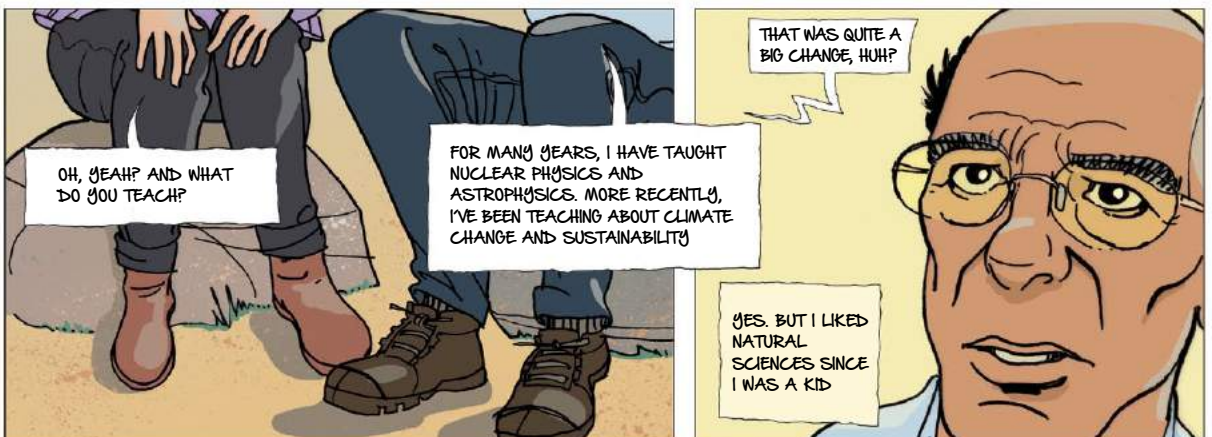
AH, AH, VERY FUNNY! WHAT IF WE REDUCE  
DRASTICALLY THE USE OF FOSSIL FUELS,  
INVEST A LOT IN RENEWABLE ENERGIES...

THEN, WE REDUCE THE  
EMISSIONS OF GASES SUCH AS  
CARBON DIOXIDE, AND AVOID  
THE WORST SCENARIOS. BUT  
THERE WILL STILL BE  
MANY CONSEQUENCES  
OF CLIMATE CHANGE





## 2 COAST LINE



WHEN I WAS 10, I DID SOME FIELD TRIPS IN THE LOURES AREA WITH A COUSIN OF MY MOTHER CALLED MATHILDE BENSAÛDE

YOU SEE IT HERE, ON THE GUIDE? CAN YOU TELL IT'S THIS ONE?

SHE STUDIED PLANT DISEASES IN POTATOES, ORANGES... AND ALSO LIKED WILD PLANTS, OF COURSE!

YES... IT'S SIMILAR

THIS WAS HOW MY INTEREST IN NATURE BEGAN

AND WHAT DO YOU SAY TO THE PEOPLE THAT THINK THAT CLIMATE CHANGE DOESN'T EXIST?

I DON'T SAY ANYTHING. PEOPLE ARE FREE TO BELIEVE IN WHATEVER THEY WANT

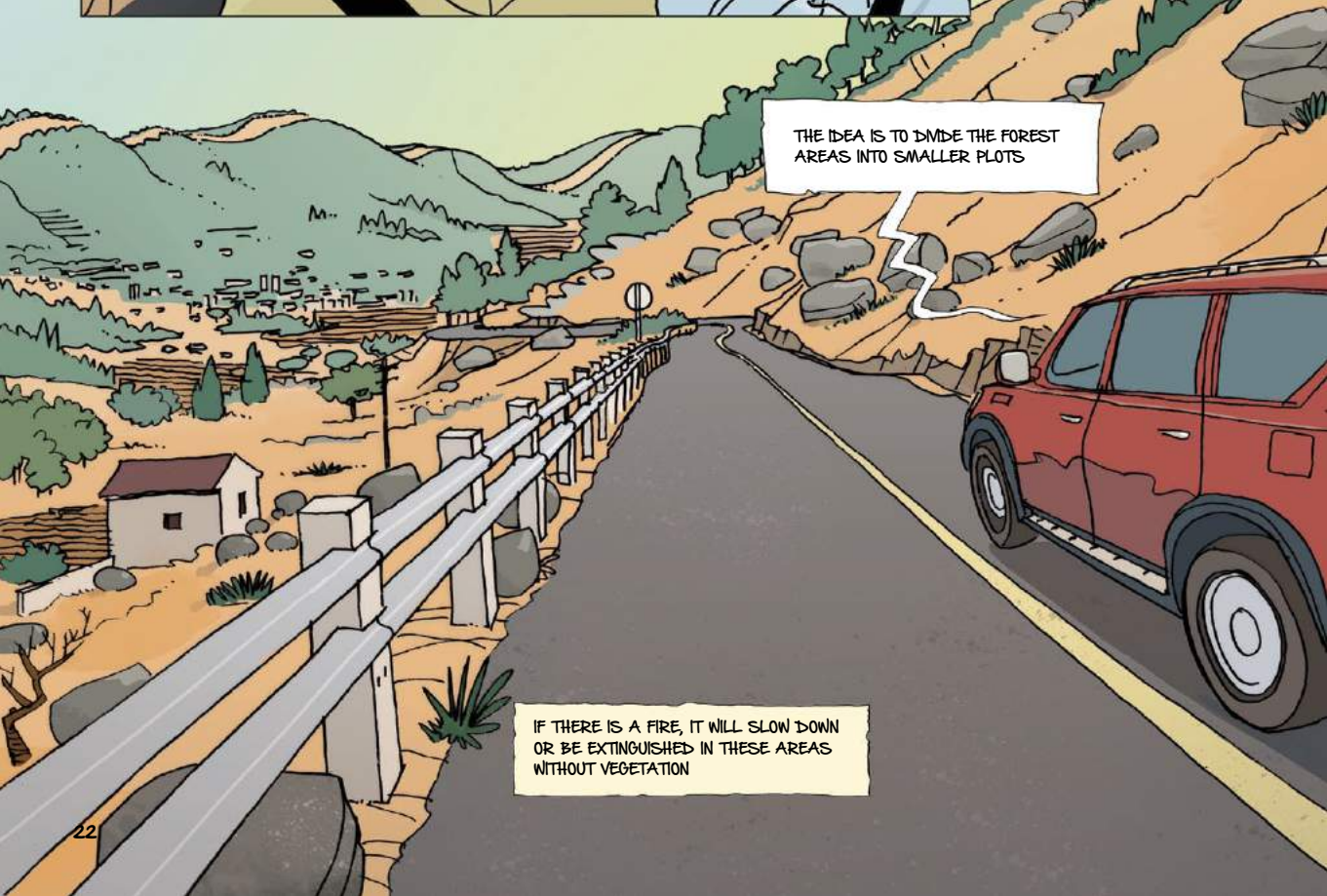
I'M NOT INTERESTED IN MAKING A CRUZADE

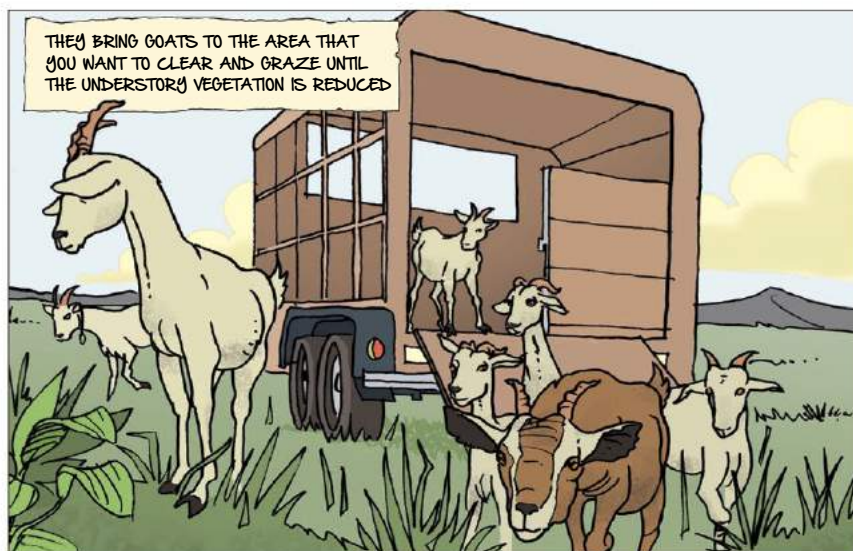
I THOUGHT THAT A SCIENTIST WOULD BE BOTHERED WITH THE SKEPTICS

BUT I ALWAYS TRY TO COMMUNICATE WHAT SCIENCE SAYS: THAT THE CLIMATE CHANGE WE ARE WITNESSING...

... IS CAUSED BY HUMAN ACTION

... AND I THINK THERE WILL ALWAYS BE SKEPTICS, NO MATTER WHAT





I'M READY!

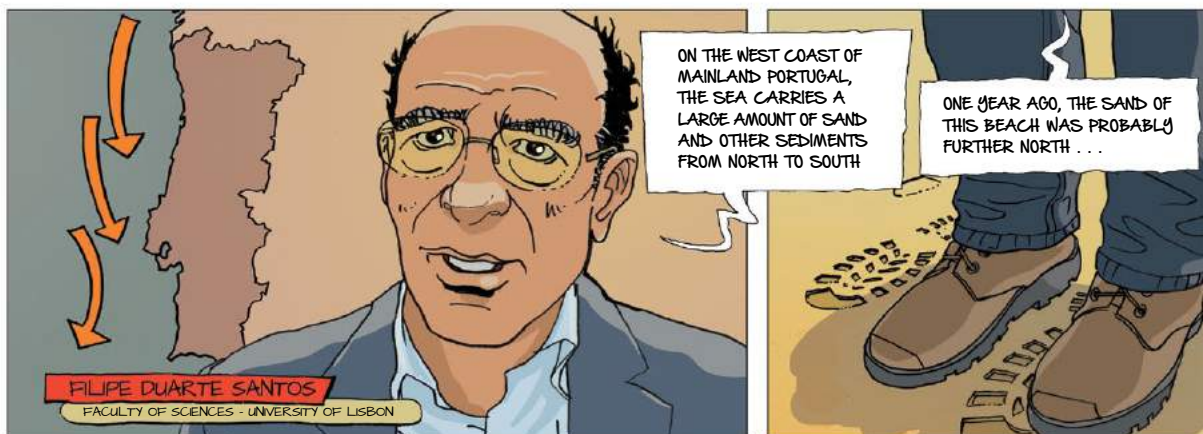
PROFESSOR, CAN YOU PLEASE TALK ABOUT THE COASTAL EROSION IN PORTUGAL? LIKE WE PLANNED?

YES. I HAVE A FEW NOTES. ARE YOU GOING TO ASK QUESTIONS?

YES, BUT JUST TO HELP YOU. WE WOULD LIKE YOU TO EXPLAIN IT IN A SIMPLE WAY, SO WE CAN ADD SOME IMAGES AFTERWARDS. CAN WE START?

YES... THE COASTAL AREA, THIS DIVISION BETWEEN LAND AND SEA, CHANGES ALONG TIME

AND ONE OF THE MAIN DRIVERS OF CHANGE IS THE EROSION CAUSED BY WAVES, TIDES, STORMS, RAIN, WIND...



ON THE WEST COAST OF MAINLAND PORTUGAL, THE SEA CARRIES A LARGE AMOUNT OF SAND AND OTHER SEDIMENTS FROM NORTH TO SOUTH

ONE YEAR AGO, THE SAND OF THIS BEACH WAS PROBABLY FURTHER NORTH...

FILIPE DUARTE SANTOS

FACULTY OF SCIENCES - UNIVERSITY OF LISBON

AND CAN YOU EXPLAIN THAT THING ABOUT THE SHORTAGE OF SAND ON THE BEACHES?

YES...

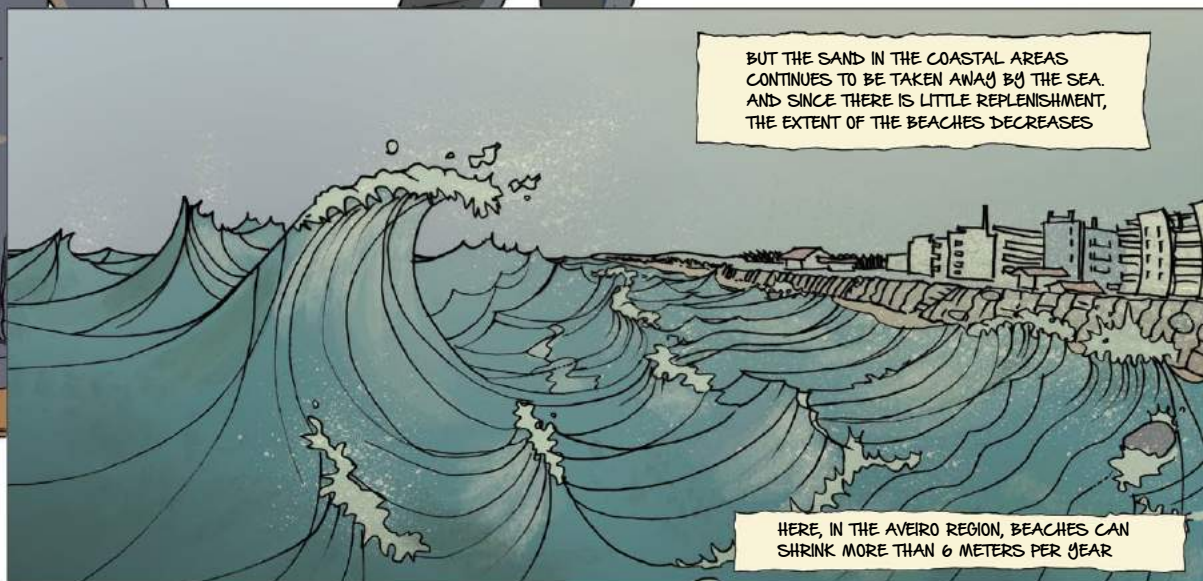
RIVERS USED TO CARRY A LOT OF SEDIMENT TO THE SEA. THIS USED TO REPLENISH THE PROTECTIVE SAND ON THE BEACHES



AFTER THE CONSTRUCTION OF DAMS AND THE INCREASE IN THE SAND EXTRACTION UP-RIVER, THE AMOUNT OF SAND FROM THE RIVERS DECREASED



BUT THE SAND IN THE COASTAL AREAS CONTINUES TO BE TAKEN AWAY BY THE SEA. AND SINCE THERE IS LITTLE REPLENISHMENT, THE EXTENT OF THE BEACHES DECREASES



HERE, IN THE AVEIRO REGION, BEACHES CAN SHRINK MORE THAN 6 METERS PER YEAR

TO DEAL WITH THIS PROBLEM, WE CAN ARTIFICIALLY REPLENISH THE BEACHES WITH SAND. SOME SAY THAT THIS IS LIKE THROWING MONEY TO THE SEA



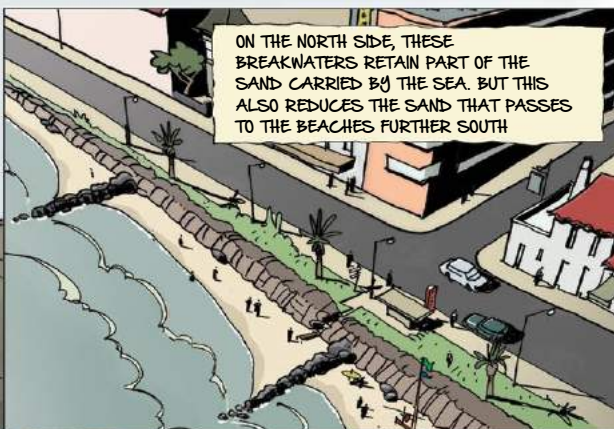
I THINK IT'S MORE LIKE DRINKING WATER TO COMPENSATE FOR THE LOSS OF LIQUIDS IN OUR BODY



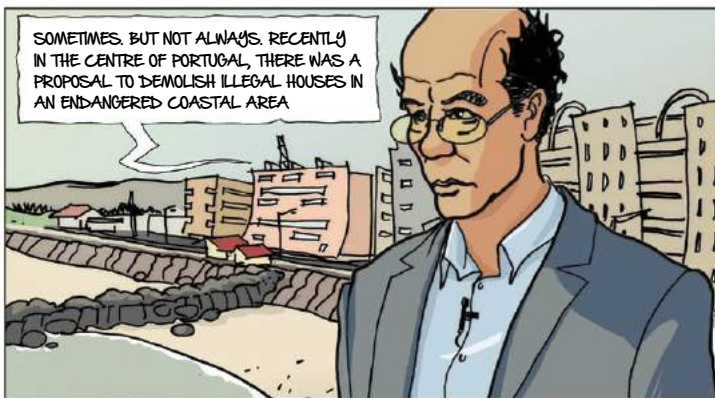
WE CAN ALSO PLACE ROCKS ALONG THE SHORE AND BUILD BREAKWATERS



ON THE NORTH SIDE, THESE BREAKWATERS RETAIN PART OF THE SAND CARRIED BY THE SEA. BUT THIS ALSO REDUCES THE SAND THAT PASSES TO THE BEACHES FURTHER SOUTH



CLIMATE CHANGE ENHANCE THESE PROBLEMS. SO, IN SOME CASES, WE SHOULD DO A STRATEGIC RETREAT INLAND



TO LEARN MORE ABOUT THE SEA LEVEL RISE, WE WENT TO VISIT THE TIDE GAUGE IN CASCAIS (ABOUT 30 KM FROM LISBON)

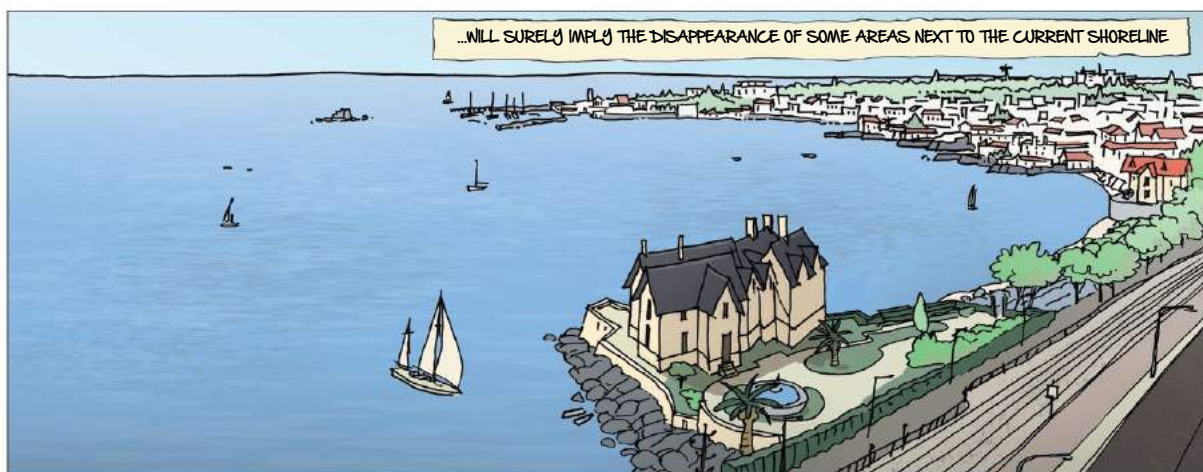
THIS IS ONE OF THE OLDEST TIDE GAUGES IN THE WORLD. IT HAS COLLECTED DATA CONTINUALLY SINCE 1882 UNTIL THE PRESENT DAY

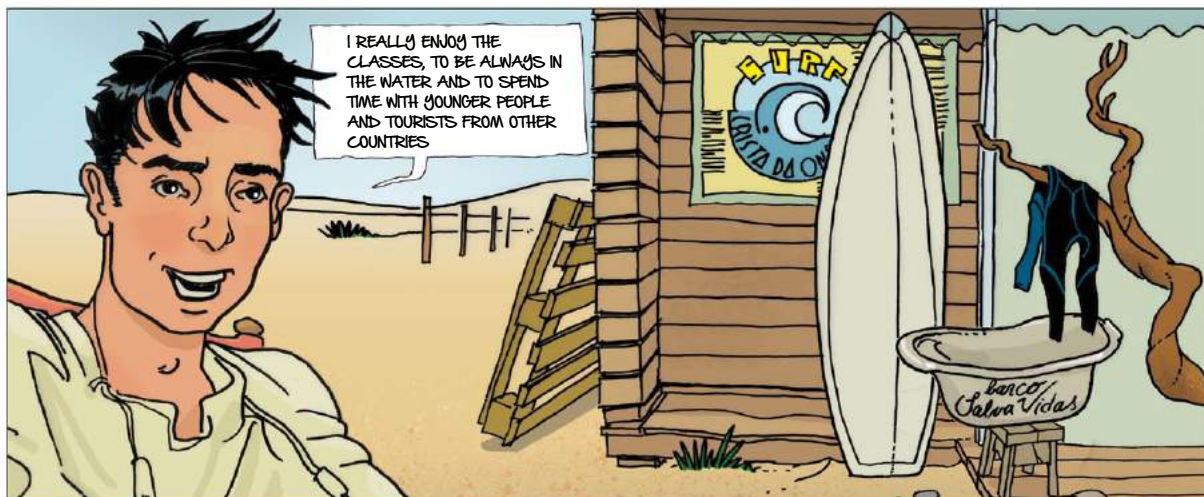
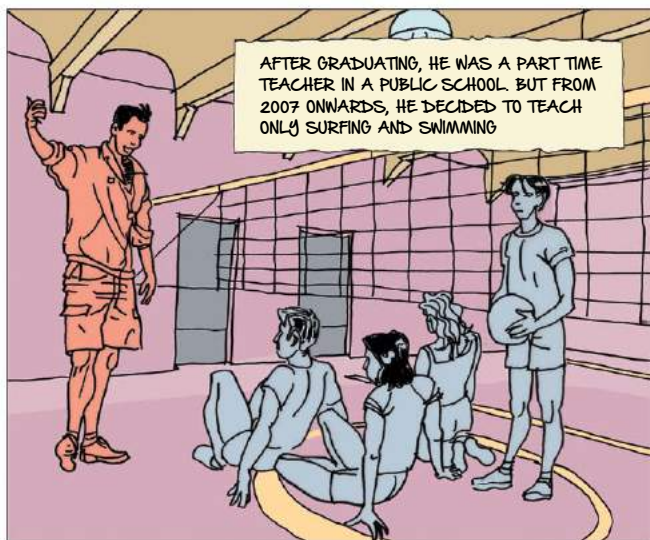
YOU SEE THAT BUOY, WHICH IS FLOATING DOWN THERE? THE IDEA WAS TO CALCULATE THE MIDDLE POINT BETWEEN LOW AND HIGH TIDE, TO USE IT AS THE ALTITUDE ZERO OF THE MAPS...

BUT IT HAS ALSO BEEN USED TO STUDY THE VARIATION OF THE SEA LEVEL, RIGHT?

YES. AND BY ANALYZING THE INFORMATION COLLECTED HERE, IT IS KNOWN THAT THE SEA LEVEL HAS RISEN ABOUT 20 CENTIMETERS SINCE 1882







BRUNO RENTED A WOODHOUSE  
NEAR TO A BREAKWATER, ABOUT  
50 METERS FROM THE BEACH

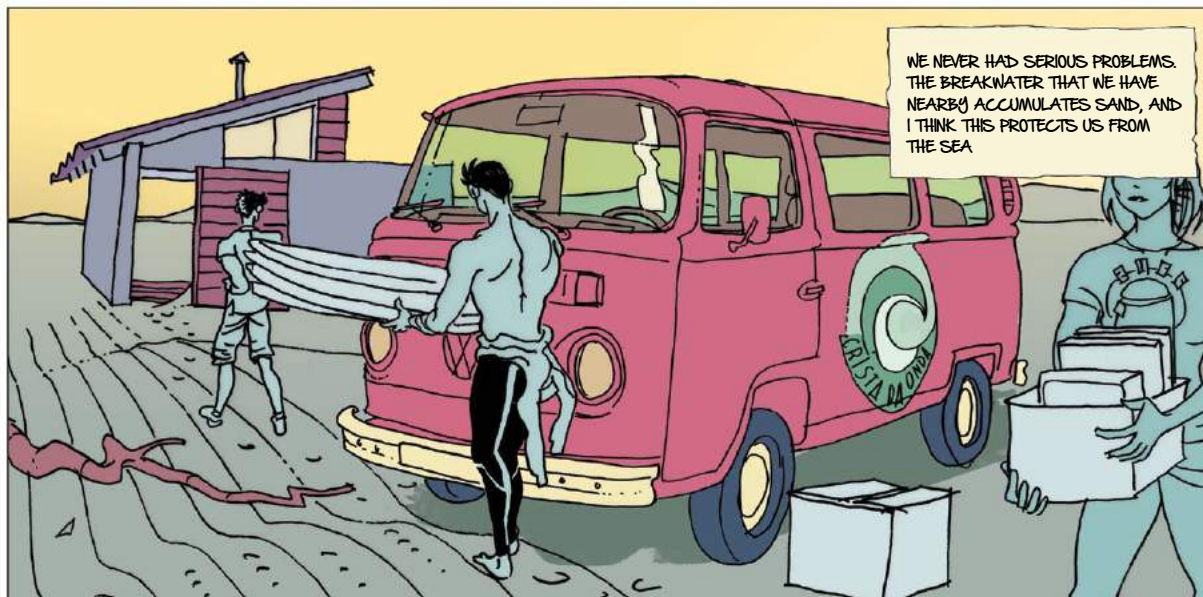
THIS HOUSE AND THE SURROUNDING  
AREA ARE OUR HEADQUARTERS:  
SCHOOL, OFFICE, WAREHOUSE, LOCKER  
ROOM, RESTAURANT... IT'S THE BASE  
OF OUR ACTIVITIES

ALMOST EVERY YEAR,  
THEY PUT SAND ON THE  
BEACHES AND DUNES

BUT THE SEA  
ALWAYS TAKES A  
LOT OF IT AWAY

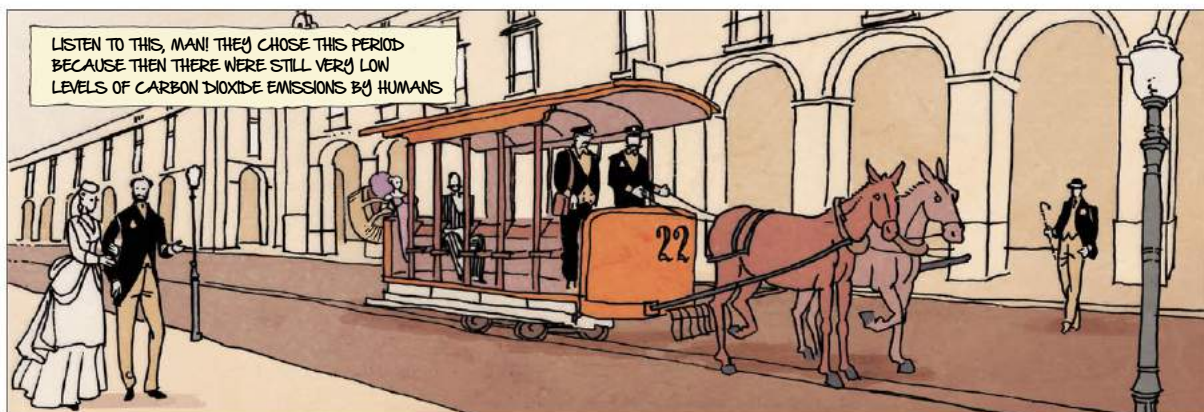
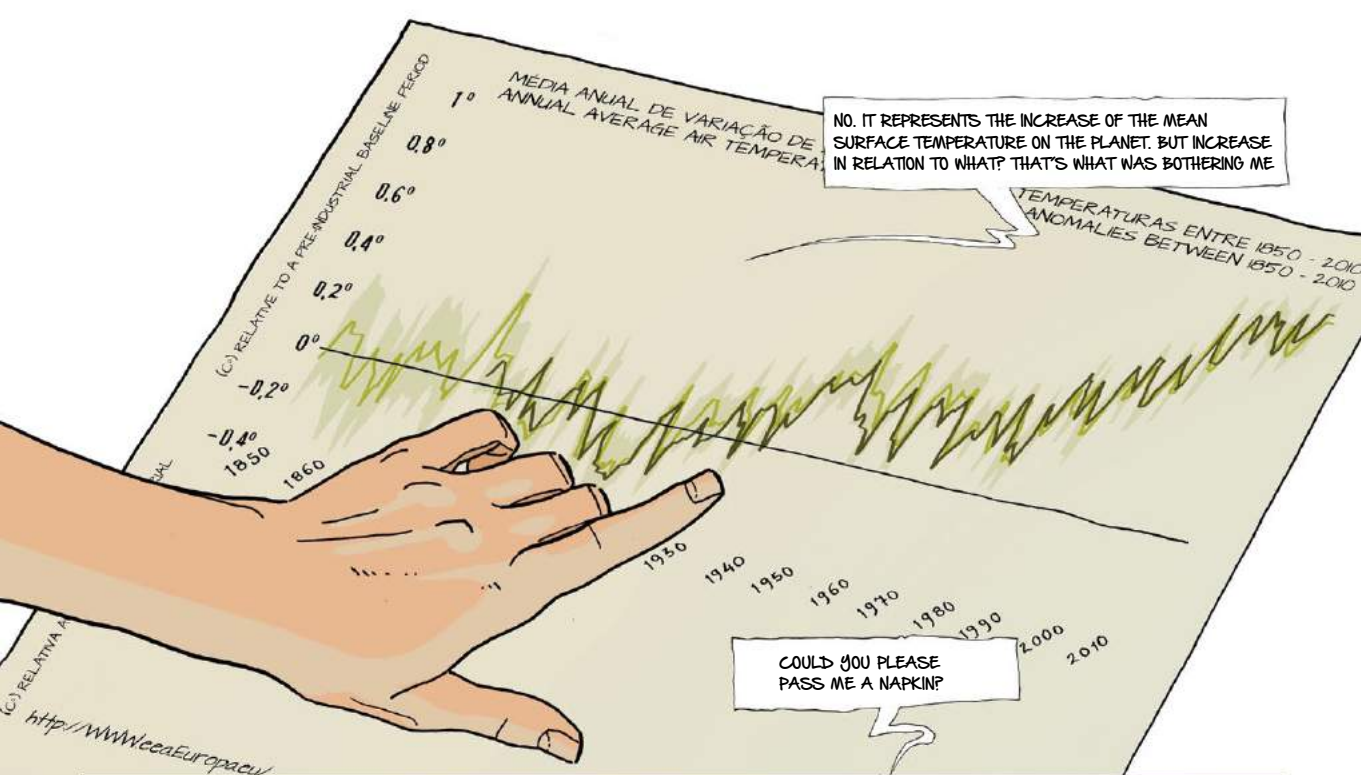
WE HAD SOME ROUGH WINTERS  
BECAUSE OF THE STORMS

THERE WERE TWO OR THREE TIMES IN WHICH WE TOOK  
ALL THE STUFF OUT OF HERE. AND WE ALSO DID NOT  
WAIT AROUND TO SEE WHAT HAPPENED...



### 3 THE STORM

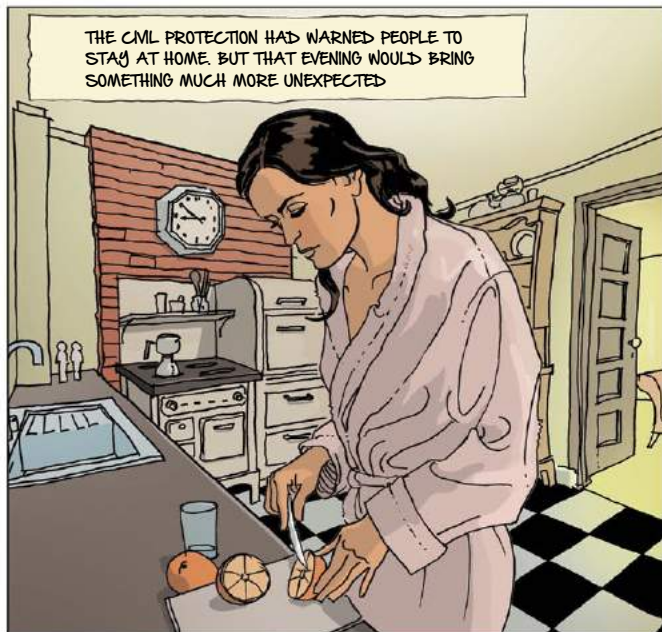








CARLA MADRUGA IS A JOURNALIST WHO IS CURRENTLY BASED IN LISBON. BUT WHEN THE STORM HIT THE CENTRE OF PORTUGAL IN 2009, SHE RAN A BOOKSTORE IN THE CITY OF TORRES VEDRAS



THE CIVIL PROTECTION HAD WARNED PEOPLE TO STAY AT HOME. BUT THAT EVENING WOULD BRING SOMETHING MUCH MORE UNEXPECTED



THE STRONG WIND SHOOK EVERYTHING AND I WAS SCARED



I DECIDED TO SLEEP IN THE CORRIDOR, FAR AWAY FROM THE WINDOWS

NEXT MORNING, I REALIZED THAT  
A COUPLE OF VASES HAD BEEN  
BLOWN AWAY FROM MY BALCONY



AND THE SITUATION ON THE  
STREET WAS QUITE STRANGE



DECEMBER 23 IS ONE OF THE BUSIEST  
DAYS OF THE YEAR. BUT THE  
ELECTRICITY WAS ALWAYS FAILING...





ONE OF MY COLLEAGUES, FROM A TOWN NEARBY, DID NOT HAVE ACCESS TO WATER AND ELECTRICITY FOR SEVERAL DAYS



ON THE 24TH OF DECEMBER, THINGS GOT BACK TO NORMAL AND A LOT OF PEOPLE WENT TO BUY WHAT THEY WERE UNABLE TO PURCHASE THE DAY BEFORE



PEOPLE HAD TO BUY THEIR STUFF VERY FAST. THE MALL CLOSED AT 7 PM AND THERE WAS A CHRISTMAS EVE TO PREPARE



THE STORM ALSO BROUGHT A LOT OF DAMAGE TO THE AGRICULTURE OF THIS AREA



HELLO, THERE DID YOU GET HERE EASILY?

MORE OR LESS. THE CAR BROKE DOWN ALONG THE WAY



FORTUNATELY, THIS HANDSMAN MANAGED TO FIX IT!

YES, BUT THE WAY YOU STARTED THE CAR WAS ALSO VERY IMPORTANT!



DO YOU WANT TO DO THE INTERVIEW IN THE GREENHOUSES?

YES, WE CAN DO THAT!

JOÃO PALMA, 46 YEARS OLD, IS A FARMER IN THE REGION OF TORRES VEDRAS AND HIS GREENHOUSES WERE SERIOUSLY DAMAGED



HE SAYS THAT HE ALWAYS LIKED TO HELP HIS FAMILY IN FARMING



AFTER FINISHING HIGH SCHOOL, HE CREATED A COMPANY AND BEGAN TO FARM ON THE LAND OF HIS PARENTS

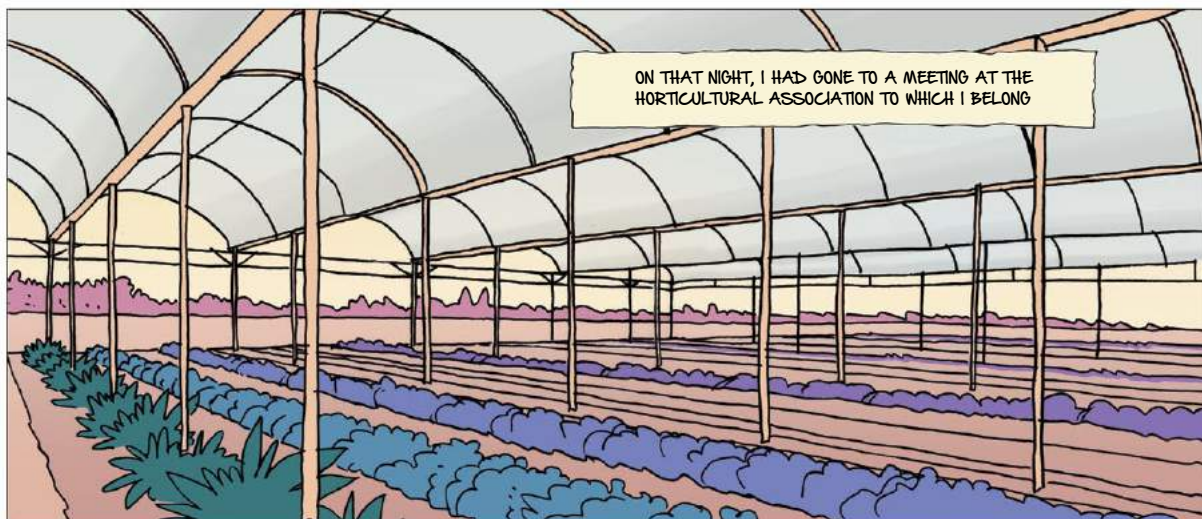
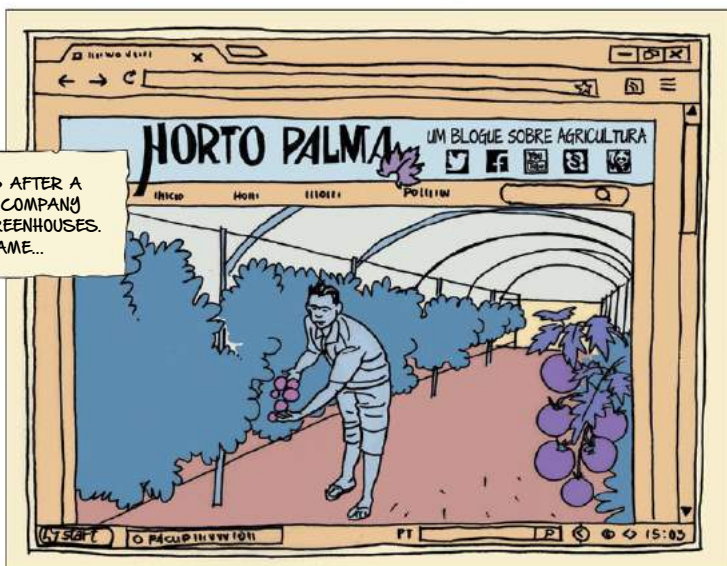


SINCE MY SALES WERE INCREASING, I DECIDED TO BUY LAND AND EQUIPMENT. I BORROWED MONEY FROM BANKS AND FROM MY FAMILY, I APPLIED FOR FUNDING IN PORTUGAL AND ABROAD...

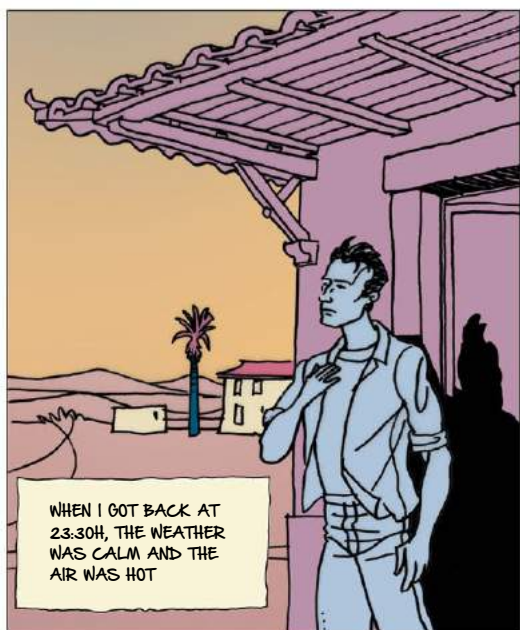


YES, JUST A MINUTE. I'M UPLOADING SOME PHOTOS ON THE WEBSITE

IN SEPTEMBER 2009, AND AFTER A MAJOR INVESTMENT, THE COMPANY HAD 10 HECTARES OF GREENHOUSES. AND THEN THE STORM CAME...



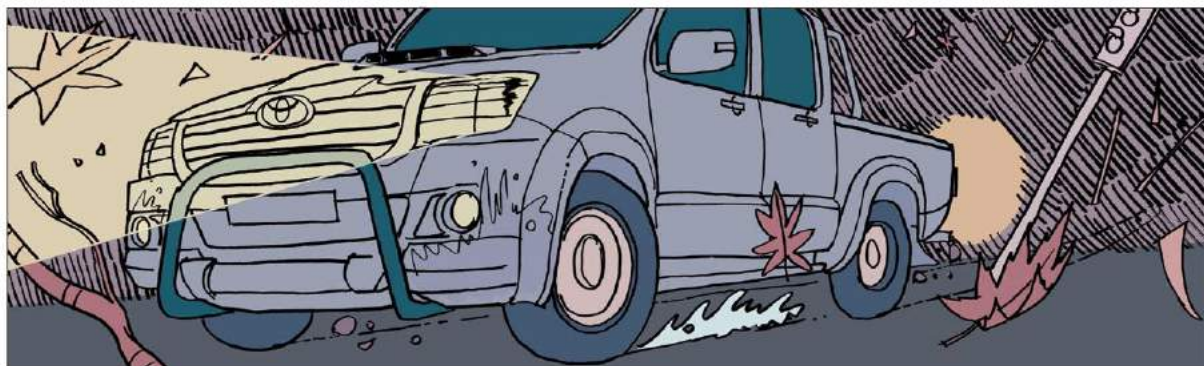
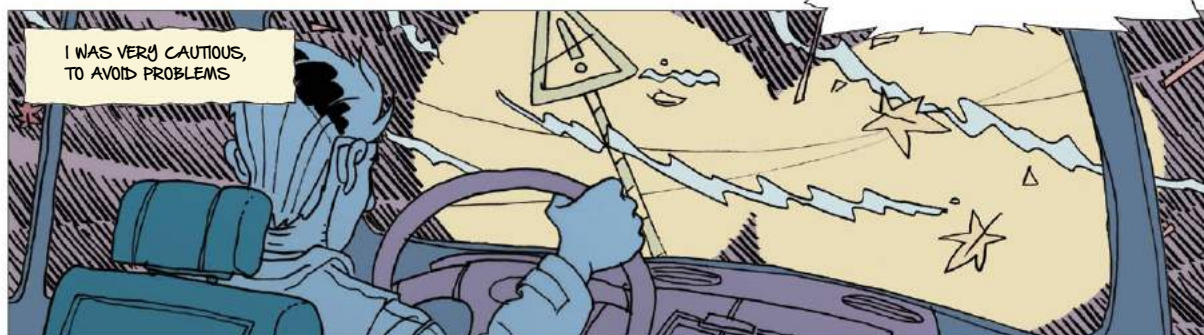
ON THAT NIGHT, I HAD GONE TO A MEETING AT THE HORTICULTURAL ASSOCIATION TO WHICH I BELONG



WHEN I GOT BACK AT 23:30H, THE WEATHER WAS CALM AND THE AIR WAS HOT



AROUND 3:30 AM, I WOKE UP WITH THE SOUND OF GALES. AND THEN I KEPT THINKING ABOUT THE GREENHOUSES





MADALENA? YES, I'M HERE...  
I TOOK A WHILE BECAUSE IT'S  
ALL A MESS. NO, THERE IS  
NOTHING I CAN DO...

SIGH

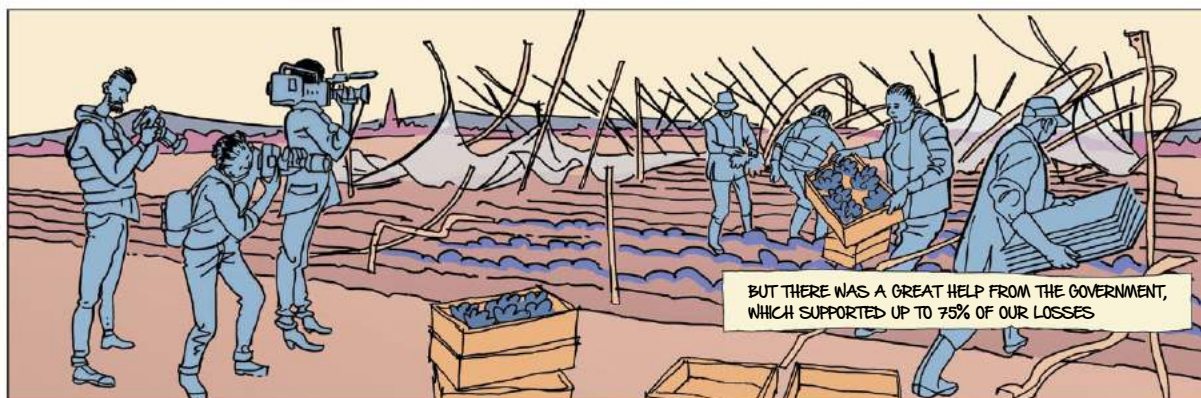


I THOUGHT THAT THIS WAS THE END. THAT THE COMPANY WOULD CLOSE  
DOWN. BUT WHAT JOB COULD I GET, IF I STOPPED BEING A FARMER?

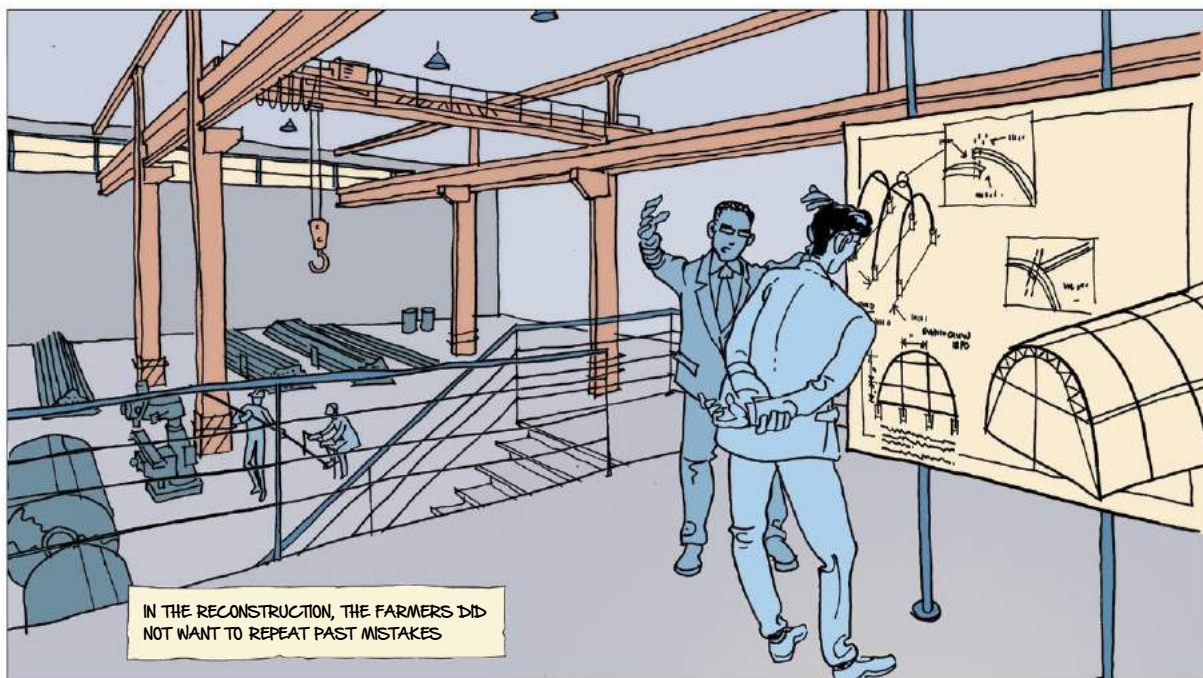


DID YOU HAVE INSURANCE?

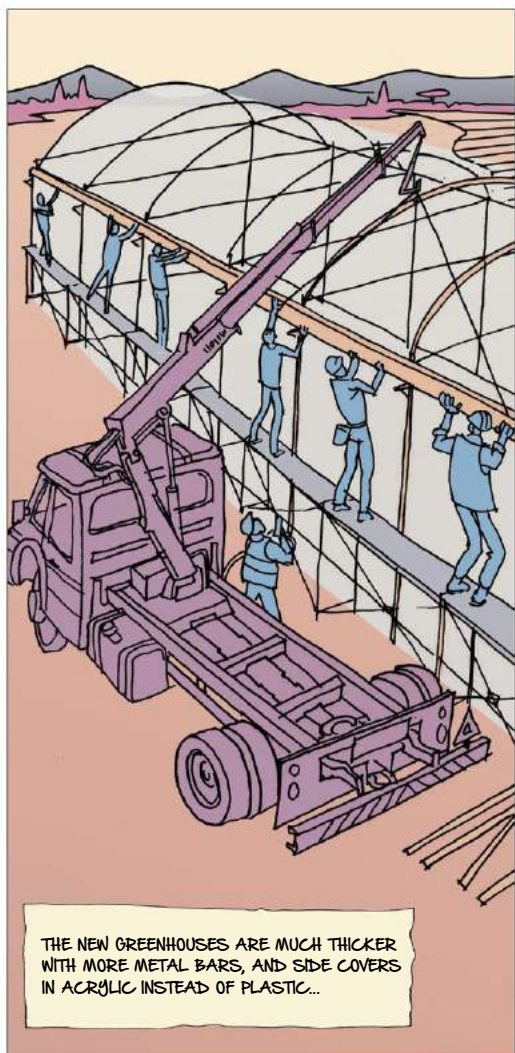
NO. AT THAT TIME, THE INSURANCE  
COMPANIES DID NOT COVER GREENHOUSES.  
NOBODY HAD INSURANCE



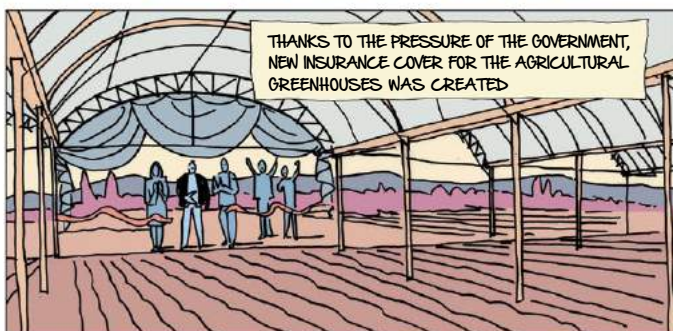
BUT THERE WAS A GREAT HELP FROM THE GOVERNMENT,  
WHICH SUPPORTED UP TO 75% OF OUR LOSSES



IN THE RECONSTRUCTION, THE FARMERS DID NOT WANT TO REPEAT PAST MISTAKES



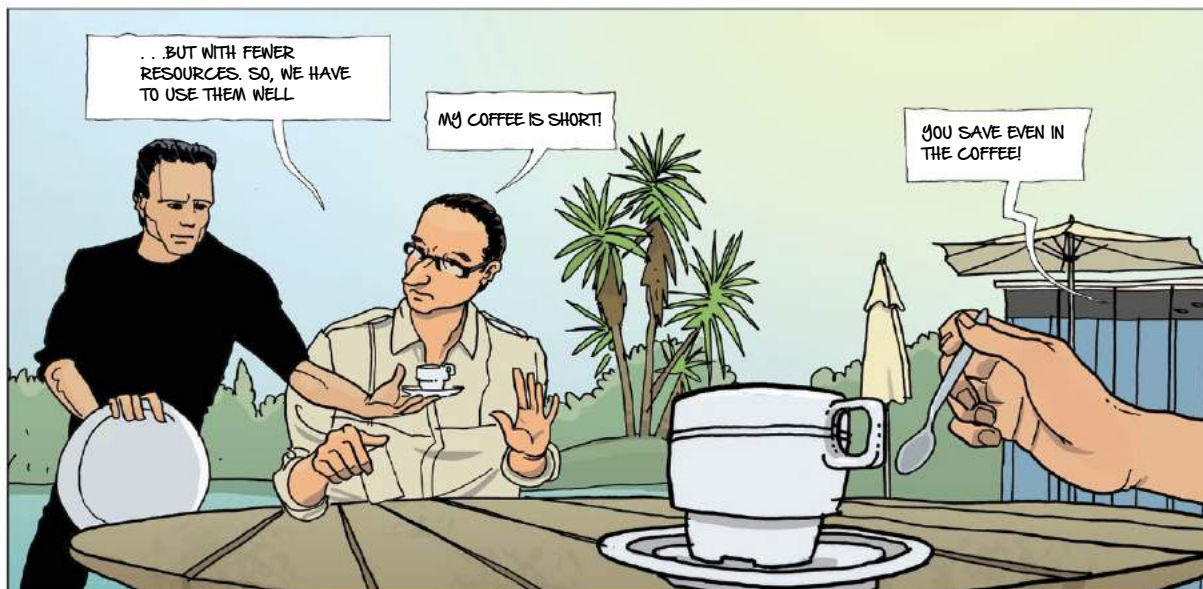
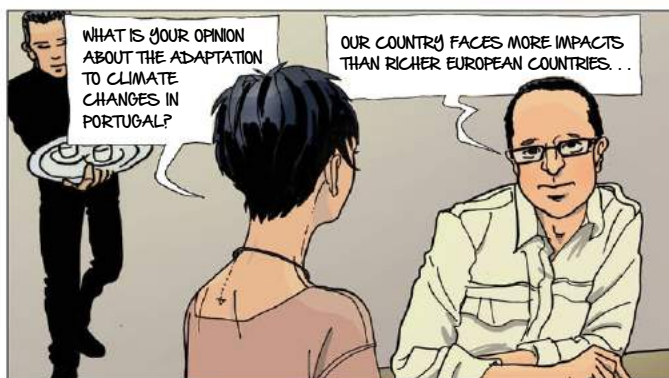
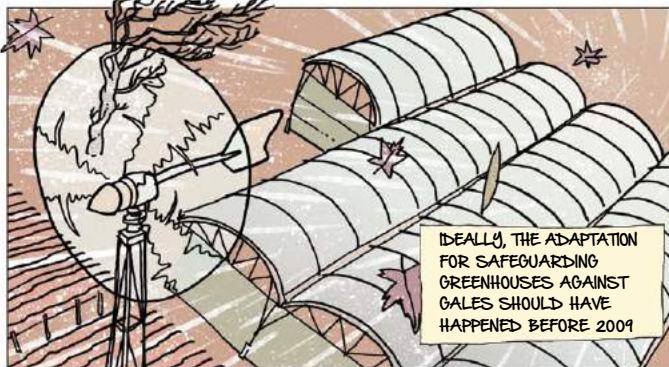
THE NEW GREENHOUSES ARE MUCH THICKER WITH MORE METAL BARS, AND SIDE COVERS IN ACRYLIC INSTEAD OF PLASTIC...

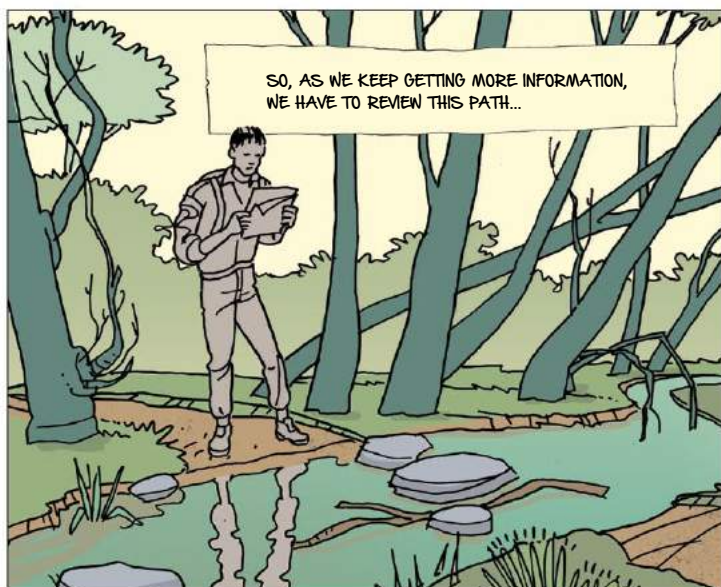
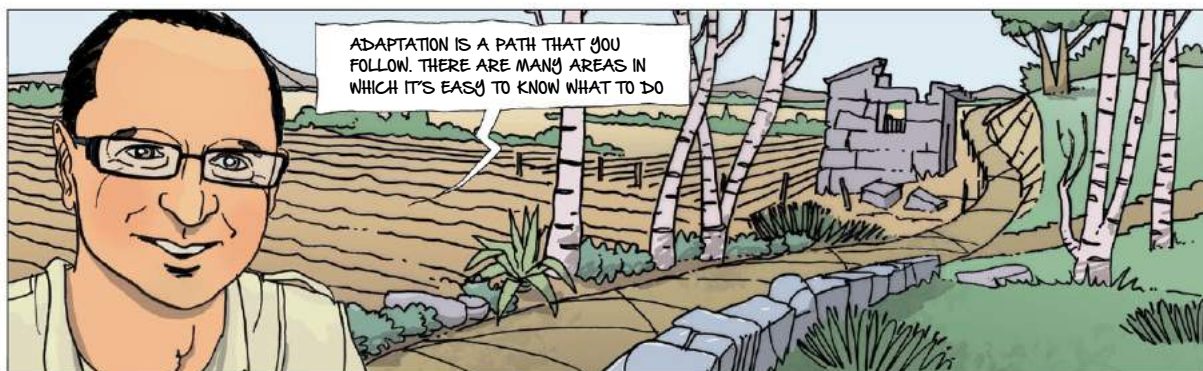


THANKS TO THE PRESSURE OF THE GOVERNMENT, NEW INSURANCE COVER FOR THE AGRICULTURAL GREENHOUSES WAS CREATED



SO I BEGAN TO SLEEP MUCH BETTER ON WINDY NIGHTS





## 4 ADAPTATION

WE WENT TO VISIT SOME EXAMPLES OF ADAPTATION IN PORTUGAL. FIRST, THE "NATURA TOWERS" IN LISBON

PATRÍCIA GUIMARÃES, ARCHITECT, EXPLAINS THE MAIN FEATURES OF THESE TWO BUILDINGS

THE FRONT HAS SOLAR PANELS, WHICH PRODUCE ELECTRIC ENERGY. AND THIS WALL HAS PLANTS, WHICH INCREASES THERMAL AND ACOUSTIC ISOLATION

SHALL WE CLIMB UP THERE USING THE PLANTS OR DO YOU PREFER THE ELEVATOR?

THE BEST IS TO FLY, REALLY!

THIS IS A VERY GREEN RECEPTION AREA

YES... IT'S GOOD TO SEE THIS EVERY MORNING, WHEN I GET TO WORK



AFTER THIS, WE VISITED A DUNE NEAR CASCAIS. JOÃO DINIS, A TECHNICIAN OF THIS MUNICIPALITY, IS OUR GUIDE

THIS IS ALMOST AT MY DOORSTEP!



YOU LIVE NEARBY?

YES. MY FAMILY HAVE LIVED AROUND HERE FOR FIVE GENERATIONS. THIS IS ACTUALLY WHY THEY DECIDED TO RECOVER THIS DUNE. NO, IT WASN'T. I'M JUST KIDDING. . .



BUT ANYWAY IT SHOULD BE GOOD FOR FAMILY VISITS

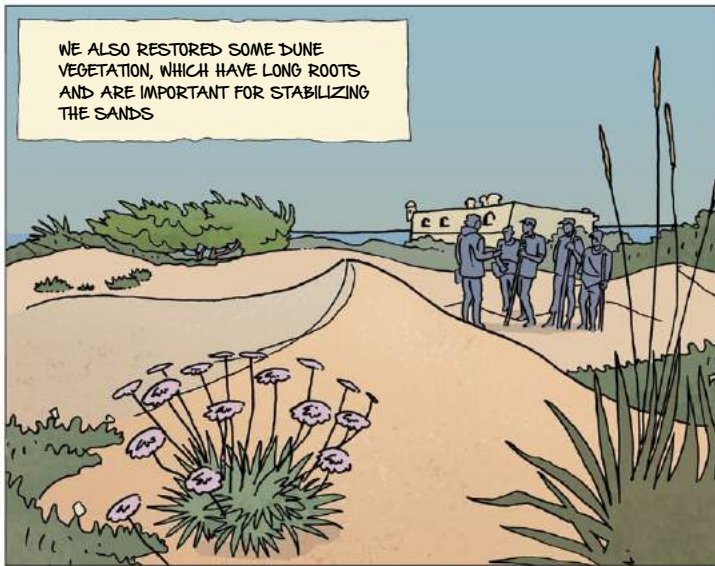
YES, AND IT'S GOOD FOR TOURISM. AND THAT IS ONE OF THE MAIN ACTIVITIES OF THIS REGION



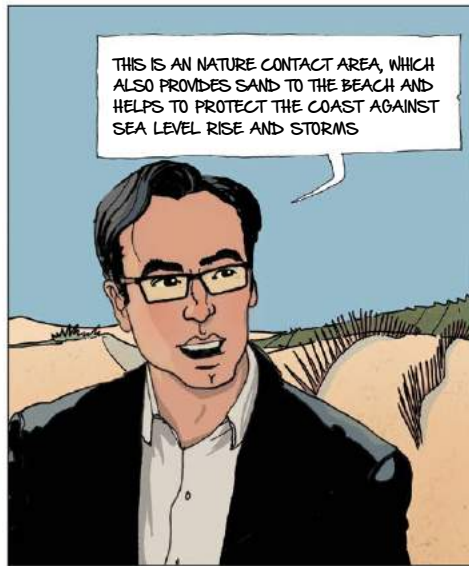
DO YOU SEE THOSE ROWS OF RATTAN? THEY WERE PLACED THERE TO REDUCE THE AMOUNT OF SAND CARRIED AWAY BY THE WIND



WE ALSO RESTORED SOME DUNE VEGETATION, WHICH HAVE LONG ROOTS AND ARE IMPORTANT FOR STABILIZING THE SANDS



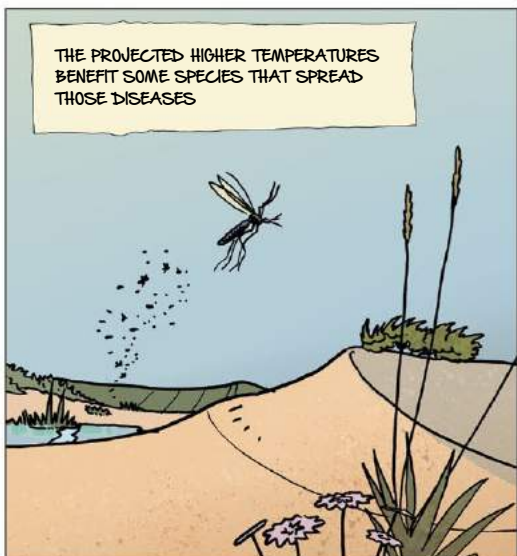
THIS IS AN NATURE CONTACT AREA, WHICH ALSO PROVIDES SAND TO THE BEACH AND HELPS TO PROTECT THE COAST AGAINST SEA LEVEL RISE AND STORMS



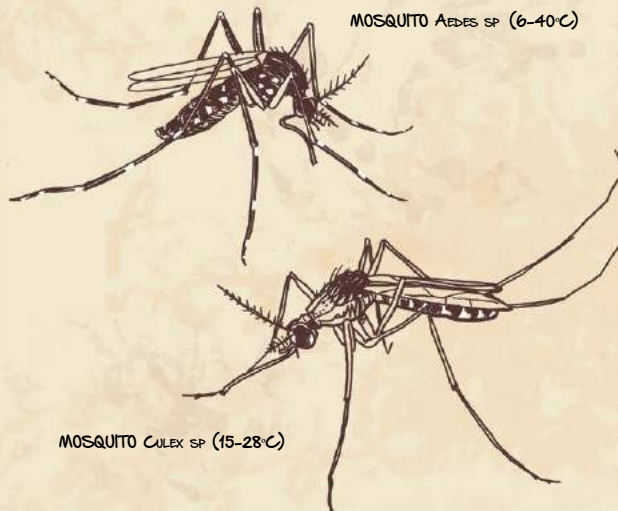
ANOTHER EFFECT OF CLIMATE CHANGE IS THE INCREASE OF TROPICAL DISEASES



THE PROTECTED HIGHER TEMPERATURES BENEFIT SOME SPECIES THAT SPREAD THOSE DISEASES

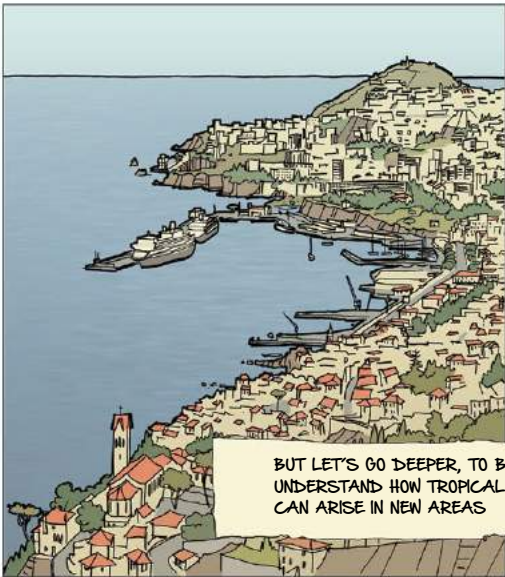


MOSQUITO Aedes SP (6-40°C)

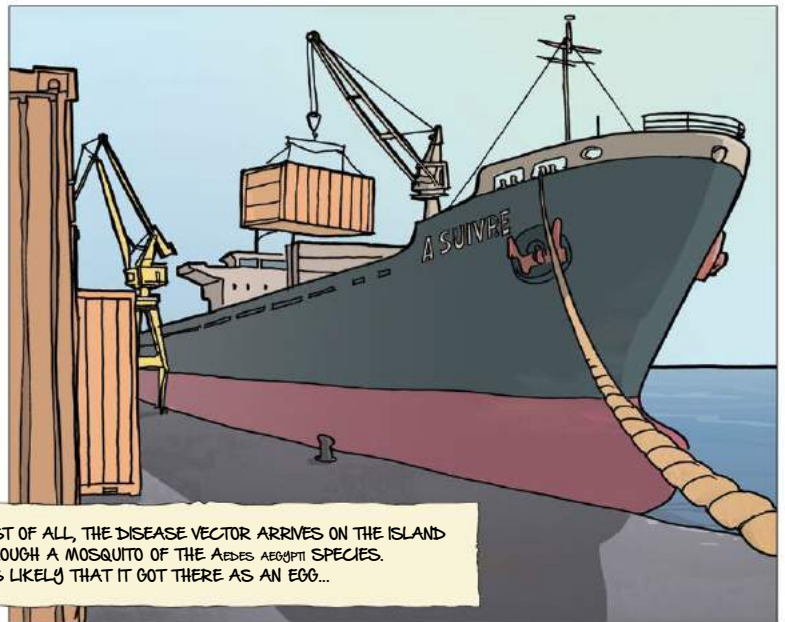


MOSQUITO Culex SP (15-28°C)

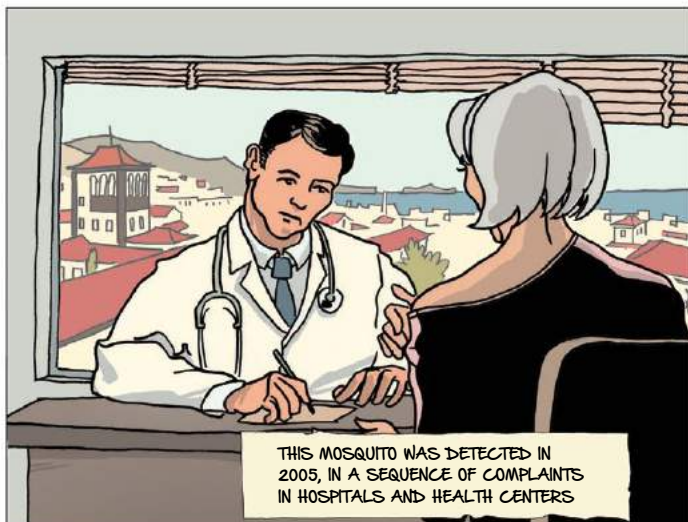
IN MADEIRA ISLAND, THERE WAS AN OUTBREAK OF DENGUE FEVER IN 2012. THIS CAN BE EXPLAINED BY INCREASED TRAFFIC OF PEOPLE AND CARGO, RATHER THAN BY CLIMATE CHANGE



BUT LET'S GO DEEPER, TO BETTER UNDERSTAND HOW TROPICAL DISEASES CAN ARISE IN NEW AREAS



FIRST OF ALL, THE DISEASE VECTOR ARRIVES ON THE ISLAND THROUGH A MOSQUITO OF THE *Aedes Aegypti* SPECIES. IT IS LIKELY THAT IT GOT THERE AS AN EGG...



THIS MOSQUITO WAS DETECTED IN 2005, IN A SEQUENCE OF COMPLAINTS IN HOSPITALS AND HEALTH CENTERS



THE FIRST ACTION AGAINST THE MOSQUITO BEGAN ONLY IN 2007. UNFORTUNATELY, THIS VARIETY IS PARTIALLY RESISTANT TO INSECTICIDES



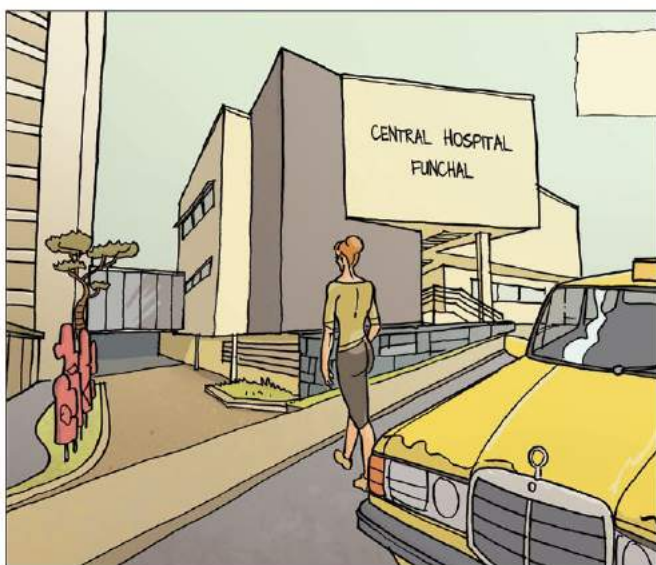
THE DISEASE ARRIVED AFTERWARDS. THE DENGUE VIRUS WAS PROBABLY BROUGHT BY A TOURIST FROM SOUTH AMERICA



THIS TOURIST WAS BITTEN BY THE MOSQUITO Aedes Aegypti, WHICH PASSED THE DISEASE ONTO OTHER PEOPLE



IN TOTAL, UNTIL MARCH 2013, THERE WERE 2168 CASES OF THIS DISEASE IN MADEIRA



THERE WERE NO SERIOUS CASES OR DEATHS AND THE TOURISM RECOVERED RAPIDLY



SINCE THEN, THERE WERE NO MORE CASES. BUT THE LOCAL AUTHORITIES ARE STILL ALERT

# 5 FLOODS

HELLO, PEDRO. HI, JOÃO.  
SO, CAN WE HAVE THAT  
TALK NOW?

AH, YES. YOU  
HAVE 3 MINUTES!

WOW! YOU ARE VERY  
GENEROUS TODAY. IT'S  
ABOUT THE SPECIAL  
REPORT: IT'S GOING WELL,  
BUT I NEED MORE TIME

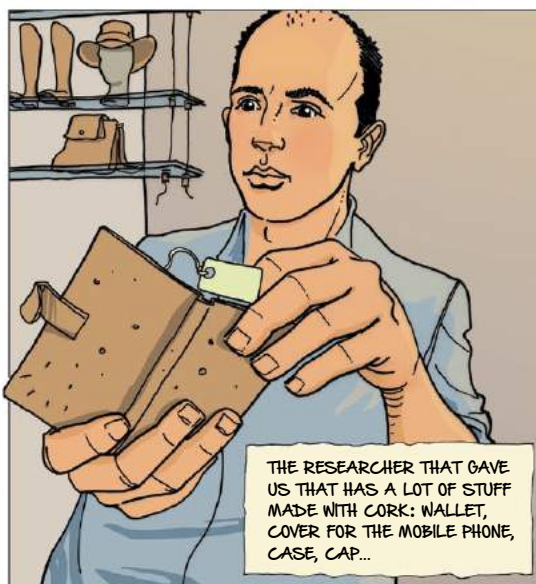
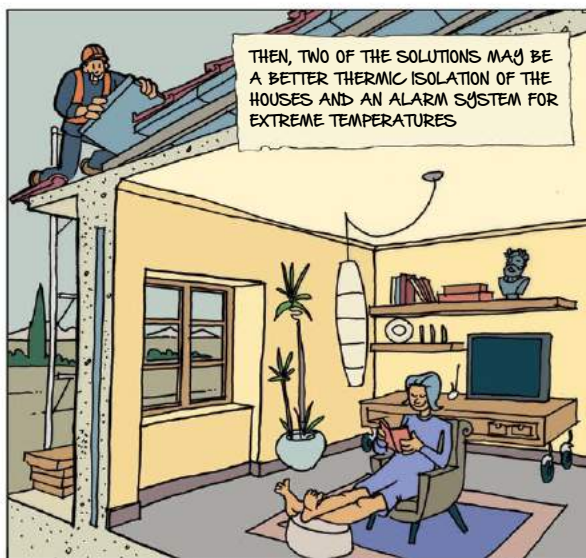
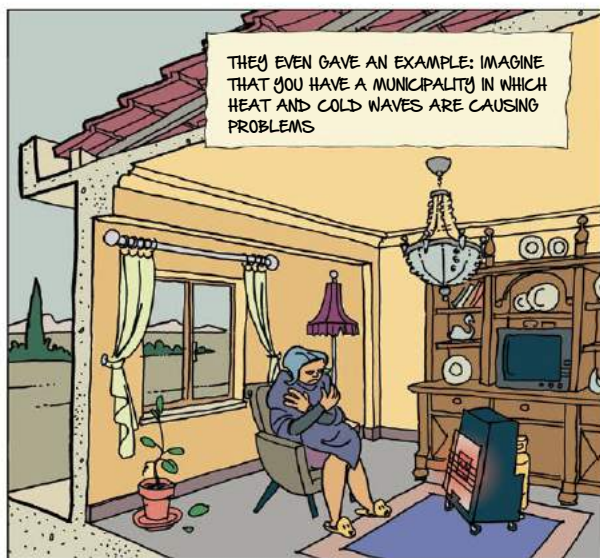
WHY IS THAT?

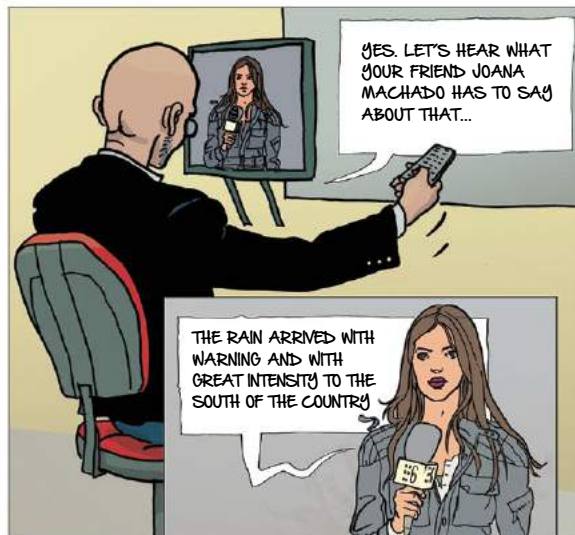
I WENT TO A WORKSHOP FOR JOURNALISTS  
ABOUT THE CLIMATE SUMMIT IN PARIS  
AND FOUND OUT ABOUT  
A PROJECT CALLED  
"CLIMADAPTLOCAL"

WHAT'S  
THAT?

IT'S ABOUT ADAPTATION TO CLIMATE CHANGE  
IN THE PORTUGUESE MUNICIPALITIES

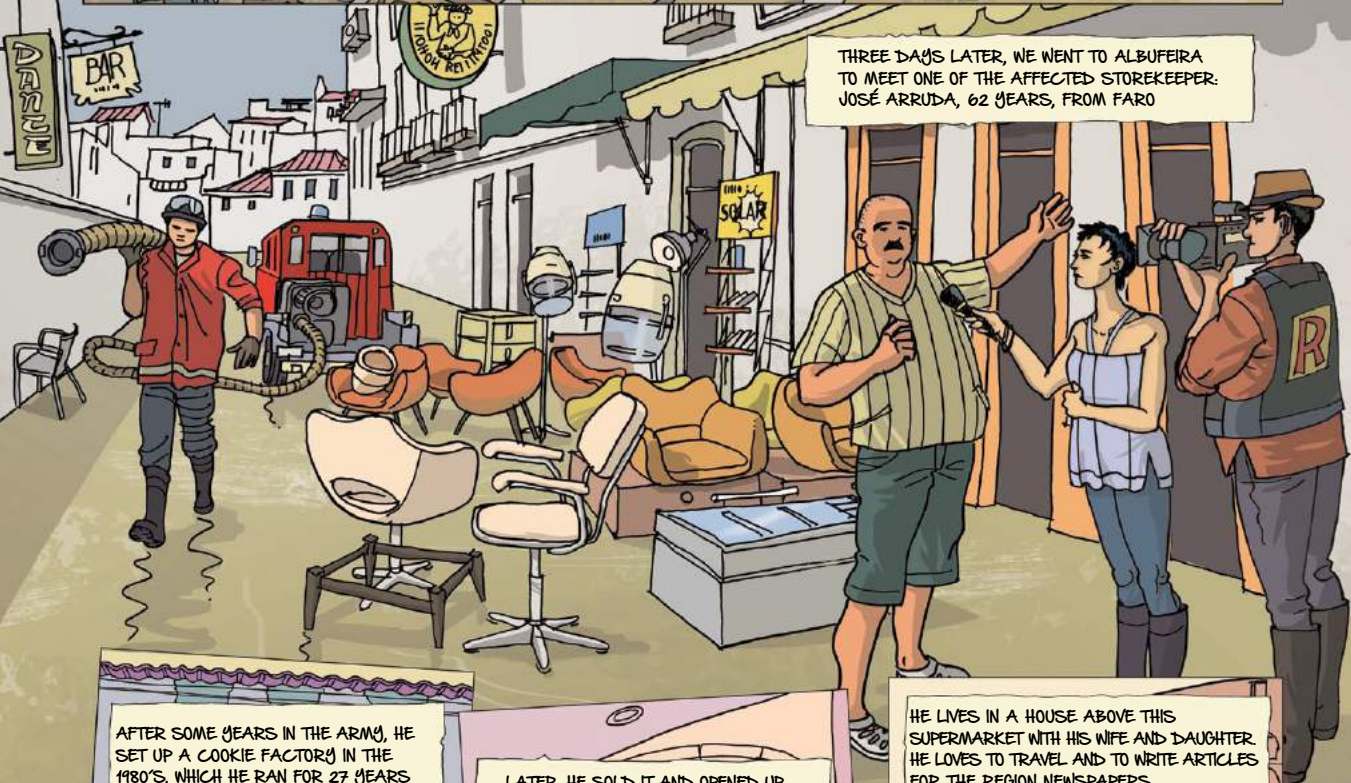
ONE OF THE GOALS IS TO UNDERSTAND  
THE BEST MEASURES OF ADAPTATION  
IN 26 MUNICIPALITIES OF THE MAINLAND  
AND ISLANDS



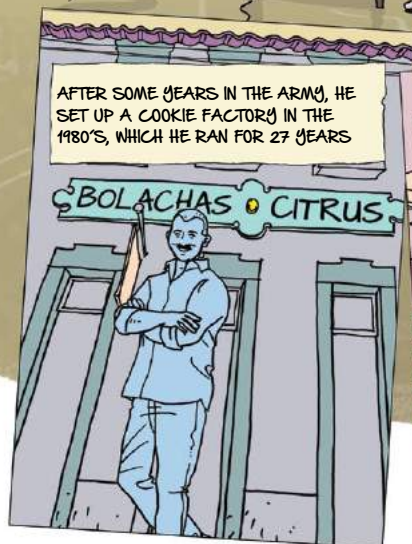




WHILE WE WERE PREPARING THIS SPECIAL REPORT, THERE WAS FLOODING IN SEVERAL AREAS OF ALGARVE



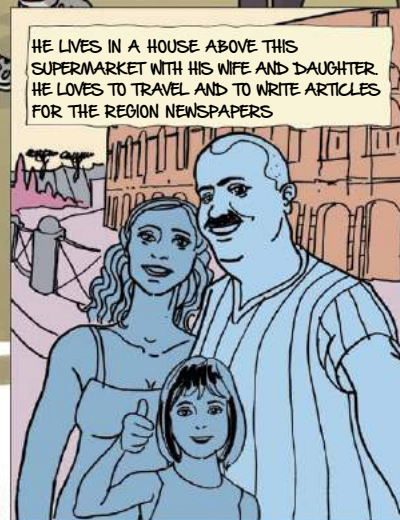
THREE DAYS LATER, WE WENT TO ALBUFEIRA TO MEET ONE OF THE AFFECTED STOREKEEPER: JOSÉ ARRUDA, 62 YEARS, FROM FARO



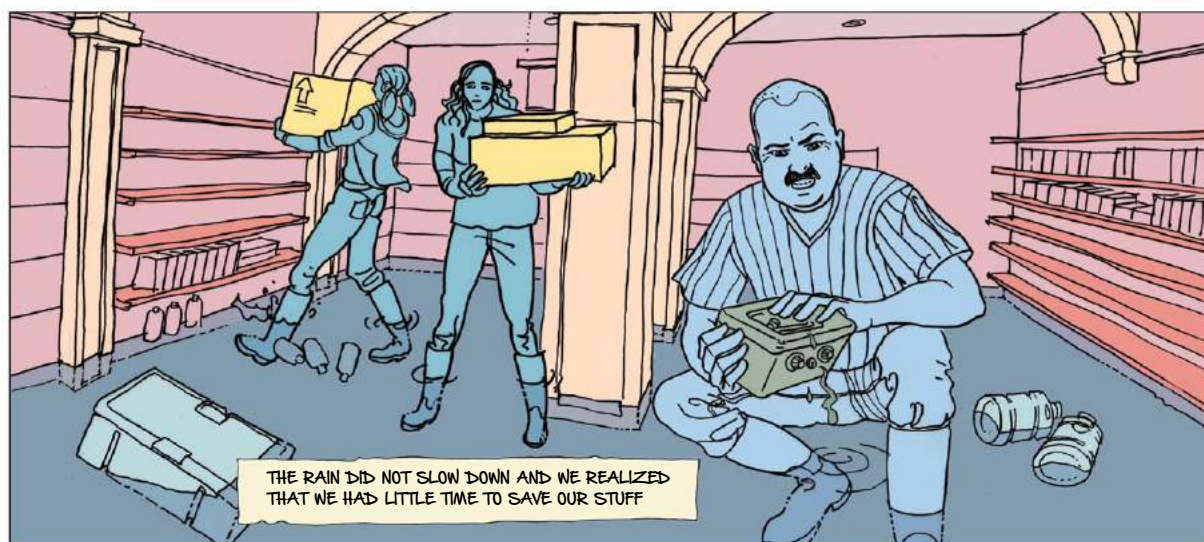
AFTER SOME YEARS IN THE ARMY, HE SET UP A COOKIE FACTORY IN THE 1980'S, WHICH HE RAN FOR 27 YEARS

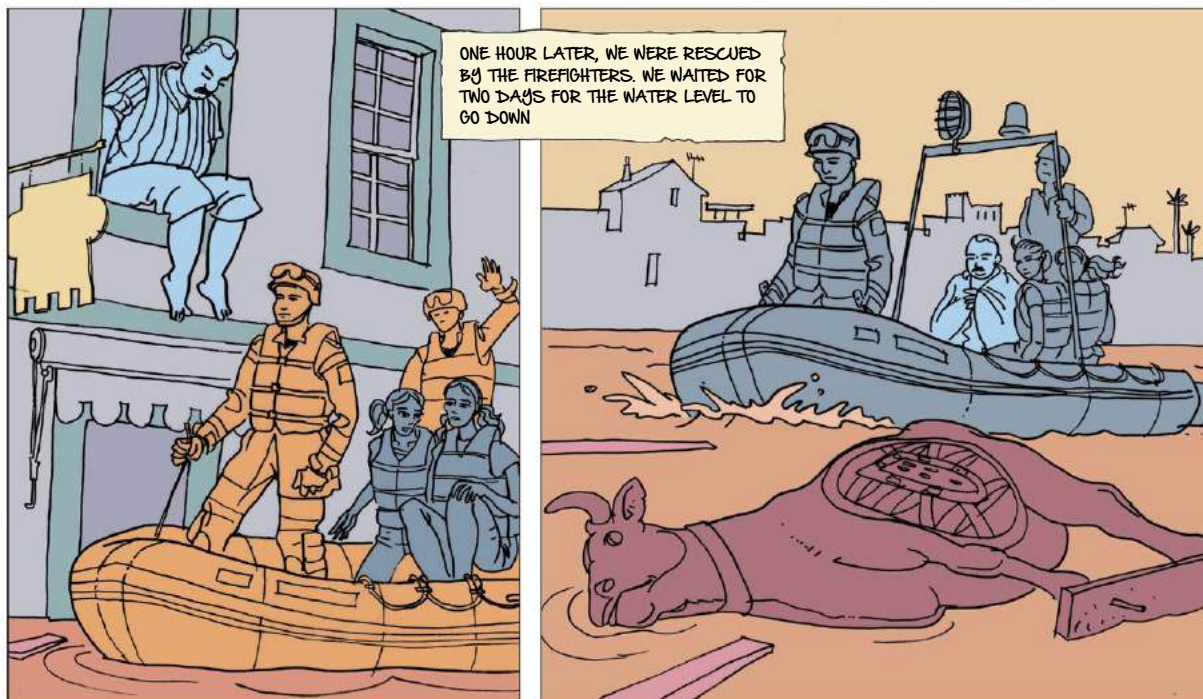


LATER, HE SOLD IT AND OPENED UP A SUPERMARKET IN THE TOURIST CENTER OF ALBUFEIRA



HE LIVES IN A HOUSE ABOVE THIS SUPERMARKET WITH HIS WIFE AND DAUGHTER. HE LOVES TO TRAVEL AND TO WRITE ARTICLES FOR THE REGION NEWSPAPERS







WE ONLY MANAGED TO GET IN THE SUPERMARKET THIS MORNING. EVERYTHING WAS UPSIDE DOWN, AS WE HAVE LEARNED TO EXPECT

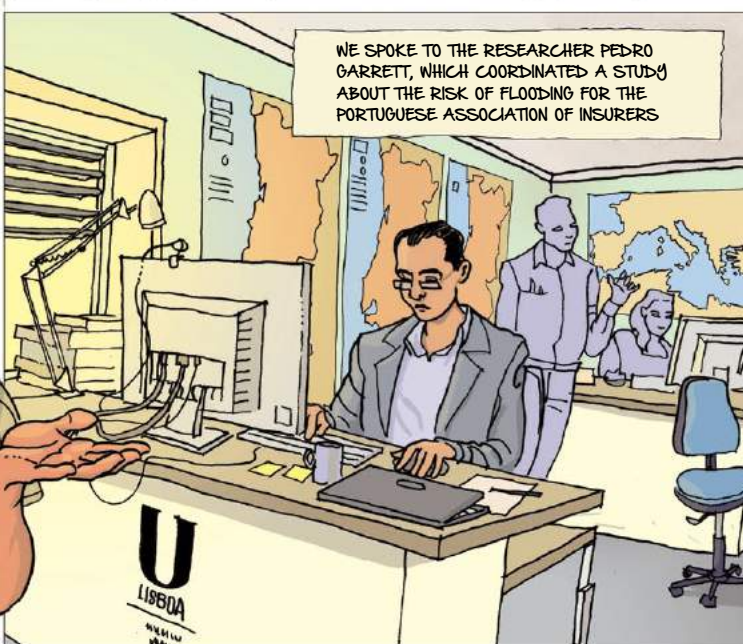


WHAT WILL YOU DO NOW?

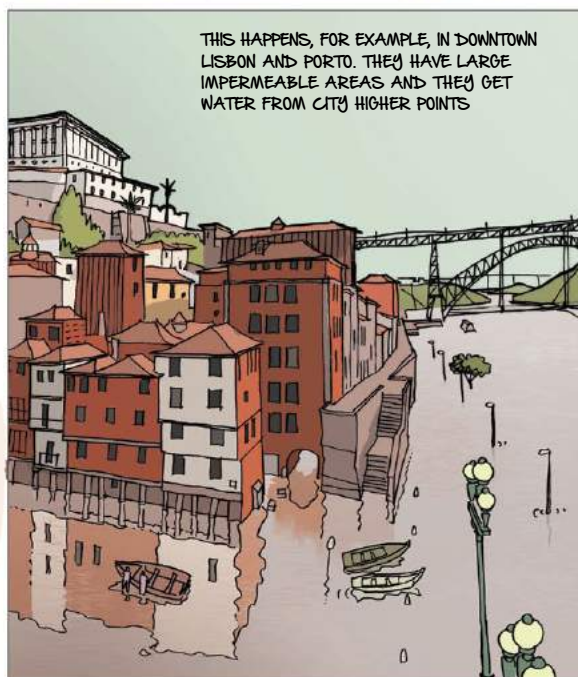
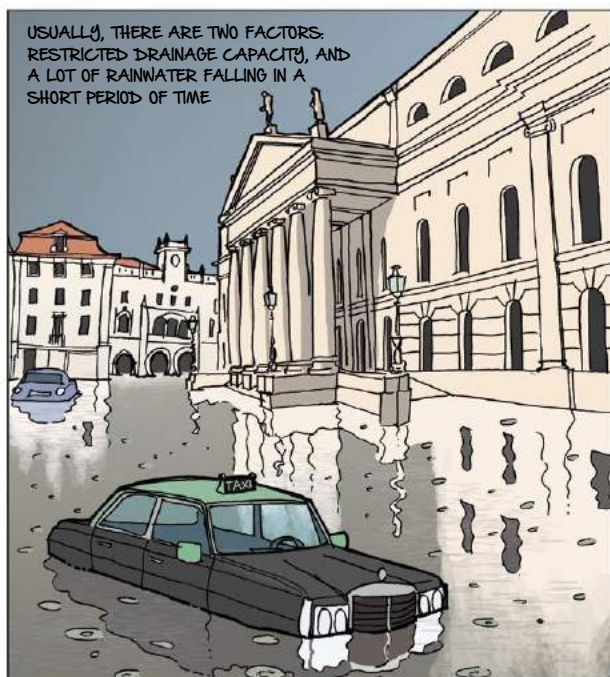
I'M NOT QUITE SURE HOW MUCH SUPPORT WE ARE GOING TO GET. UNTIL NOW, THERE AREN'T GUARANTEES

WE DID NOT HAVE INSURANCE, BECAUSE IT'S EXPENSIVE. IT'S THE SAME WITH OTHER STOREKEEPERS...

IF I DON'T GET ANY SUPPORT, I WILL HAVE TO CLOSE DOWN THE SUPERMARKET. MAYBE I WILL HAVE TO DO SOMETHING ELSE IN LIFE



WE SPOKE TO THE RESEARCHER PEDRO GARRETT, WHICH COORDINATED A STUDY ABOUT THE RISK OF FLOODING FOR THE PORTUGUESE ASSOCIATION OF INSURERS



IT WOULD BE GOOD TO ADAPT OUR CITIES TO DIFFERENT CLIMATIC CONDITIONS, IN WHICH INTENSE RAIN IS MORE USUAL AND PREPARED FOR



HOW CAN WE DO THAT?  
WITH MORE GARDENS?

YES, GARDENS CAN HELP TO REDUCE URBAN FLOODING. SOME OF THEM ARE DESIGNED TO BE TEMPORARILY FLOODED

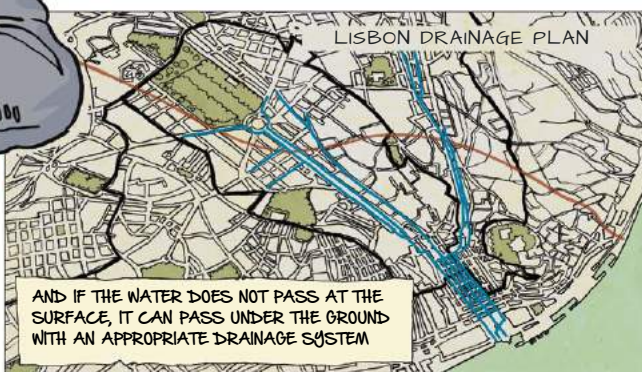


BUT WE SHOULD ALSO AVOID BUILDING IN AREAS NEAR RIVERS AND STREAMS



LISBON DRAINAGE PLAN

AND IF THE WATER DOES NOT PASS AT THE SURFACE, IT CAN PASS UNDER THE GROUND WITH AN APPROPRIATE DRAINAGE SYSTEM

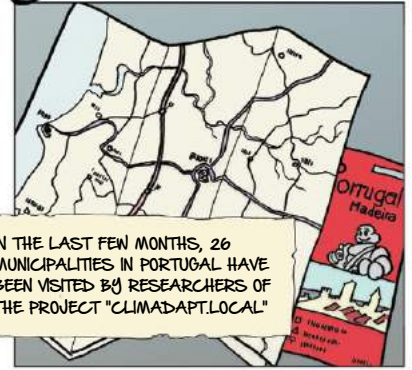


WE CAN ALSO HAVE POROUS PAVEMENTS THAT LET THE WATER PASS THROUGH THEM AND AN EMERGENCY PLAN FOR FLOODS ...

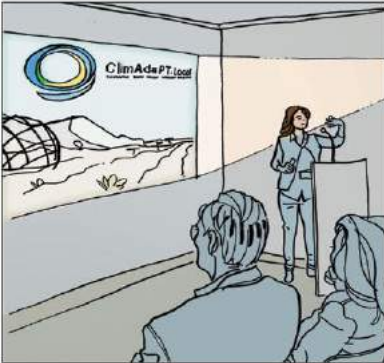
DO YOU WANT ME TO CONTINUE?



# 6 ON THE ROAD

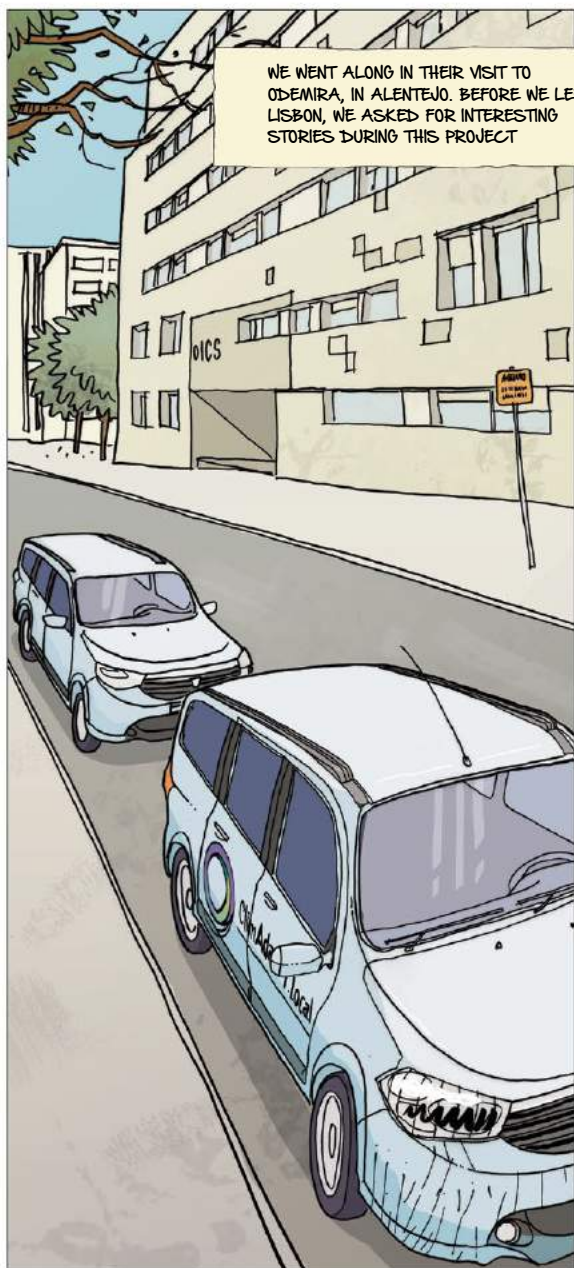


IN THE LAST FEW MONTHS, 26 MUNICIPALITIES IN PORTUGAL HAVE BEEN VISITED BY RESEARCHERS OF THE PROJECT "CLIMADAPT.LOCAL"



THE OBJECTIVE IS TO DO CAPACITY BUILDING AND TO DEVELOP MUNICIPAL STRATEGIES FOR CLIMATE CHANGE ADAPTATION IN THE COUNTRY





WE WENT ALONG IN THEIR VISIT TO ODEMIRA, IN ALENTEJO. BEFORE WE LEFT LISBON, WE ASKED FOR INTERESTING STORIES DURING THIS PROJECT



OK, LET ME THINK...

WELL, THERE WAS A PARTICIPANT WHICH SAID THAT HE NOTED THE HEAT WAVES EFFECT BY THE INCREASE OF THE NUMBER OF DEATHS. AND I ASKED ...



HOW? DO YOU WORK IN A HOSPITAL?

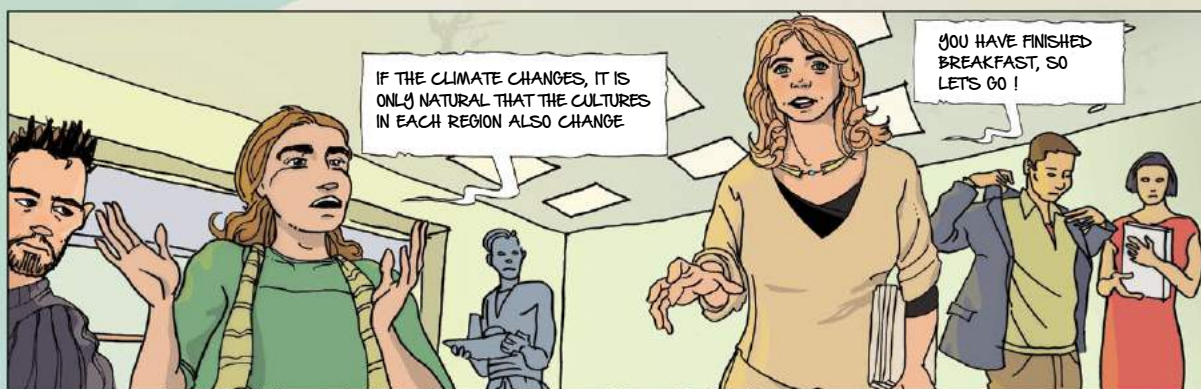
NO. I'VE BEEN WORKING AT A REGIONAL NEWSPAPER FOR MANY YEARS. AND WHENEVER THERE ARE HEAT WAVES, THE OBITUARY COLUMNS INCREASES

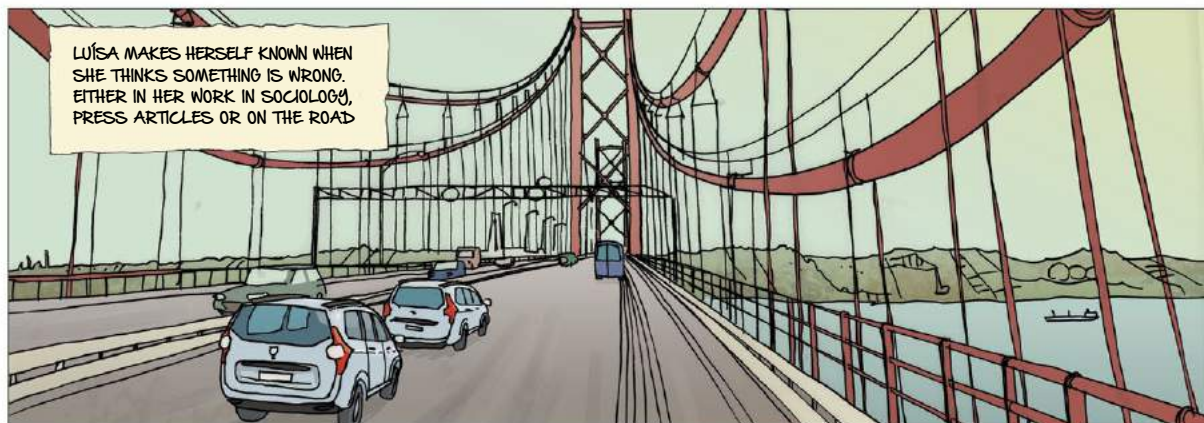


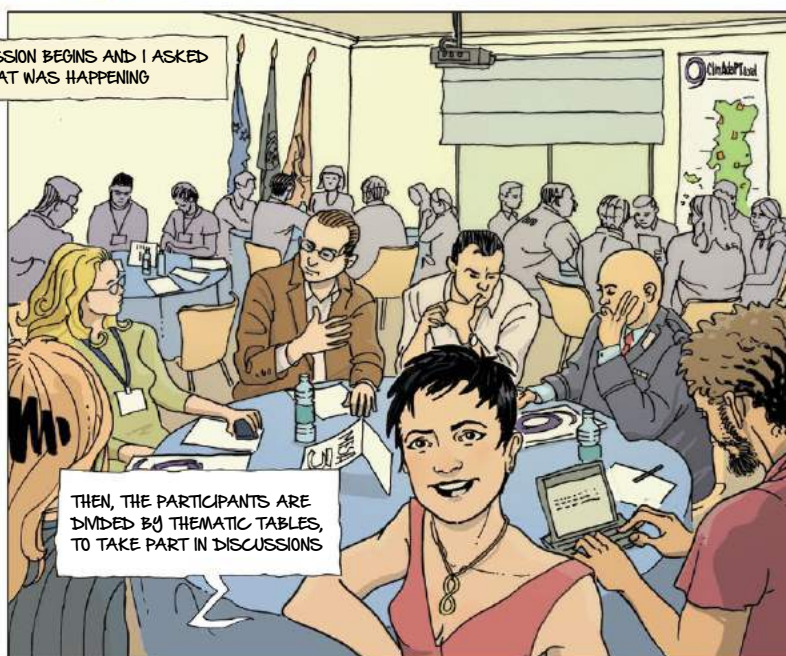
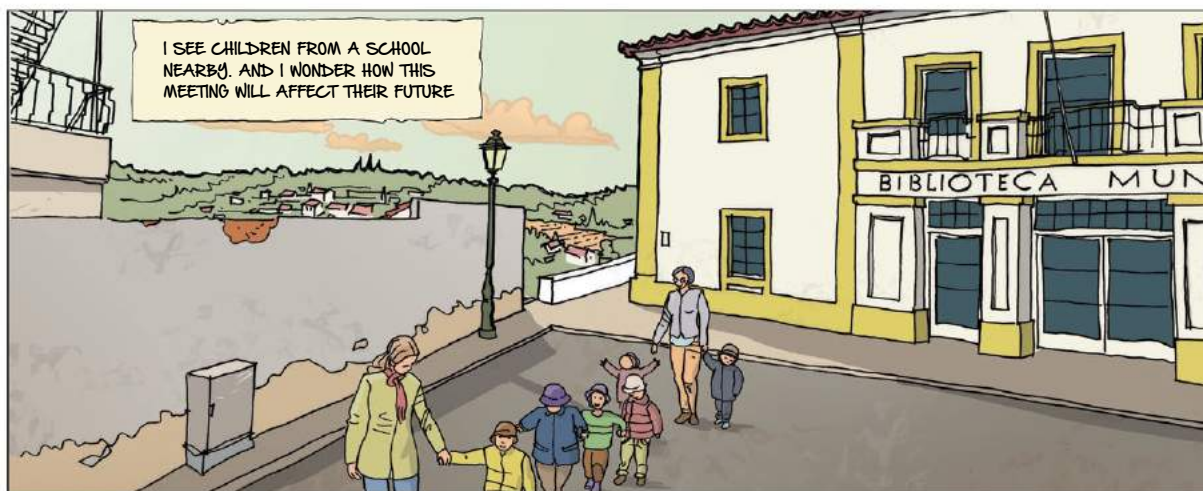
A SHORT TIME AGO, A FARMER TOLD ME THAT HIS OLIVES ARE MATURING SOONER DUE TO WARMER SEASONS



AND SINCE THE LOCAL OLIVE OIL MILL DID NOT CHANGE THE OPENING DATE, HE HAS TO PICK THEM AND KEEP THEM STORED, SO THEY WOULD NOT ROT



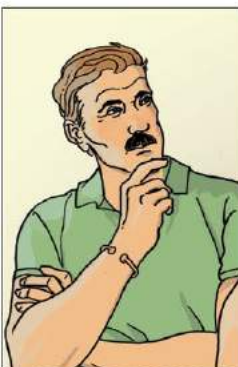




BUT HOW ARE THIS  
THEMATIC TABLES DONE?



MR. JOSE: FOREST LANDOWNER



MR. VITOR: FIRE CHIEF

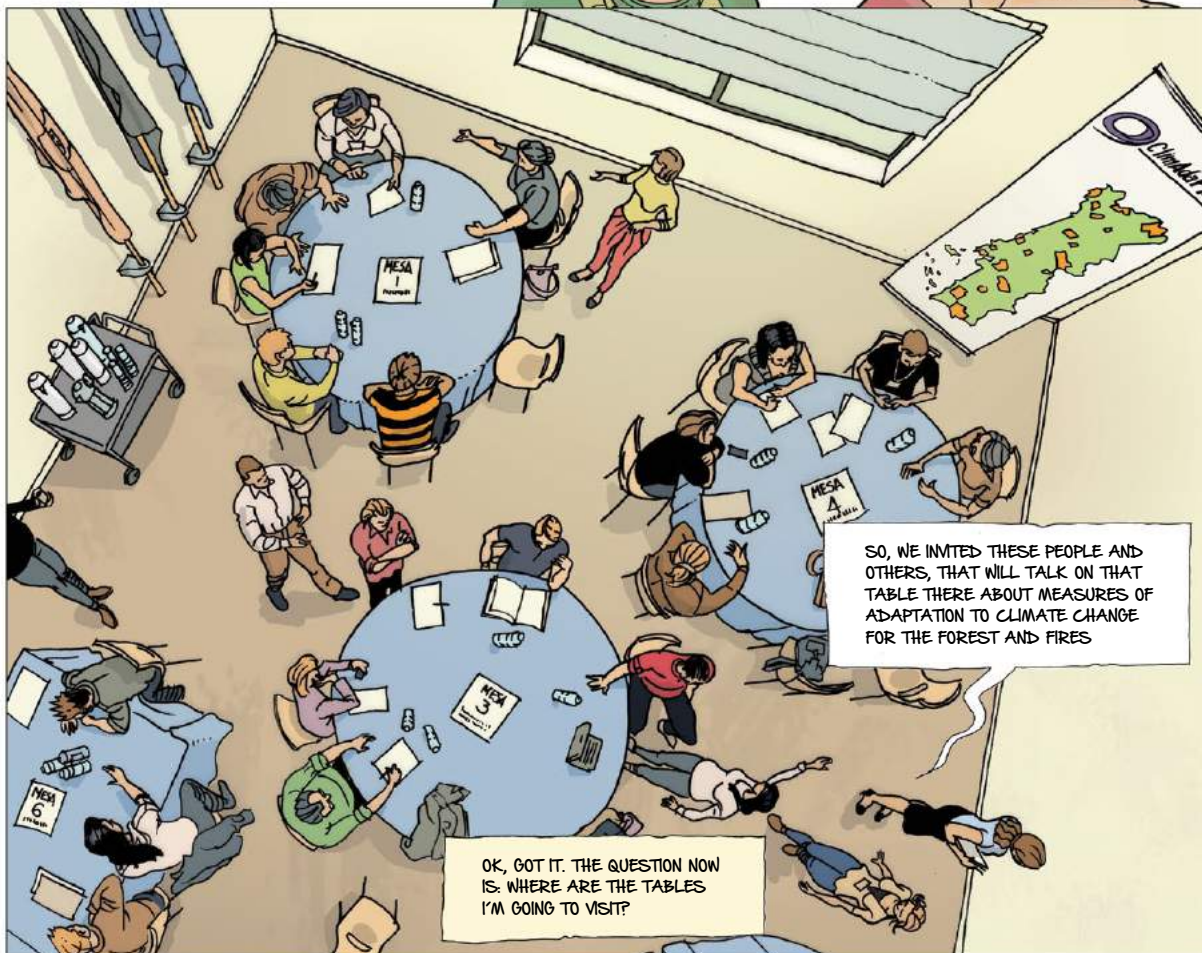


MR. BRÁZ: MUNICIPAL MANAGER



LET'S SEE... A FOREST LANDOWNER, A  
FIRE CHIEF, SOMEONE FROM A LOCAL  
MUNICIPALITY AFFECTED BY FIRE...

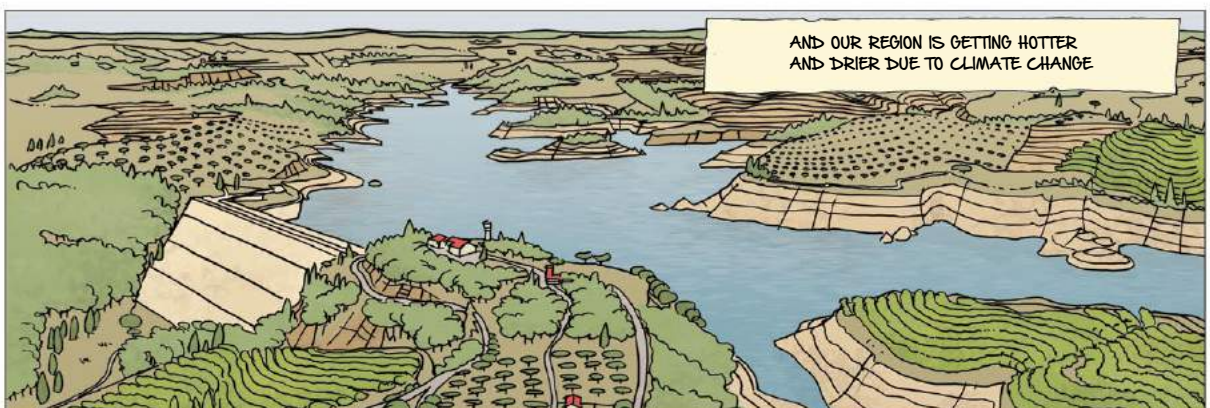
SUPPOSE YOU WANT TO DO A PUBLIC  
DEBATE IN THIS AREA ABOUT FORESTS  
AND FIRES. WHOM WOULD YOU INVITE?



SO, WE INVITED THESE PEOPLE AND  
OTHERS, THAT WILL TALK ON THAT  
TABLE THERE ABOUT MEASURES OF  
ADAPTATION TO CLIMATE CHANGE  
FOR THE FOREST AND FIRES

OK, GOT IT. THE QUESTION NOW  
IS: WHERE ARE THE TABLES  
I'M GOING TO VISIT?







BESIDES THIS, THERE HAS TO BE A BALANCE BETWEEN AGRICULTURE AND TOURISM. REMEMBER WE HAVE HERE THE NATURAL PARK OF SUDOESTE ALENTEJANO



IN PORTUGAL, THERE ARE AREAS WITH WATER SCARCITY FOR AGRICULTURE AND OTHER AREAS WITH A LOT OF WASTAGE OF WATER

THERE IT IS AGAIN, THE WATER WASTE!

YOU CAN TALK IN A MINUTE. TAKE IT EASY!



AT THE END, THE MAIN CONCLUSIONS OF EACH TABLE ARE PRESENTED AND THE SESSION IS CLOSED



THE PROPOSALS THAT RESULT FROM THE DISCUSSIONS ARE INTEGRATED IN THE CLIMATE CHANGE ADAPTATION MUNICIPAL PLAN

AND WHAT HAPPENS NEXT?

## BRIGHT FUTURE

USE OF ALTERNATIVE ENERGY SOURCES

REHABILITATE THE HISTORIC HERITAGE PROMOTING TOURISM

SHOPS WITH LOCAL CERTIFIED PRODUCTS

CONSTRUCTION OF GOOD QUALITY BUILDINGS

PREVENT FIRES BY MANAGING VEGETATION

CREATE AND/OR RESTORE GREEN SPACES

IMPROVE THE REUSE OF WATER AND DRAINAGE SYSTEMS

CLEAN WATER LINES, WITH NO PLANT DEBRIS

KEEP CLEAN AND WELL TREATED AGRICULTURAL AREAS

NATURE TOURISM COMPATIBLE WITH AGRICULTURE

## GRIM FUTURE

ABANDONED BUILDINGS IN RUINS

POPULATION REDUCTION

INADEQUATE FIRE PREVENTION

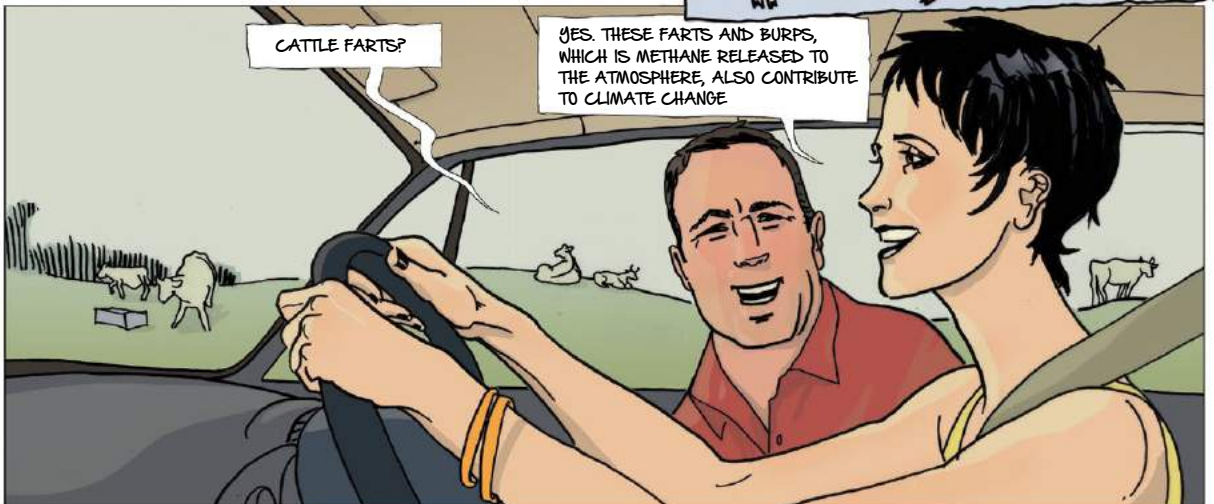
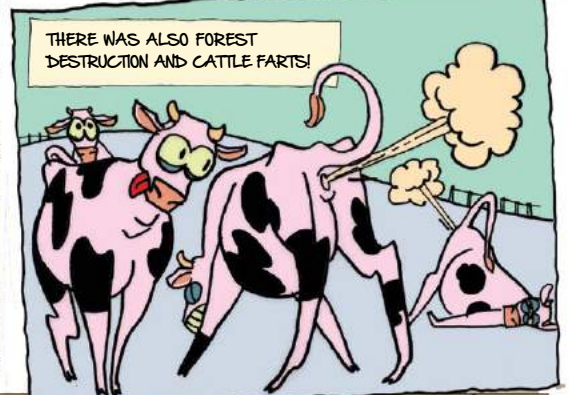
UNFINISHED AND/OR DILAPIDATED BUILDINGS

ABANDONED AGRICULTURAL AREAS AND LACK OF WATER FOR AGRICULTURE

WATER LINES WITH REDUCED VOLUME AND A LOT OF DEBRIS

LACK OF PREVENTION FOR EXTREME WEATHER

## 7 SUSTENTABILITY





SO, THERE WERE PEOPLE WHO WARNED:  
MAYBE WE SHOULD LIMIT THE WARMING  
OF GLOBAL TEMPERATURES TO 2°C  
IN RELATION TO PRE-INDUSTRIAL LEVELS...



MORE RECENTLY, OTHERS SAID: AT  
THE END OF 2015, WE WILL REACH  
1°C ABOVE THIS LEVEL. SO BEWARE,  
SINCE THE MARGIN FOR  
TEMPERATURE INCREASE IS SMALL



BUT IT WAS DIFFICULT TO REACH AN  
AGREEMENT. ONE OF THE REASONS IS  
THAT CLIMATE CHANGE WAS MAINLY  
CAUSED BY DEVELOPED COUNTRIES

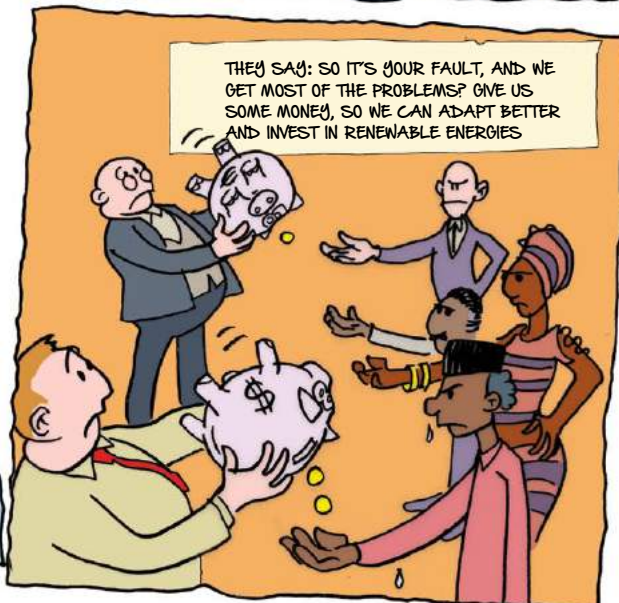


SO, THE OTHER COUNTRIES SAY:  
YOU HAVE ALREADY EATEN A  
LOT! NOW, IT'S OUR TURN, SINCE  
WE ARE GROWING UP



EVEN WORSE, THE POOR COUNTRIES ARE THE ONES  
THAT WILL SUFFER MORE WITH THE IMPACTS OF  
CLIMATE CHANGE!

THAT'S TOTALLY UNFAIR!

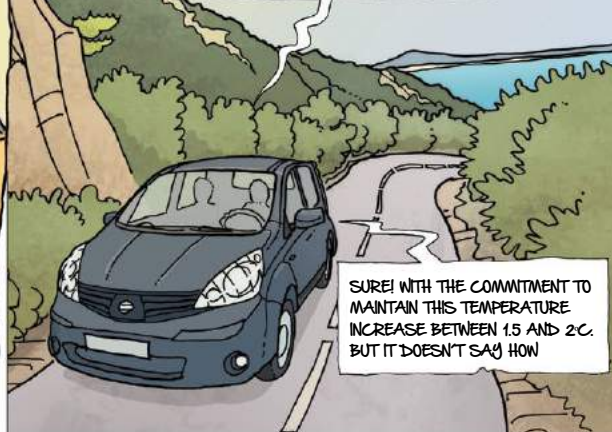


THEY SAY: SO IT'S YOUR FAULT, AND WE  
GET MOST OF THE PROBLEMS? GIVE US  
SOME MONEY, SO WE CAN ADAPT BETTER  
AND INVEST IN RENEWABLE ENERGIES

AND THERE ARE OTHER ISSUES. FOR EXAMPLE, SAUDI ARABIA THINKS THEY HAVE TO BE COMPENSATED FOR THE OIL THEY WILL NOT SELL, IF THERE IS A GLOBAL CLIMATE AGREEMENT!



AND WHAT WAS THE RESULT OF THE PARIS SUMMIT? THERE WAS AN AGREEMENT?



SURE! WITH THE COMMITMENT TO MAINTAIN THIS TEMPERATURE INCREASE BETWEEN 1.5 AND 2C. BUT IT DOESN'T SAY HOW

SO, THERE ARE NO DEADLINES AND OBJECTIVES TO ACHIEVE THIS. IT SAYS "AS SOON AS POSSIBLE". WHENEVER YOU CAN... IF THIS IS NOT TOO INCONVENIENT...



I THINK IT'S THIS WAY

OK. EXPLAIN ME ONCE MORE WHY DID WE CAME HERE TO SEE?



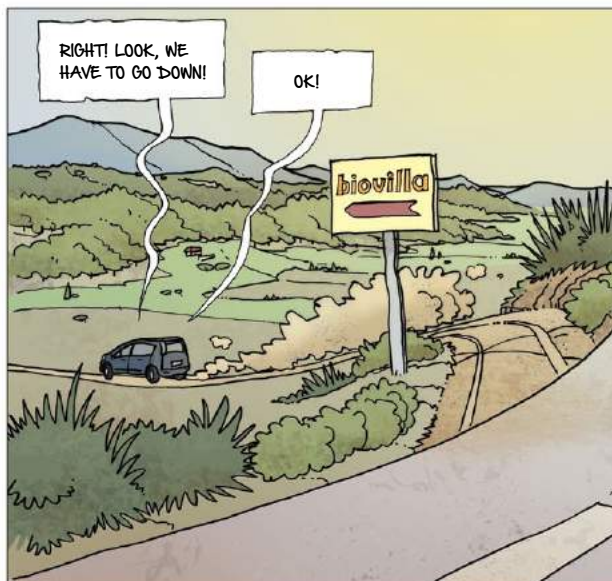
A PHD CLASS PROGRAMME ABOUT CLIMATE CHANGE AND SUSTAINABLE DEVELOPMENT. IN A PLACE CALLED BIOVILLA

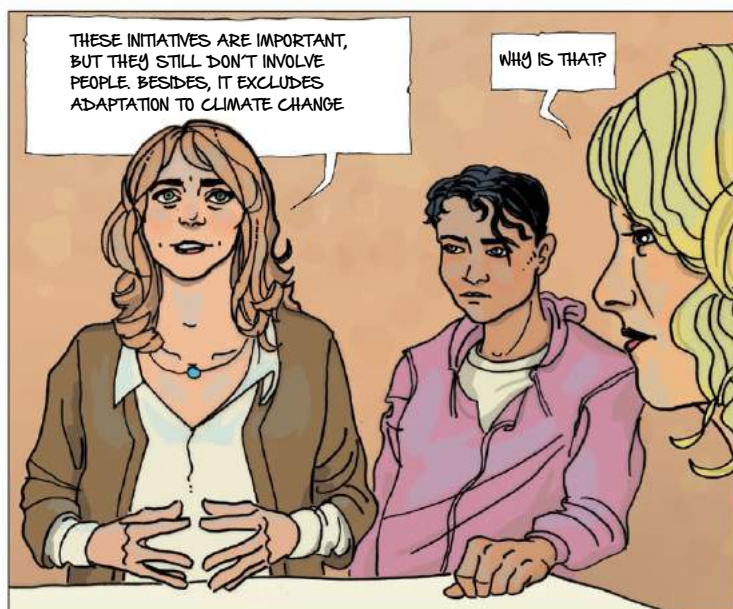
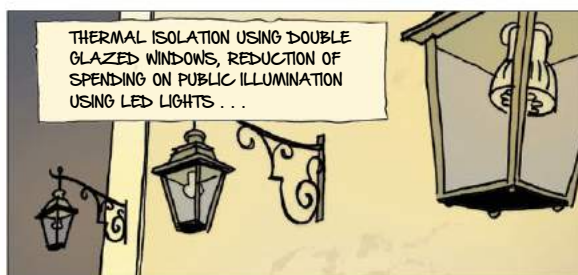
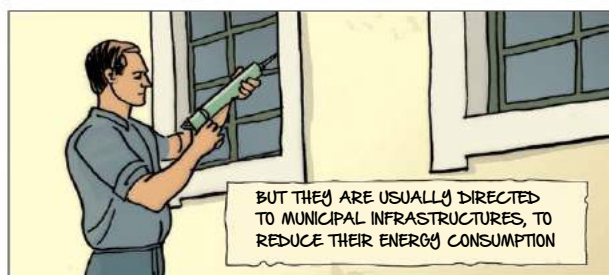
THAT'S THE FARM WHERE THEY WORK ON SUSTAINABILITY, RIGHT?

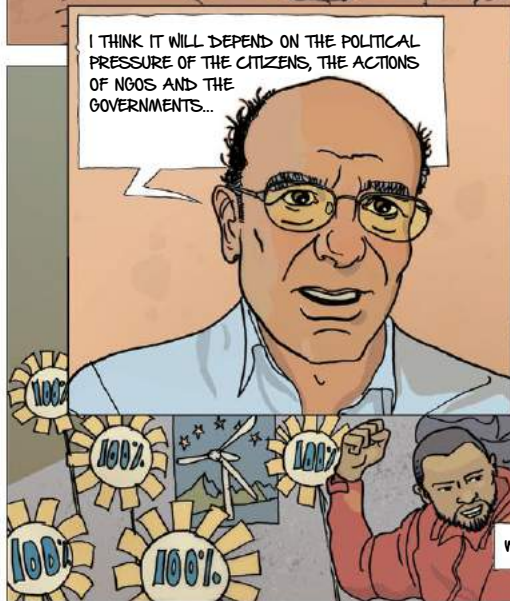
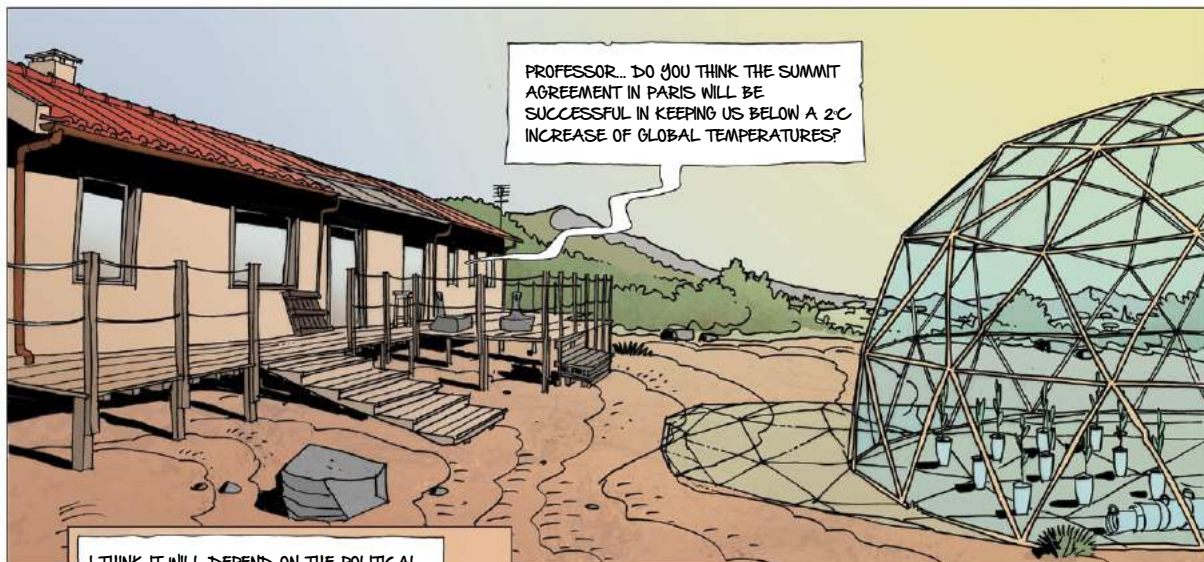


RIGHT! LOOK, WE HAVE TO GO DOWN!

OK!











... I REMEMBER IT AS AN OLD FRIEND



I ONLY SAW IT AGAIN MANY YEARS LATER, BECAUSE MY DAUGHTER INSISTED



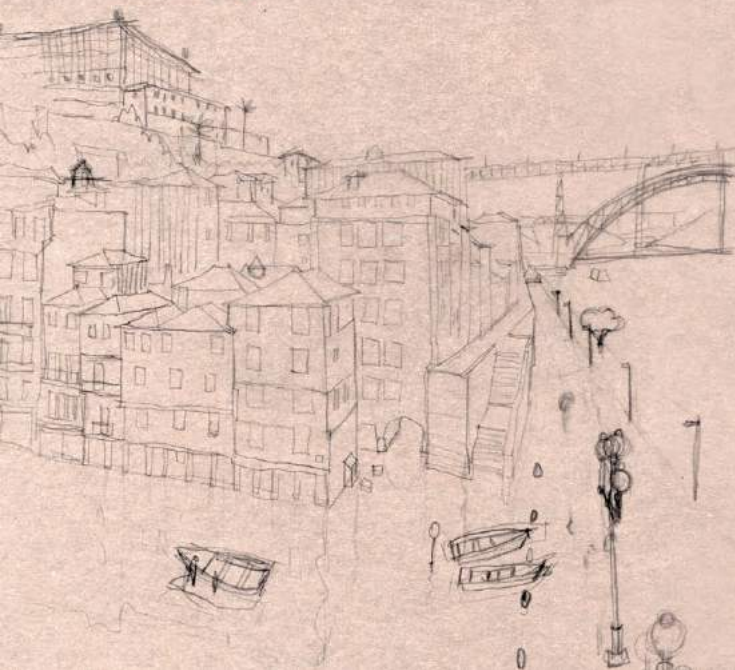
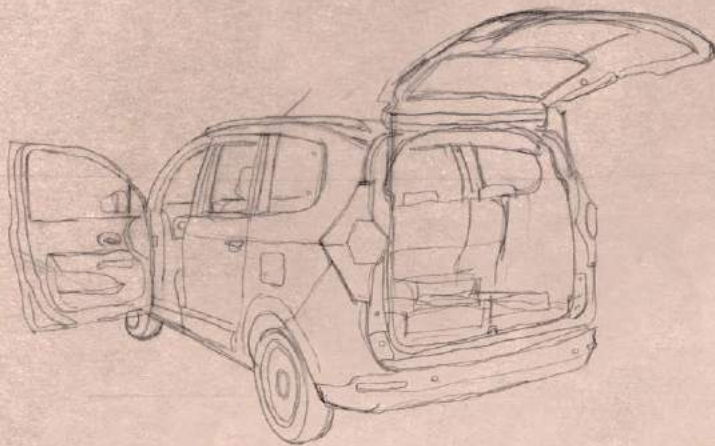
AND WHAT I REMEMBERED THE MOST WAS THAT WALK UP THE HILL. THE LANDSCAPE. THE LIGHT.



AND THAT GORGEOUS VIEW FROM THE TOP...

**THE END**

# Sketches







**ClimAdaPT.Local**

Estratégias Municipais de Adaptação às Alterações Climáticas



Fundo português de Carbono



**AGÊNCIA  
PORTUGUESA  
DO AMBIENTE**