

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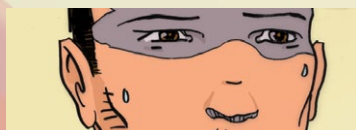
Note: This book is based on real facts. Some names and identifying details have been changed to protect the privacy of individuals.



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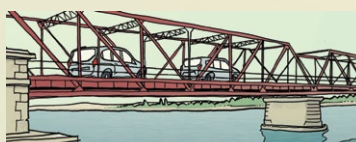
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## FOREWORD

### **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.

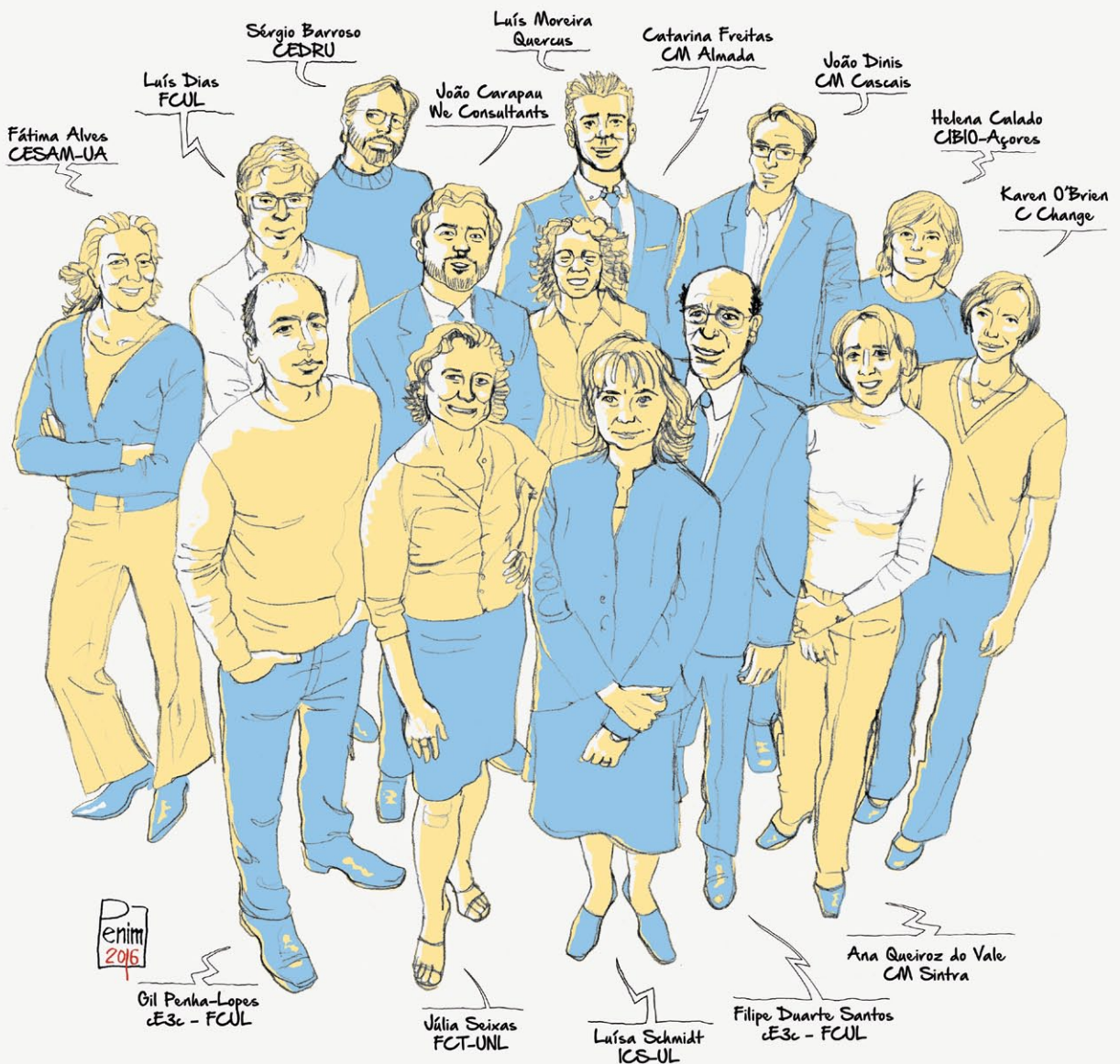
This comic book presents climate change in Portugal and in particular the ClimAdaPT.Local project in a very nice and innovative way by an easily understandable storyline. It shows the main issues and also possible solutions. Hopefully this can inspire municipalities and citizens throughout the country 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.



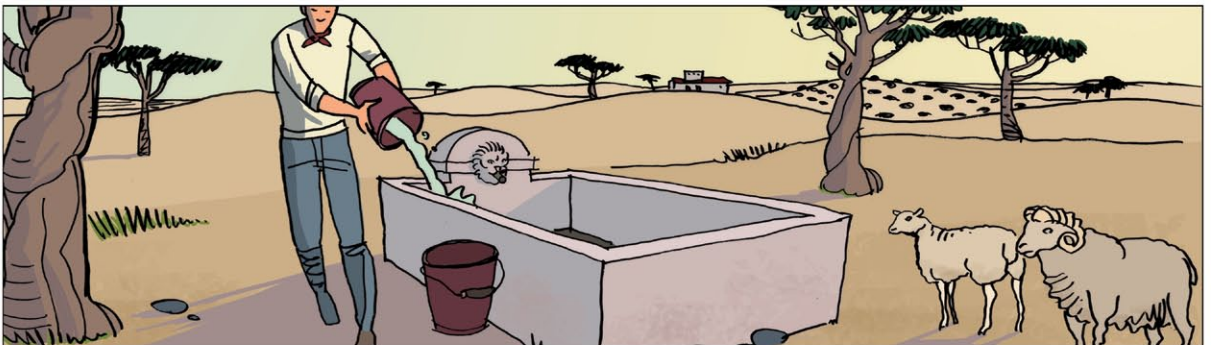
## ABOUT THE BOOK

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.

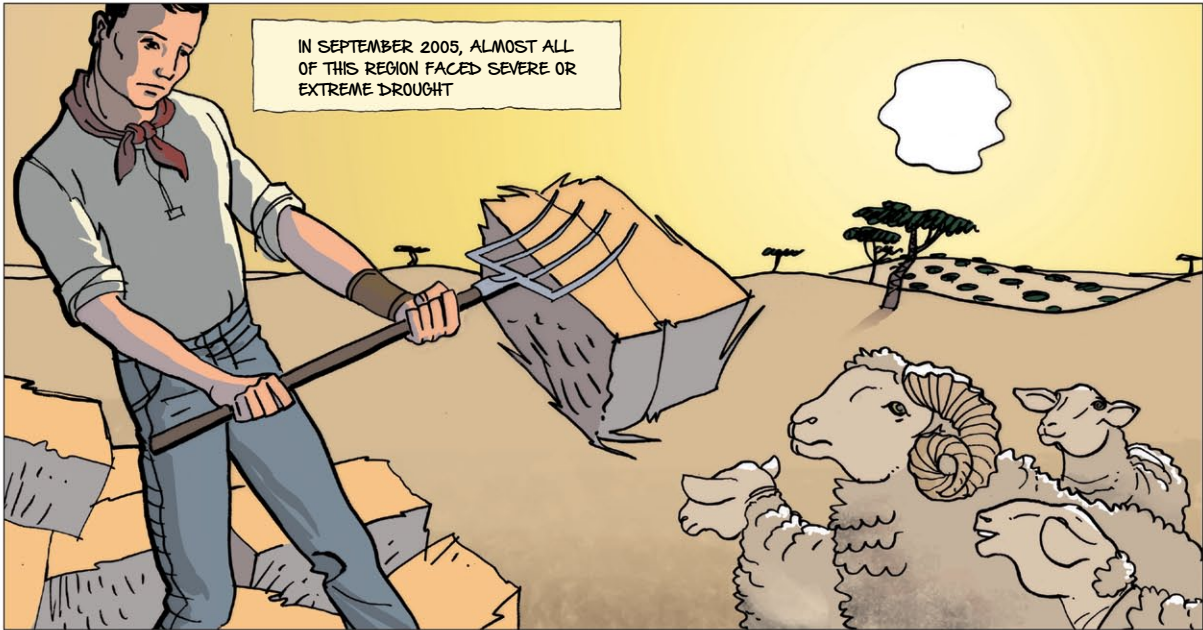
## THE TEAM



# 1 METEOROLOGY

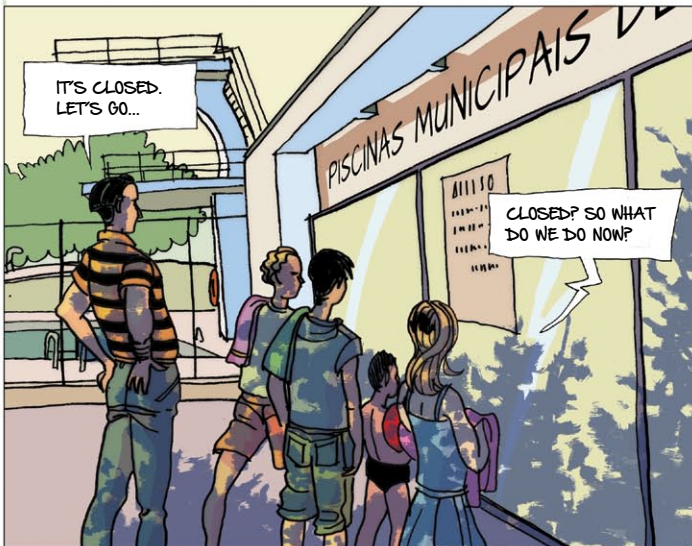


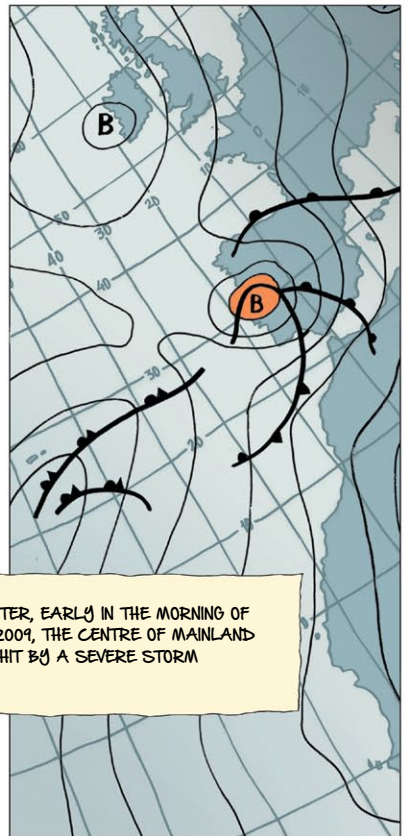
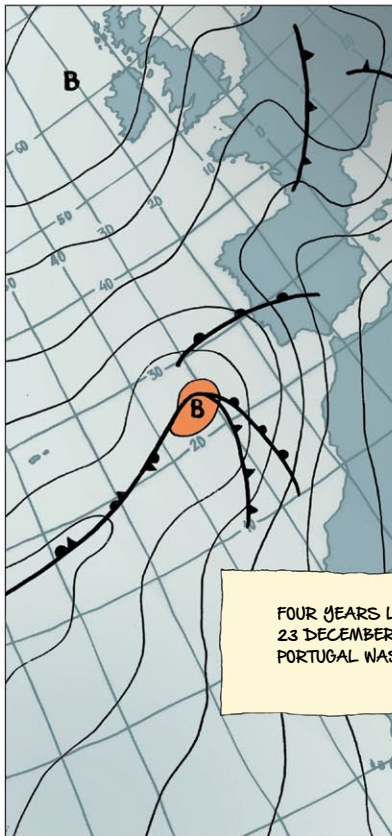




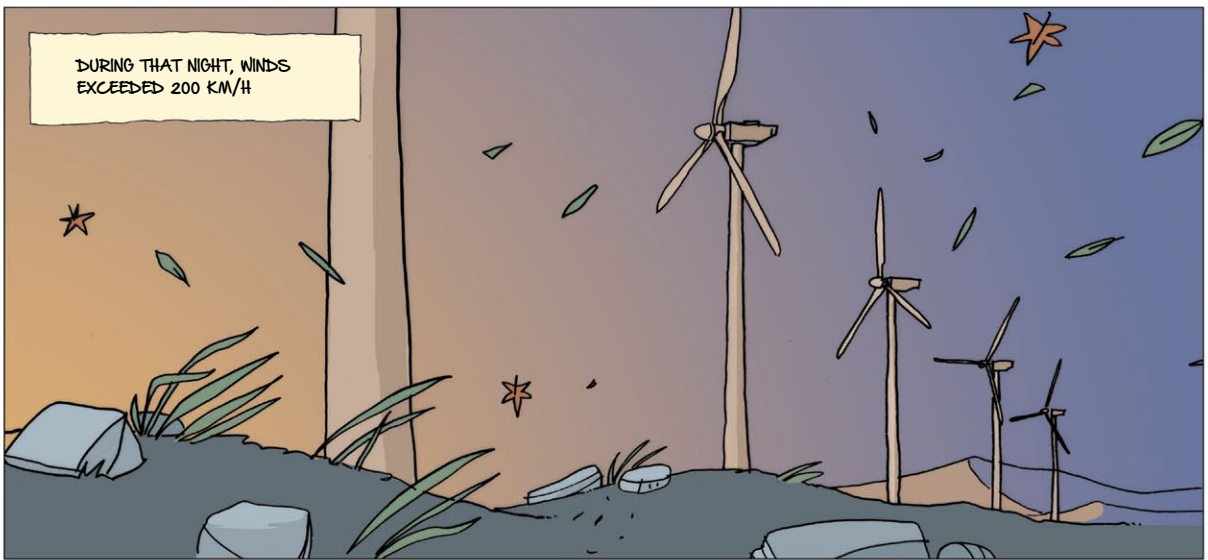


THE WATER SCARCITY ALSO CONTRIBUTED TO AN INCREASE OF FOREST FIRES





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

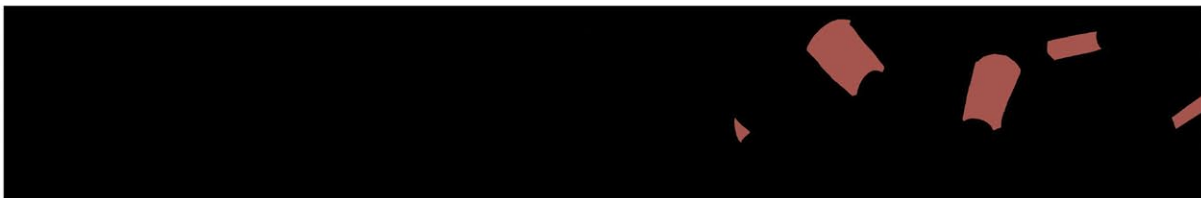




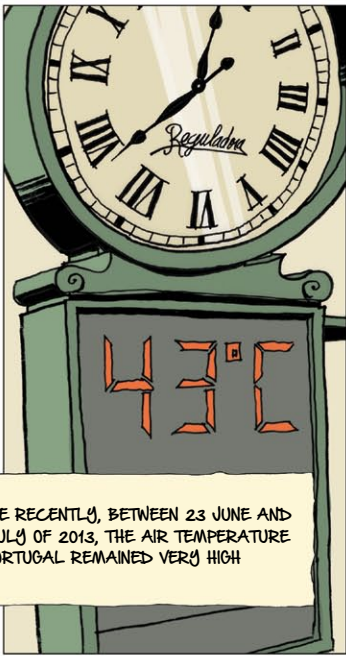
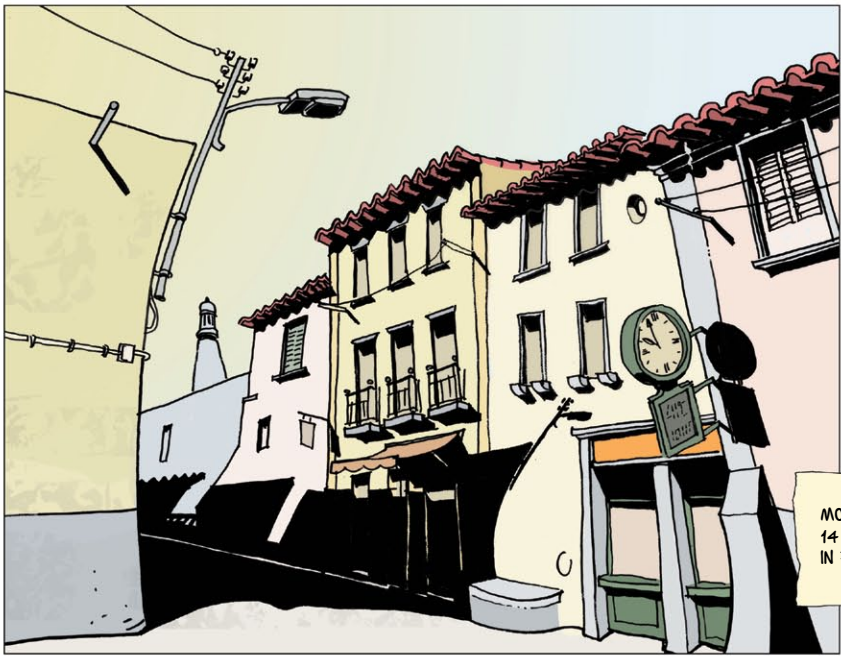
AGRICULTURAL GREENHOUSES WERE DESTROYED, BUILDINGS WERE DAMAGED, AND MANY FAMILIES LOST THEIR HOUSES...



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



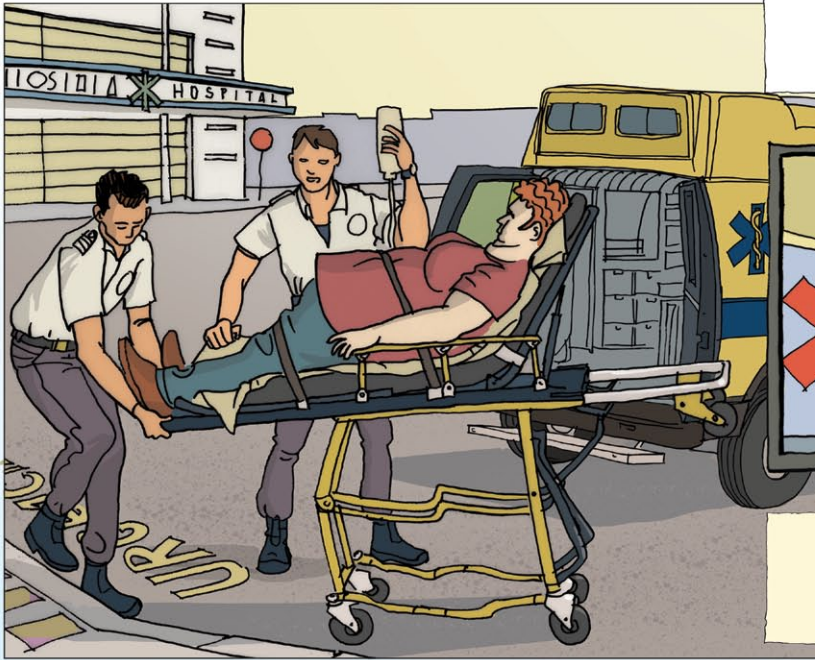
THIS IS KNOWN AS A HEAT WAVE, IT IS ALREADY HAVING AN EFFECT ON PEOPLE'S HEALTH AND MORTALITY IN SEVERAL REGIONS OF THE COUNTRY

SOS HEALTH. HOW MAY I HELP YOU?



SOS HEALTH. HOW MAY I HELP YOU?

IF THE CHILD IS STILL COMPLAINING, YOU SHOULD TAKE HIM TO THE HOSPITAL. MEANWHILE, HE SHOULD BE TAKEN TO A COOL PLACE AND ENCOURAGED TO DRINK PLENTY OF WATER



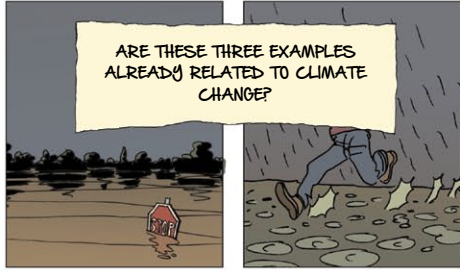
THE EMERGENCY SERVICES ASSISTED MANY CASES OF DEHYDRATION, FAINTING, AND BREATHING PROBLEMS



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



ARE THESE THREE EXAMPLES ALREADY RELATED TO CLIMATE CHANGE?



IT'S ALMOST CERTAIN THAT THEY ARE. BUT SINCE THERE IS ALSO NATURAL VARIATION OF METEOROLOGICAL CONDITIONS, WE WILL ONLY BE SURE IN A FEW MORE YEARS

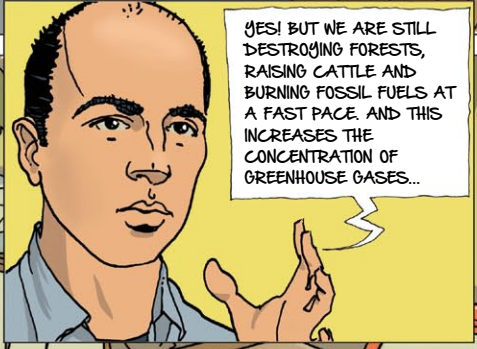
**GIL PENHA-LOPES**  
FACULTY OF SCIENCES - UNIVERSITY OF LISBON



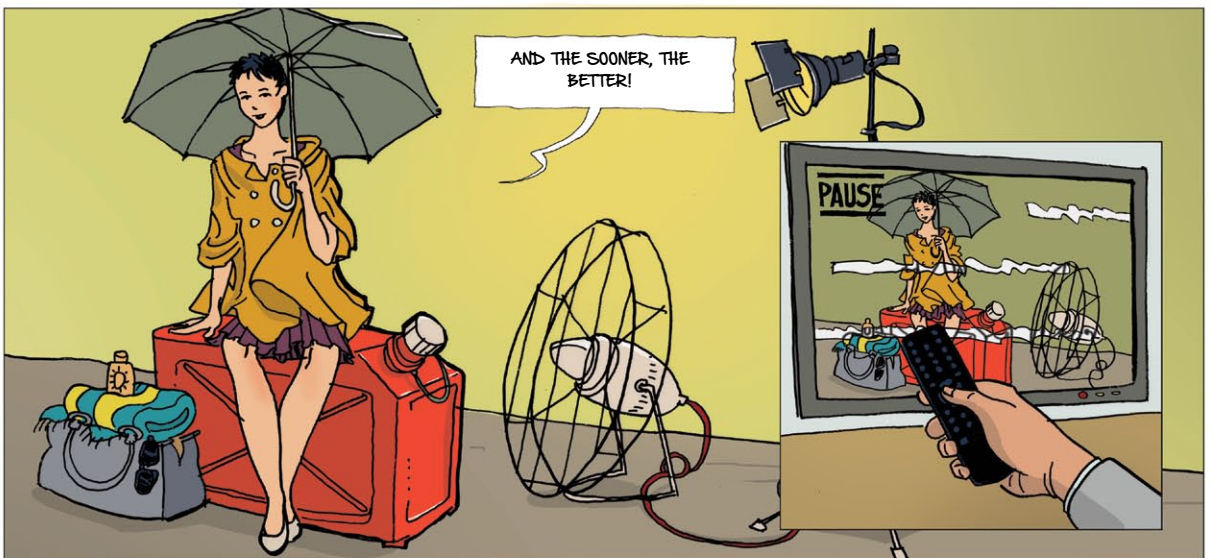
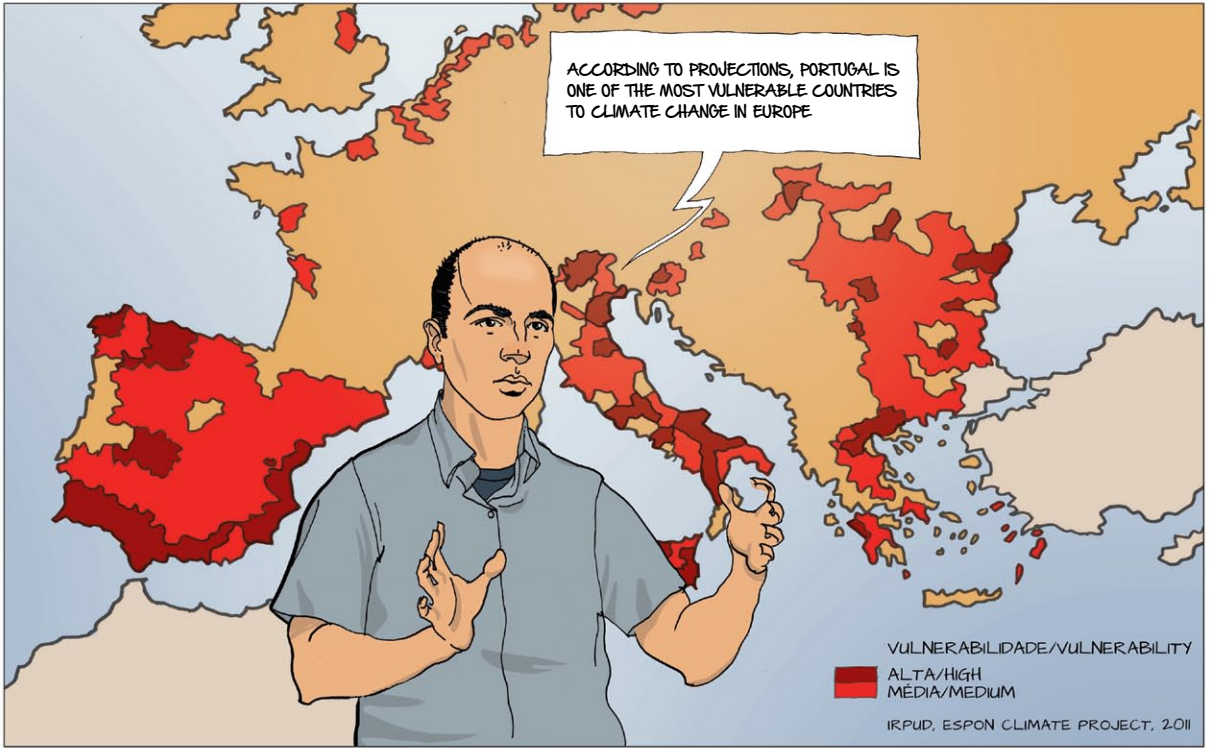
THAT'S ALSO WHY WE NEED MANY YEARS OF METEOROLOGICAL INFORMATION TO STUDY THE CLIMATE. THIRTY YEARS, AT LEAST



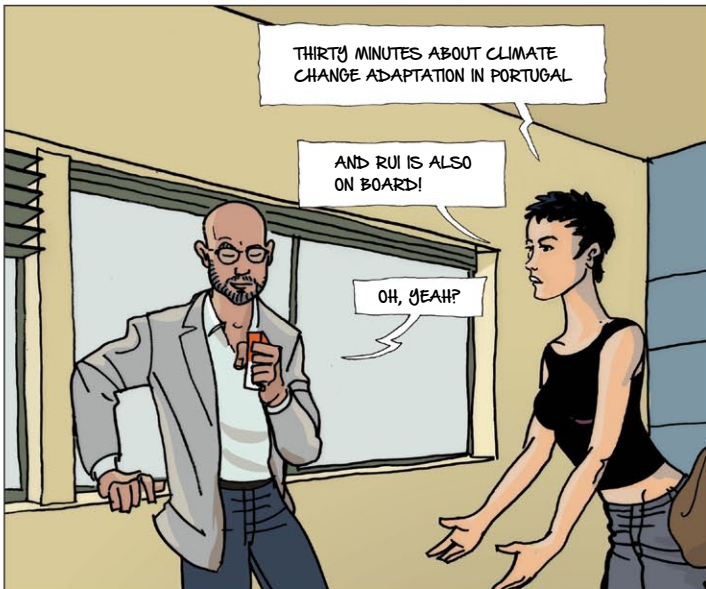
SO I SHOULD REMEMBER TO ASK THAT AGAIN IN THE 30 YEARS' TIME!



YES! BUT WE ARE STILL DESTROYING FORESTS, RAISING CATTLE AND BURNING FOSSIL FUELS AT A FAST PACE. AND THIS INCREASES THE CONCENTRATION OF GREENHOUSE GASES...









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



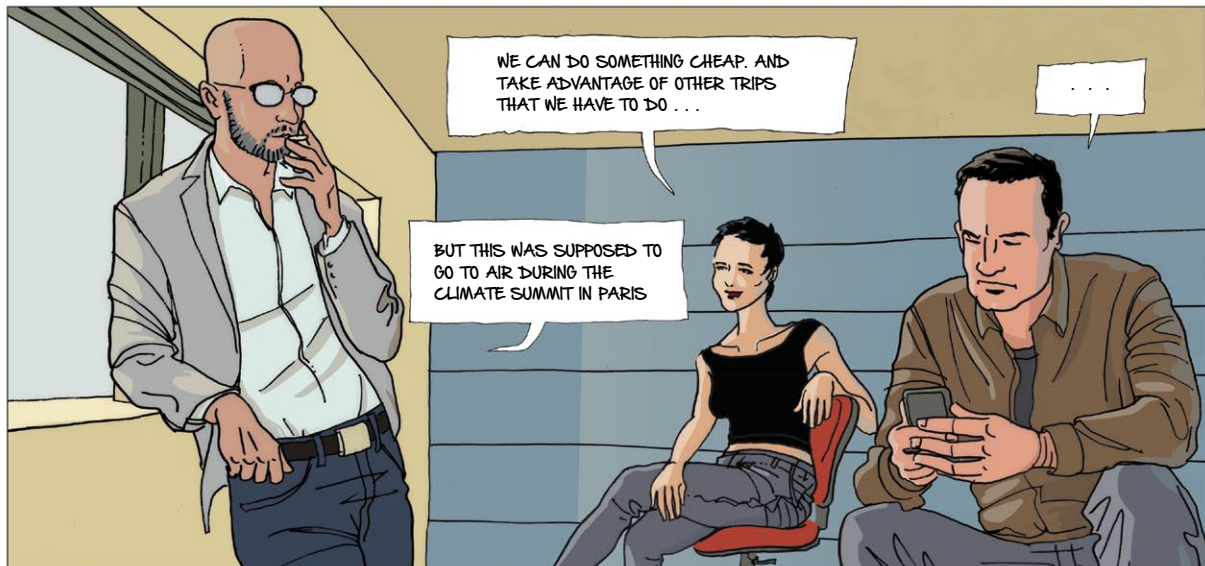
HELLO THERE, FOLKS. PEDRO, LET'S GO?

JUST GIVE ME TWO MINUTES AND I'LL BE THERE!



SO, THE IDEA IS TO SHOW WHAT WE ARE DOING TO DEAL WITH THIS ISSUE, TALK WITH SOME OF THE PEOPLE INVOLVED, SCIENTISTS...

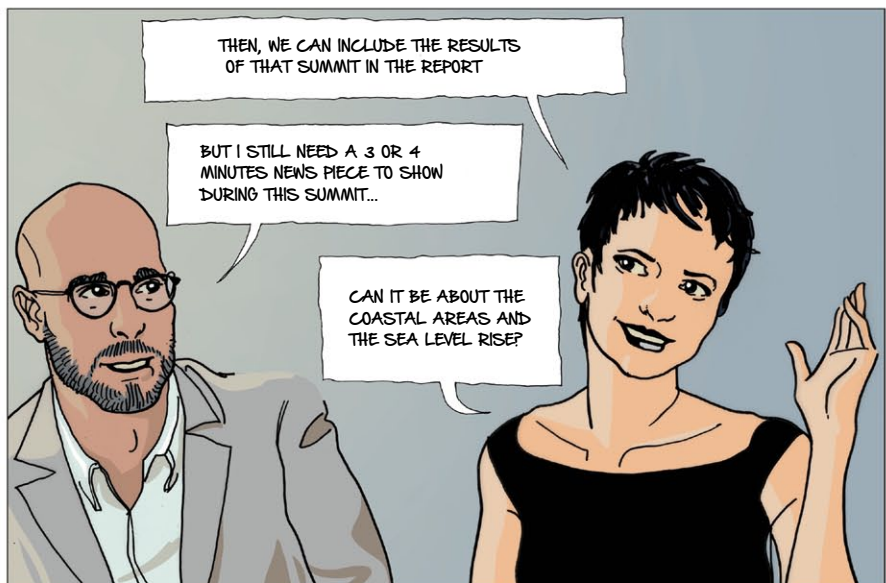
AND WHERE'S THE MONEY TO DO THAT?



WE CAN DO SOMETHING CHEAP. AND TAKE ADVANTAGE OF OTHER TRIPS THAT WE HAVE TO DO . . .

...

BUT THIS WAS SUPPOSED TO GO TO AIR DURING THE CLIMATE SUMMIT IN PARIS



THEN, WE CAN INCLUDE THE RESULTS OF THAT SUMMIT IN THE REPORT

BUT I STILL NEED A 3 OR 4 MINUTES NEWS PIECE TO SHOW DURING THIS SUMMIT...

CAN IT BE ABOUT THE COASTAL AREAS AND THE SEA LEVEL RISE?

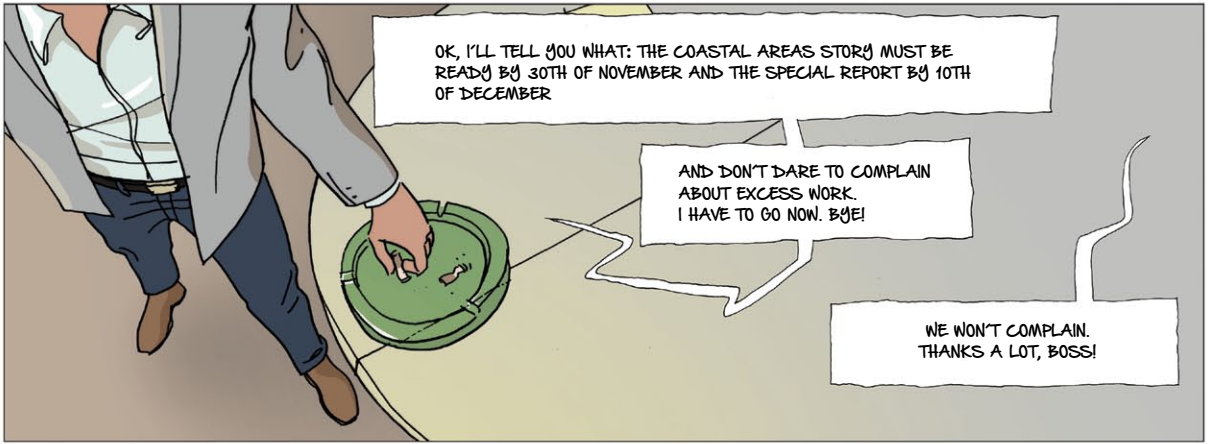


IS THE SEA ALREADY RISING?



YES

WE COULD ACTUALLY VISIT THE TIDE GAUGE IN CASCAIS



OK, I'LL TELL YOU WHAT: THE COASTAL AREAS STORY MUST BE READY BY 30TH OF NOVEMBER AND THE SPECIAL REPORT BY 10TH OF DECEMBER

AND DON'T DARE TO COMPLAIN ABOUT EXCESS WORK. I HAVE TO GO NOW. BYE!

WE WON'T COMPLAIN. THANKS A LOT, BOSS!

THIS WILL BE A LOT OF FUN!

FUN? YOU MEAN A DREADFUL RACE AGAINST TIME?

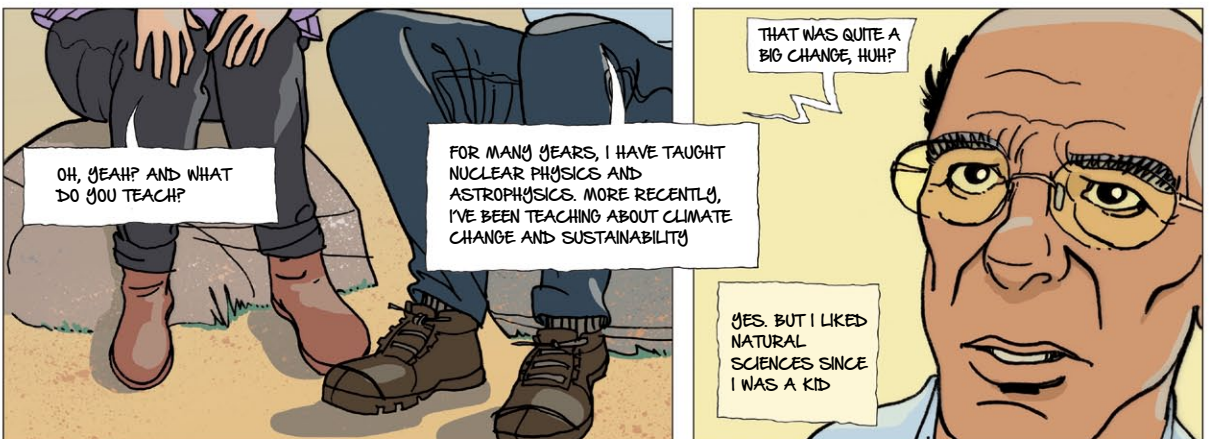


SLAM!

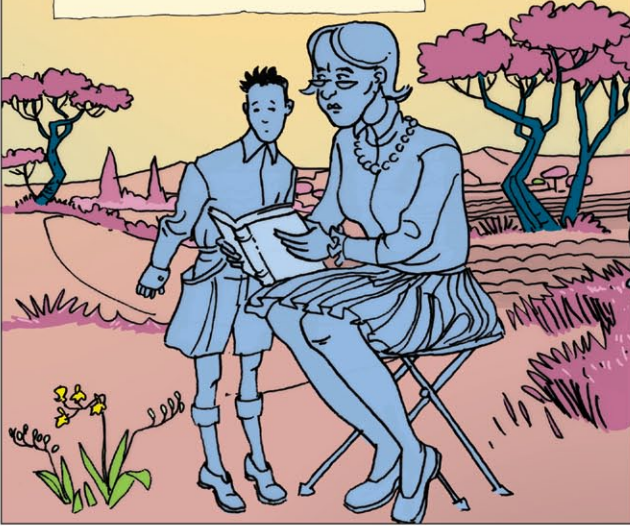
# 2 COAST LINE



WHAT'S THIS CALLED?



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



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



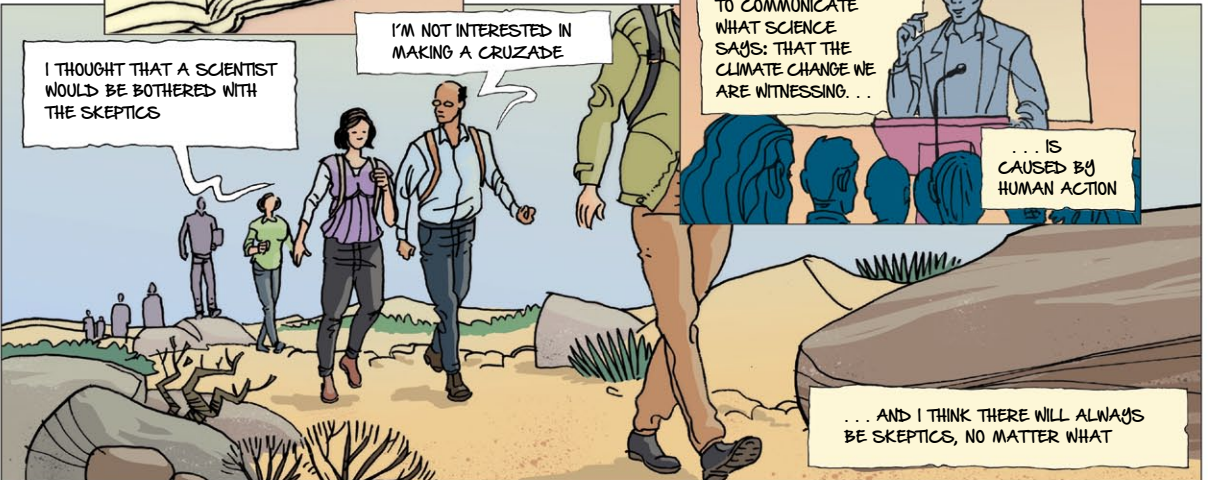
I THOUGHT THAT A SCIENTIST WOULD BE BOTHERED WITH THE SKEPTICS

I'M NOT INTERESTED IN MAKING A CRUZADE

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

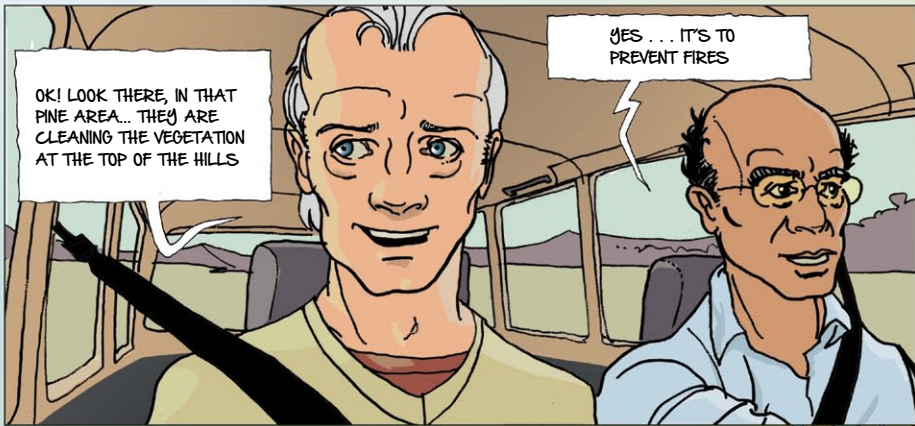




LATER . . .

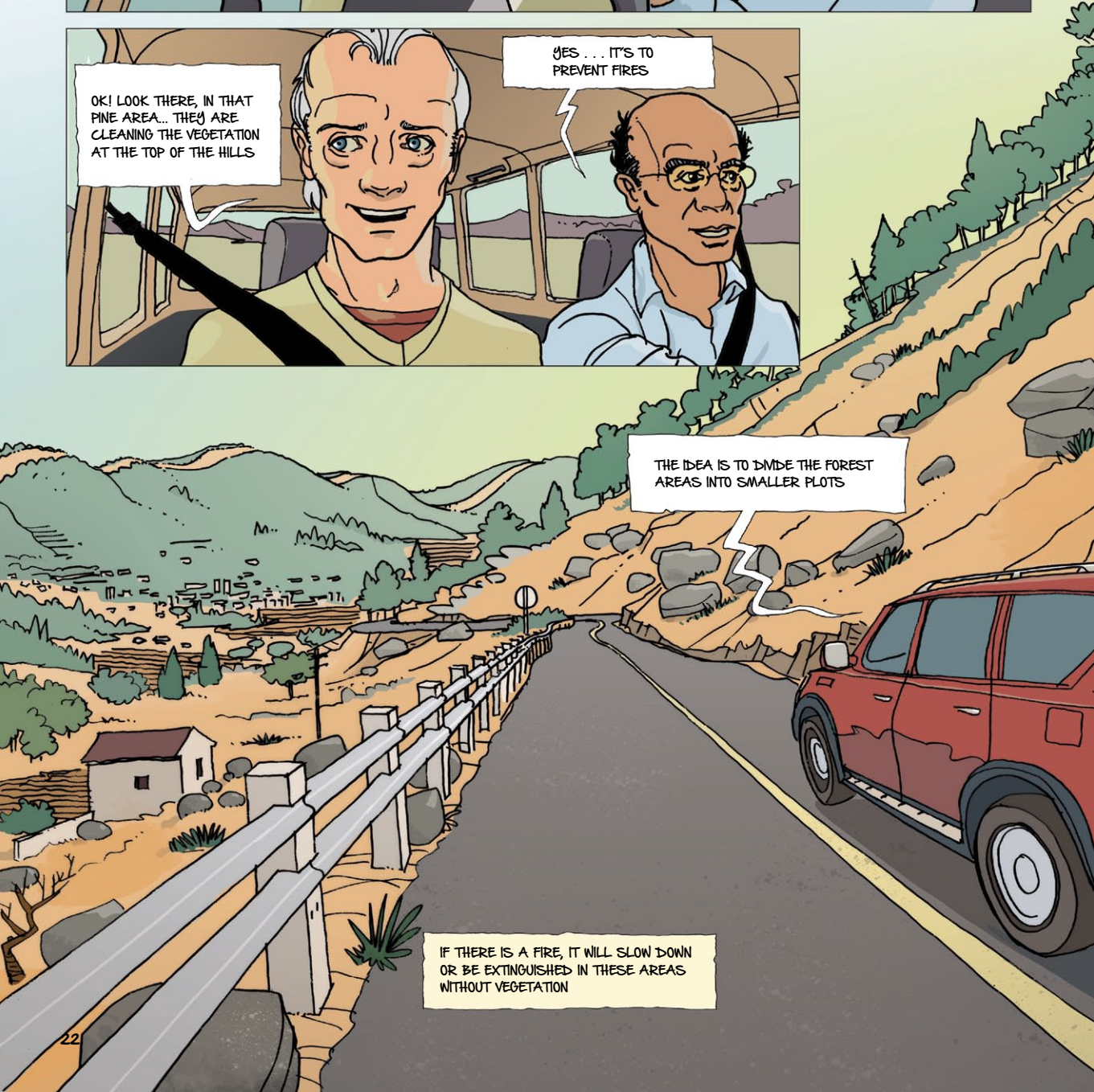
I DON'T KNOW. I WILL BE VERY BUSY UNTIL THE END OF THE YEAR

SO WHEN CAN WE DO ANOTHER FIELD TRIP, TO SEE MORE ORCHIDS?



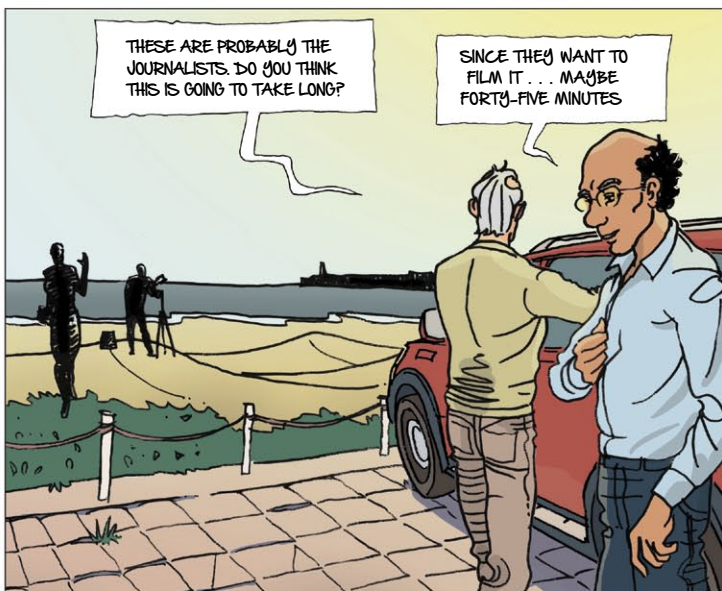
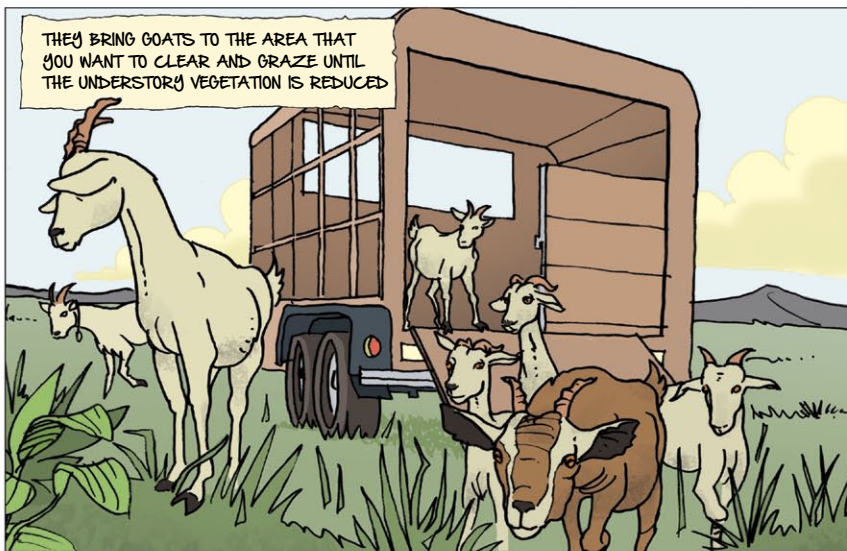
OK! LOOK THERE, IN THAT PINE AREA.. THEY ARE CLEANING THE VEGETATION AT THE TOP OF THE HILLS

YES . . . IT'S TO PREVENT FIRES



THE IDEA IS TO DIVIDE THE FOREST AREAS INTO SMALLER PLOTS

IF THERE IS A FIRE, IT WILL SLOW DOWN OR BE EXTINGUISHED IN THESE AREAS WITHOUT VEGETATION





I'M READY!

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

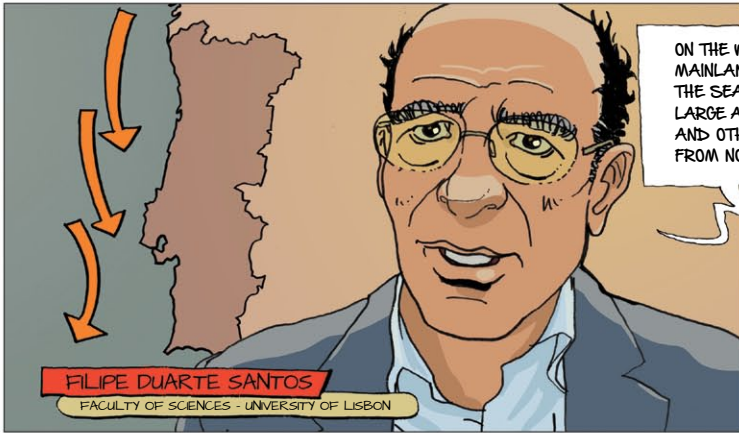
YES. I HAVE A FEW NOTES. ARE YOU GOING TO ASK QUESTIONS?

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...





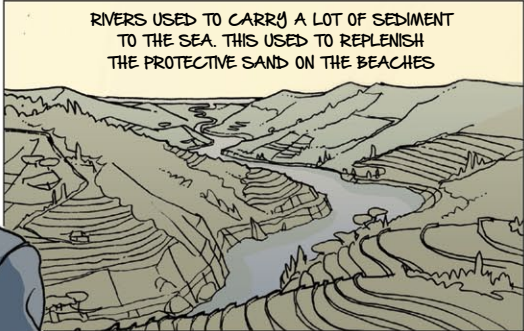
FILIPE DUARTE SANTOS  
FACULTY OF SCIENCES - UNIVERSITY OF LISBON

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

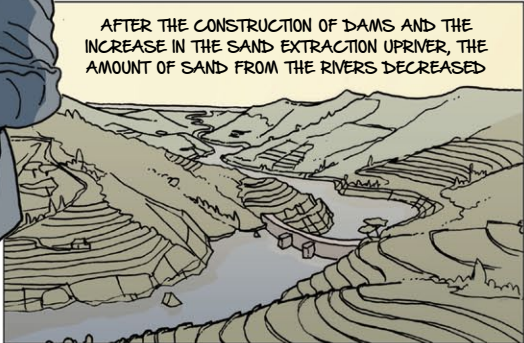


ONE YEAR AGO, THE SAND OF THIS BEACH WAS PROBABLY FURTHER NORTH . . .

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



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

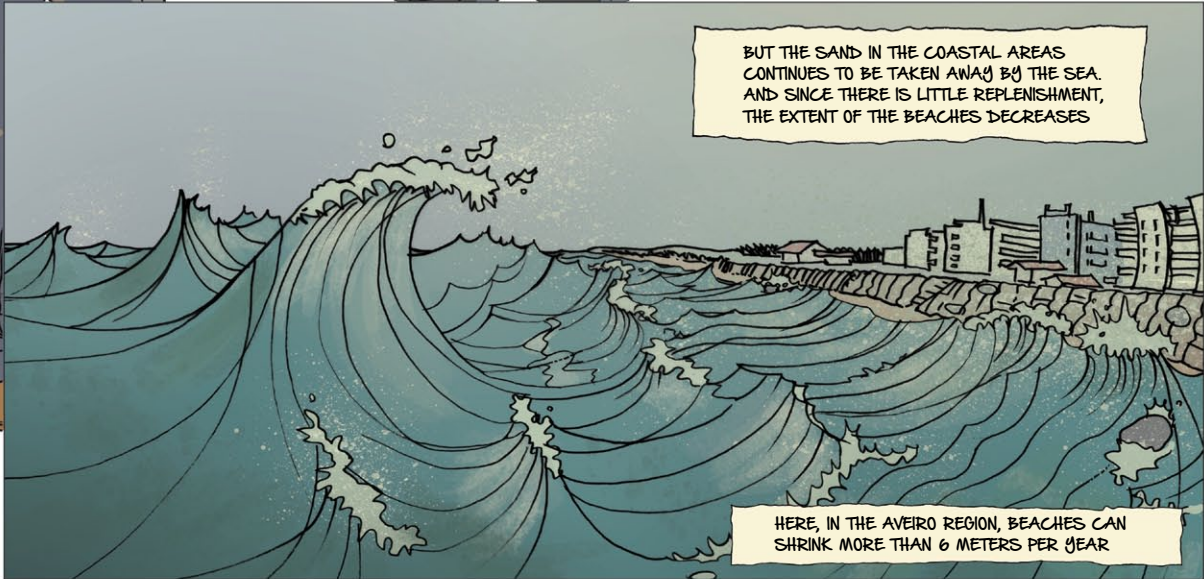


AFTER THE CONSTRUCTION OF DAMS AND THE INCREASE IN THE SAND EXTRACTION UP RIVER, THE AMOUNT OF SAND FROM THE RIVERS DECREASED



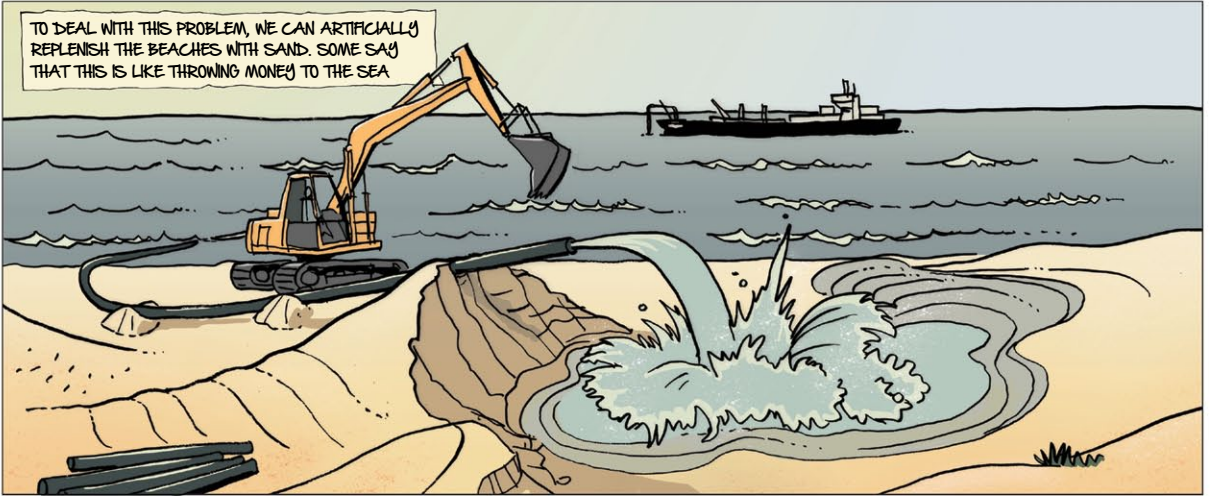
YES . . .

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



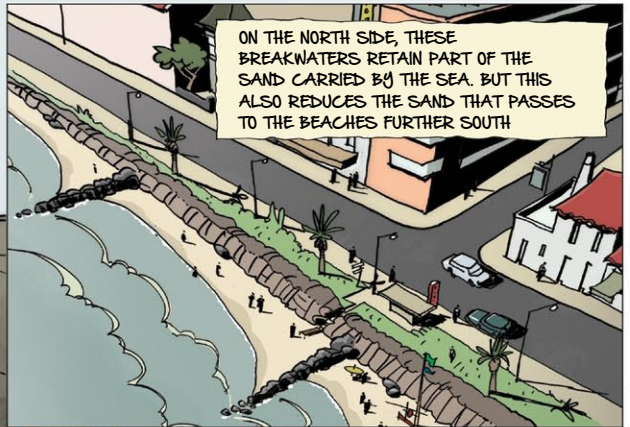
I THINK IT'S MORE LIKE DRINKING WATER TO COMPENSATE FOR THE LOSS OF LIQUIDS IN OUR BODY



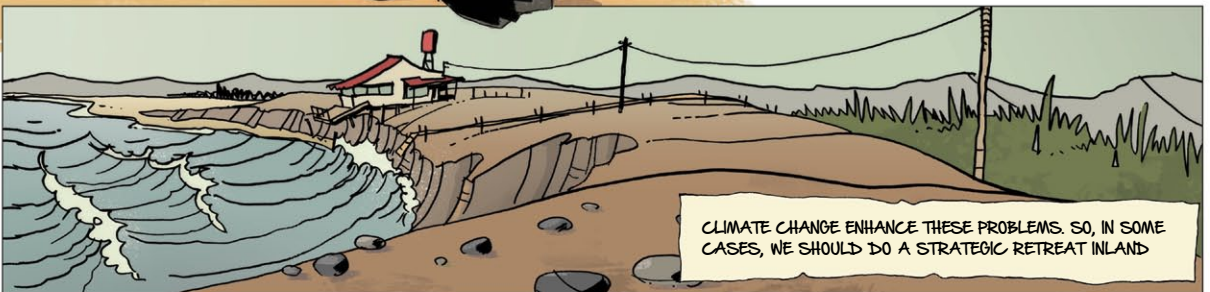
WE CAN ALSO PLACE ROCKS ALONG THE SHORE AND BUILD BREAKWATERS



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

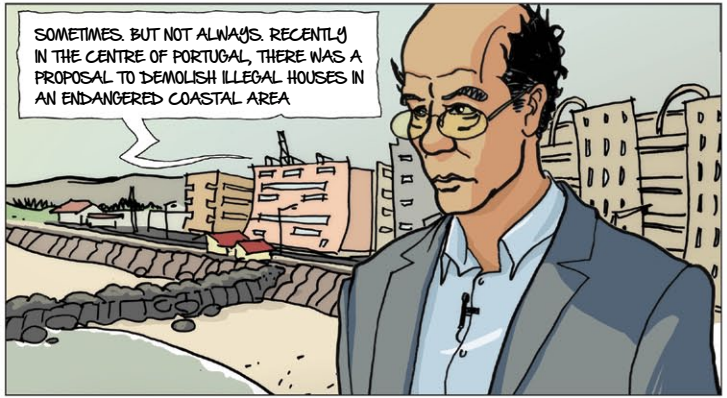


CLIMATE CHANGE ENHANCE THESE PROBLEMS. SO, IN SOME CASES, WE SHOULD DO A STRATEGIC RETREAT INLAND





AND THIS IS ALREADY HAPPENING?



SOMETIMES, BUT NOT ALWAYS. RECENTLY IN THE CENTRE OF PORTUGAL, THERE WAS A PROPOSAL TO DEMOLISH ILLEGAL HOUSES IN AN ENDANGERED COASTAL AREA



BUT WHEN THE MAYOR REALIZED THERE WAS A LOT OF PEOPLE AGAINST THIS, HE PULLED BACK IMMEDIATELY

WE HAVE TO CONSIDER THE ISSUE OF ACCOMMODATING PEOPLE THAT DO NOT HAVE ANOTHER HOUSE



BUT WE CANNOT SIMPLY IGNORE THIS PROBLEM

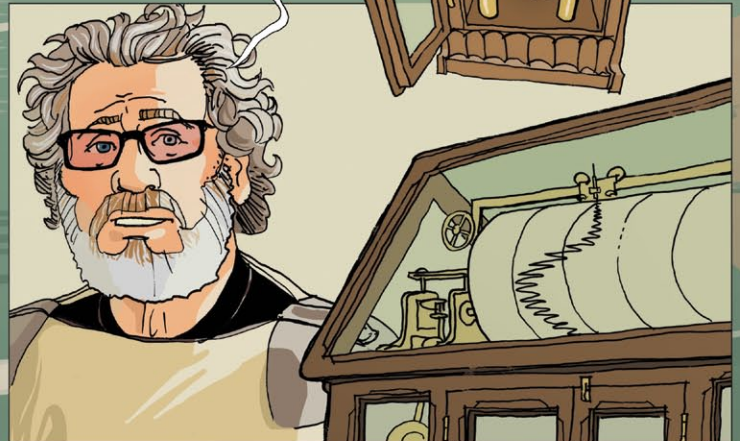
TO LEARN MORE ABOUT THE SEA LEVEL RISE, WE WENT TO VISIT THE TIDE GAUGE IN CASCAIS (ABOUT 30 KM FROM LISBON)

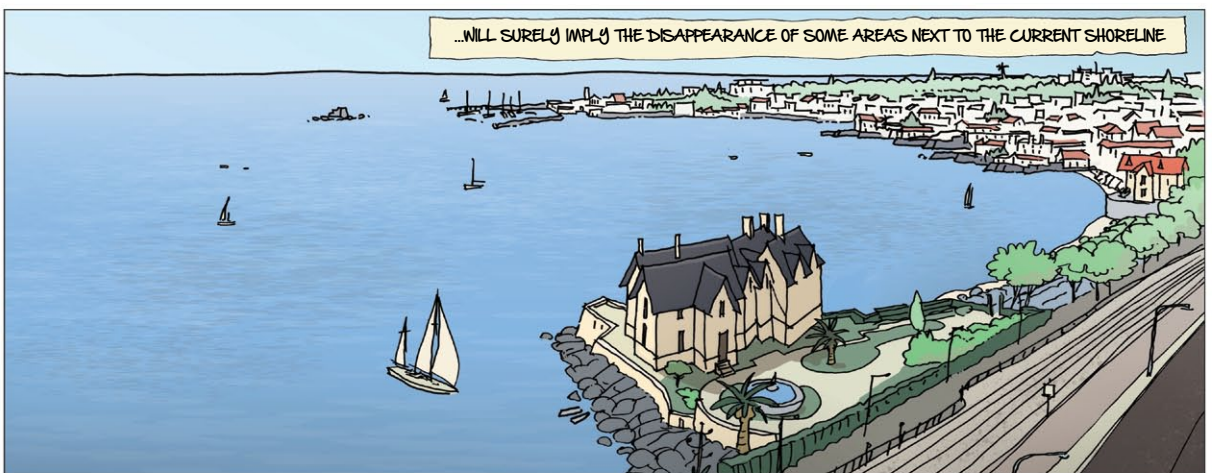
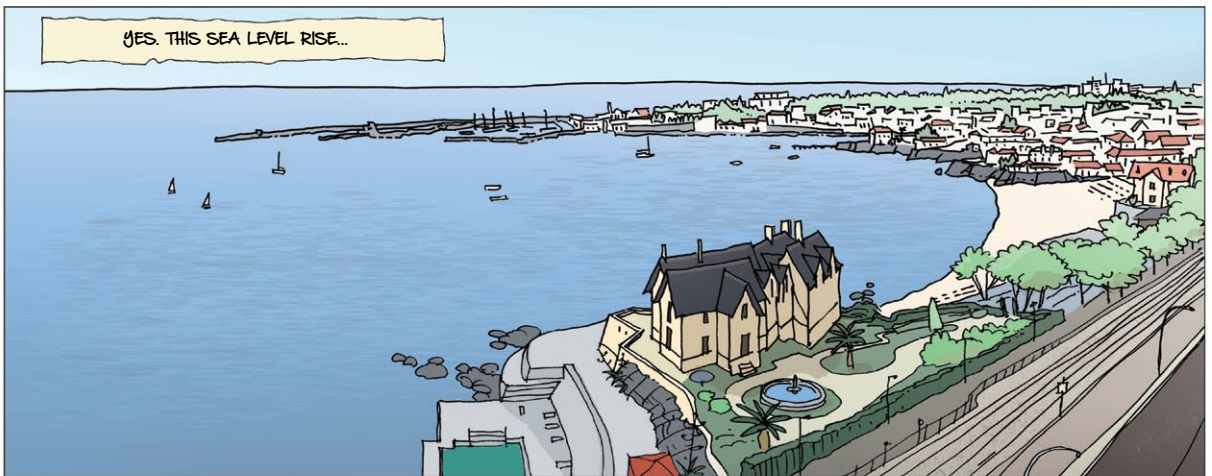
THIS IS ONE OF THE OLDEST TIDE GAUGES IN THE WORLD. IT HAS COLLECTED DATA CONTINUALLY SINCE 1882 UNTIL THE PRESENT DAY

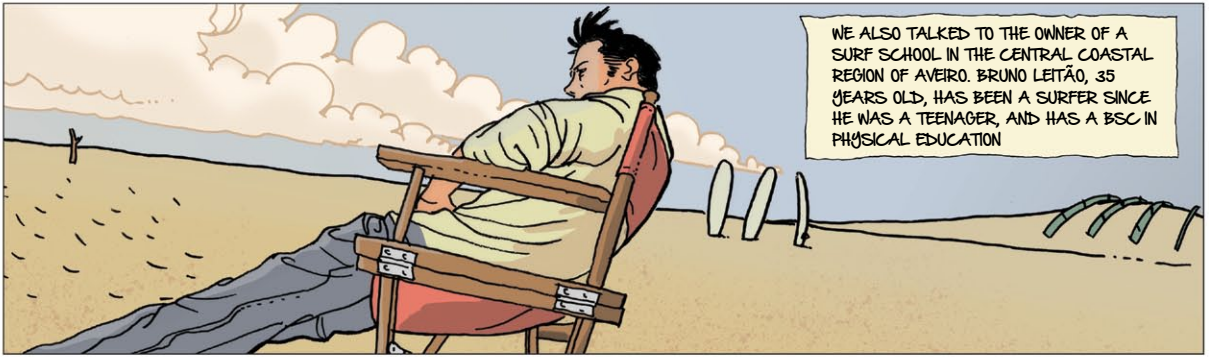
YOU SEE THAT BUOY, WHICH IS FLOATING DOWN THERE? THE IDEA WAS TO CALCULATE THE MIDDLE POINT BETWEEN LOW AND HIGH TIDE, TO USE IT AS THE ALTITUDE ZERO OF THE MAPS...

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

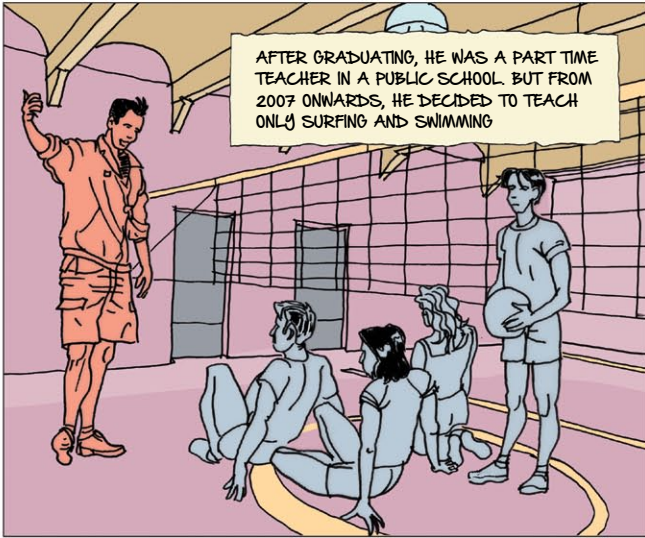
YES. AND BY ANALYZING THE INFORMATION COLLECTED HERE, IT IS KNOWN THAT THE SEA LEVEL HAS RISEN ABOUT 20 CENTIMETERS SINCE 1882







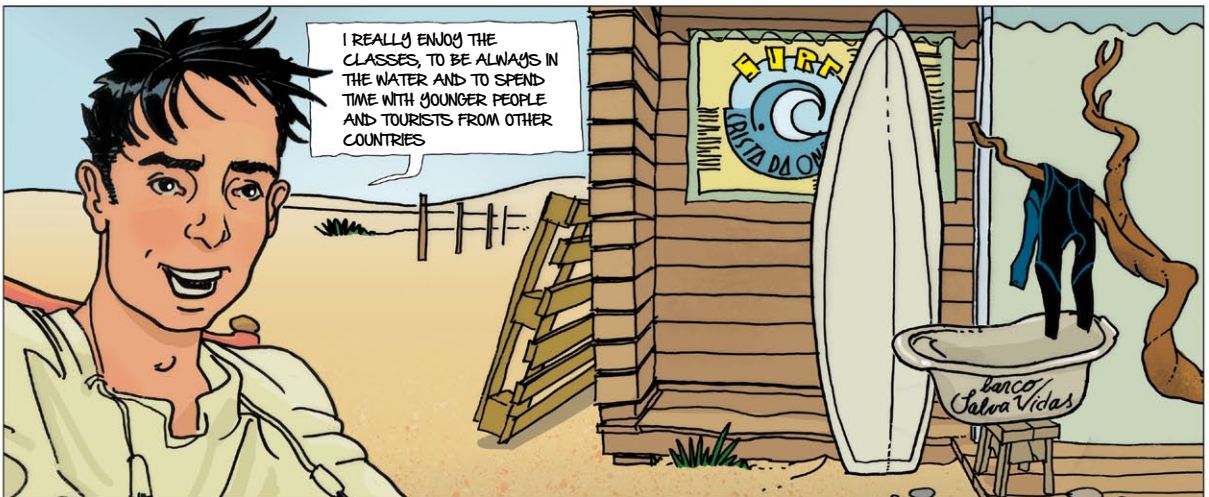
WE ALSO TALKED TO THE OWNER OF A SURF SCHOOL IN THE CENTRAL COASTAL REGION OF AVEIRO. BRUNO LEITÃO, 35 YEARS OLD, HAS BEEN A SURFER SINCE HE WAS A TEENAGER, AND HAS A BSC IN PHYSICAL EDUCATION



AFTER GRADUATING, HE WAS A PART TIME TEACHER IN A PUBLIC SCHOOL BUT FROM 2007 ONWARDS, HE DECIDED TO TEACH ONLY SURFING AND SWIMMING



ONE YEAR LATER, HE OPENED UP A SURF SCHOOL

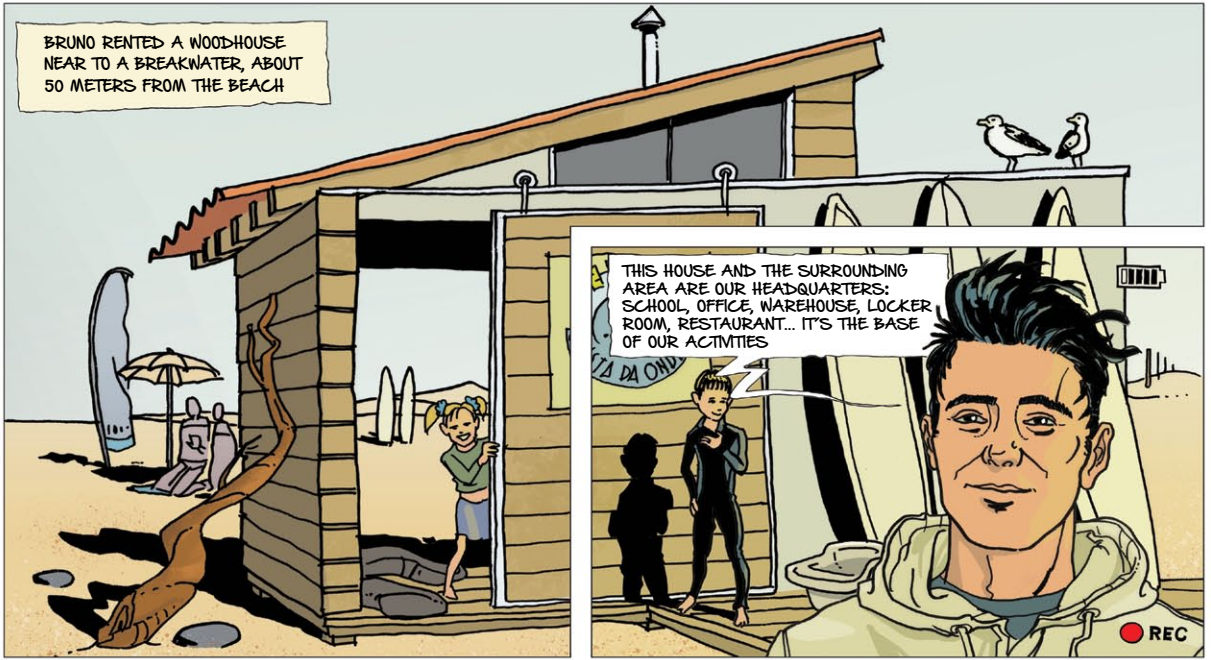


I REALLY ENJOY THE CLASSES, TO BE ALWAYS IN THE WATER AND TO SPEND TIME WITH YOUNGER PEOPLE AND TOURISTS FROM OTHER COUNTRIES



THE SCHOOL IS GROWING WELL. WE ARE ALREADY FIVE TEACHERS, AND SOME OF OUR STUDENTS HAVE WON REGIONAL CHAMPIONSHIPS

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

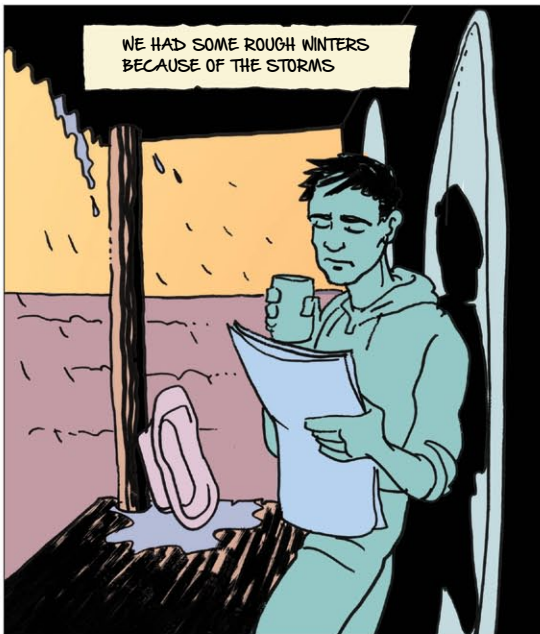


THIS HOUSE AND THE SURROUNDING AREA ARE OUR HEADQUARTERS: SCHOOL, OFFICE, WAREHOUSE, LOCKER ROOM, RESTAURANT... IT'S THE BASE OF OUR ACTIVITIES



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

BUT THE SEA ALWAYS TAKES A LOT OF IT AWAY

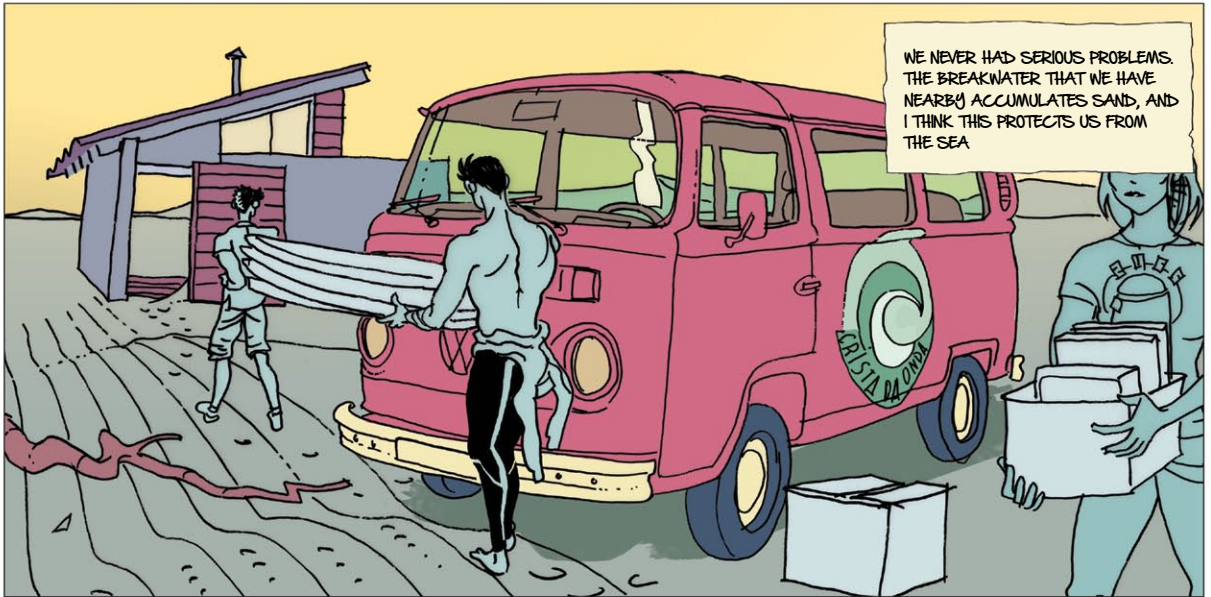


WE HAD SOME ROUGH WINTERS BECAUSE OF THE STORMS



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 . . .





WE NEVER HAD SERIOUS PROBLEMS. THE BREAKWATER THAT WE HAVE NEARBY ACCUMULATES SAND, AND I THINK THIS PROTECTS US FROM THE SEA

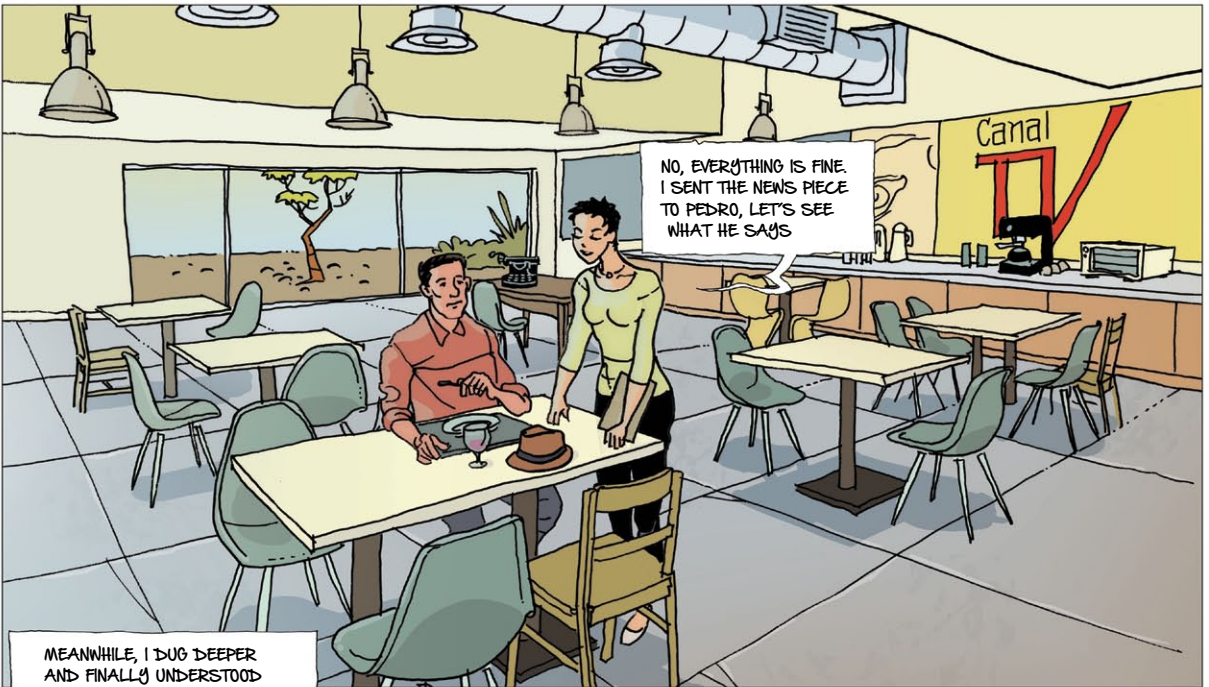


BUT EVERY YEAR, WHEN I SEE THE WEATHER GETTING WORSE, I WONDER: IS THIS THE YEAR IN WHICH SOMETHING BAD WILL HAPPEN TO US?



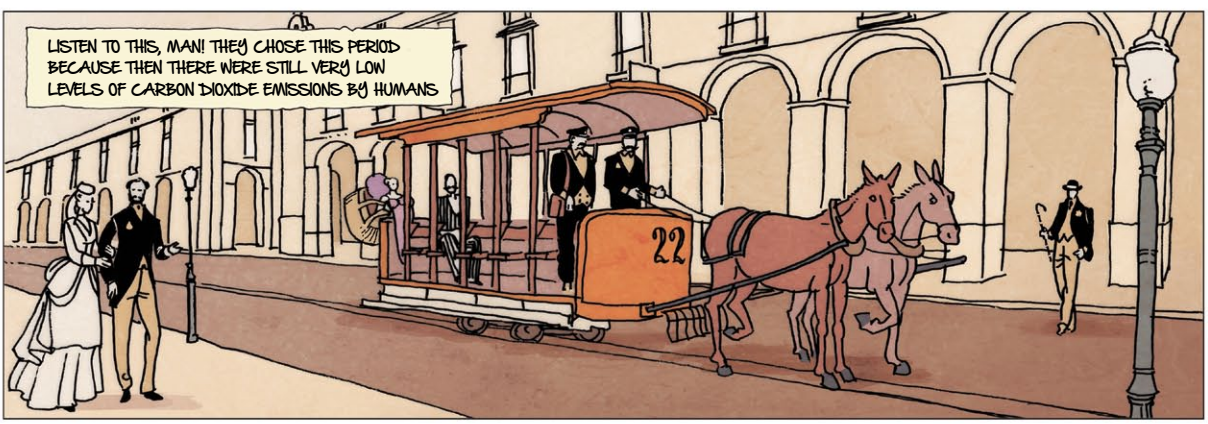
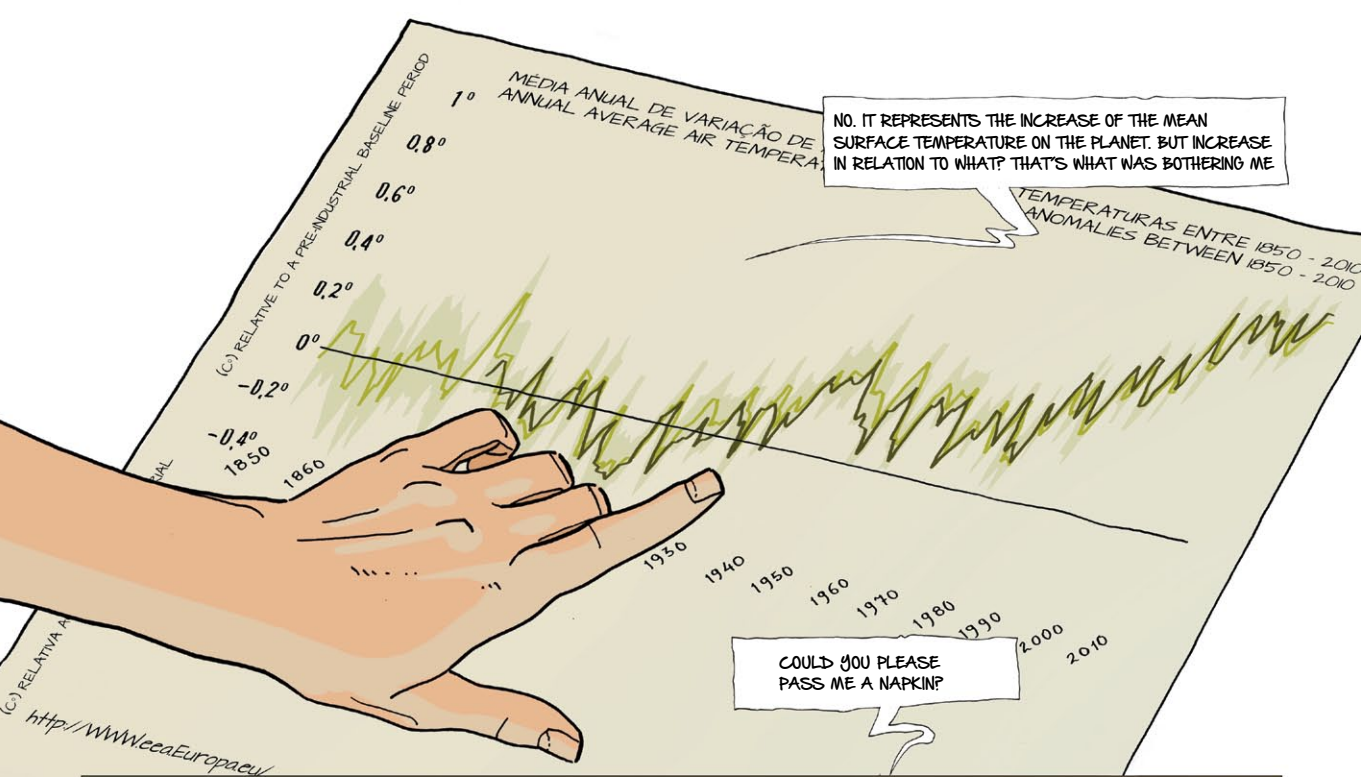
... WILL WE HAVE TO LEAVE?

# 3 THE STORM



MEANWHILE, I DUG DEEPER AND FINALLY UNDERSTOOD THE TEMPERATURE CHART. CAN I EXPLAIN IT TO YOU?







AND IT'S 30 YEARS, THE MINIMUM TIME TO STUDY THE CLIMATE. THIS IS THE BASIS FOR COMPARISON, THE SO-CALLED PRE-INDUSTRIAL PERIOD. GOT IT?

YES, I THINK SO. THEY COMPARED RECENT TEMPERATURES WITH THE ONES BEFORE THERE WAS A LOT OF AIR POLLUTION



THAT'S RIGHT! SORRY TO BOTHER, BUT I REALLY HAD TO SHARE THIS WITH SOMEONE. I TEND TO BE A BIT IMPATIENT

THANKS FOR THE WARNING!



I HAVE ALREADY PACKED EVERYTHING. SO, WE JUST HAVE TO CARRY OUR STUFF TO THE CAR AND GO

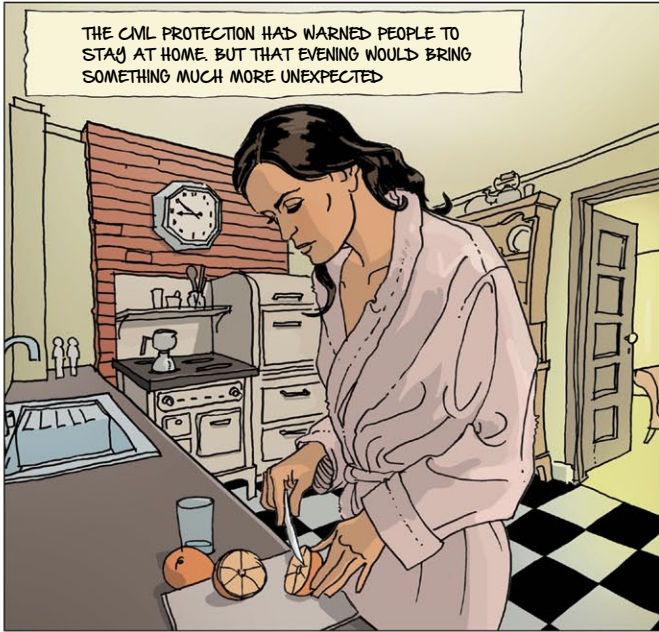


YOU ARE NOT GOING TO HAVE LUNCH?

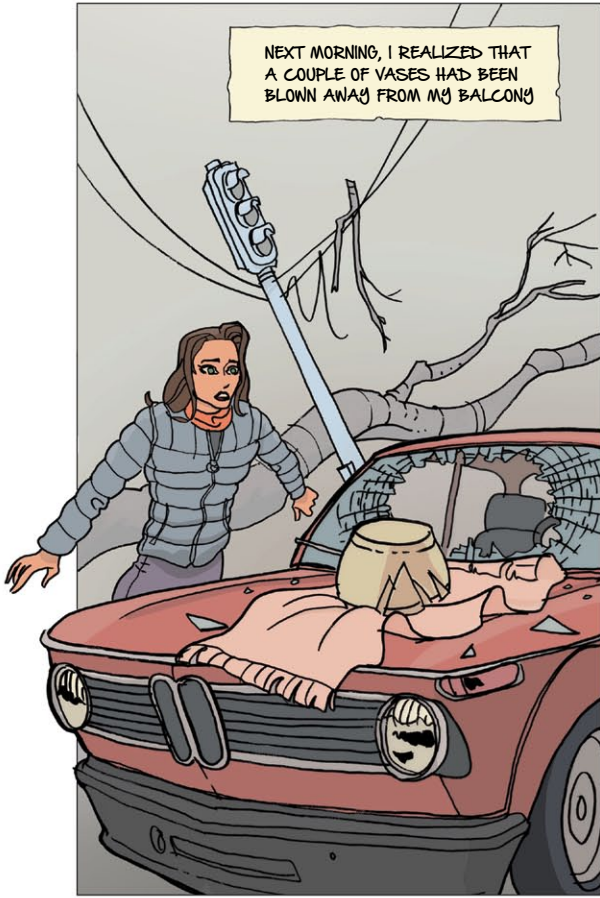
I THINK I HAVE SOME COOKIES IN MY BAG



COOKIES? I WILL TAKE SOME PROPER FOOD FROM THE BAR FOR YOU!



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





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!

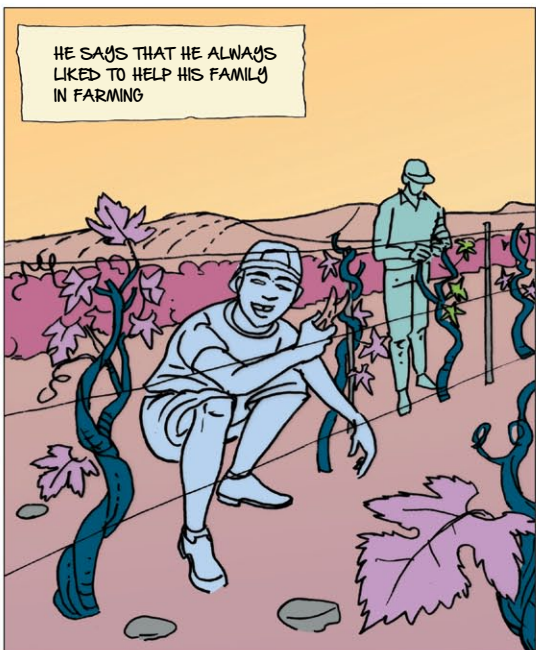
YES, BUT THE WAY YOU STARTED THE CAR WAS ALSO VERY IMPORTANT!



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

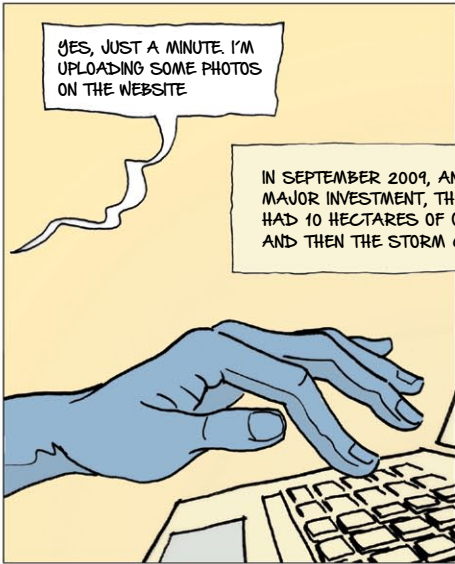


AFTER FINISHING HIGH SCHOOL, HE CREATED A COMPANY AND BEGAN TO FARM ON THE LAND OF HIS PARENTS



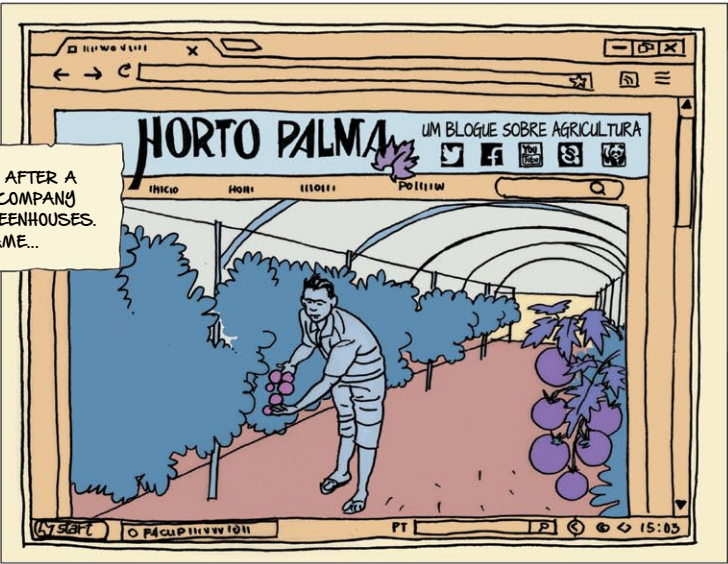
SINCE MY SALES WERE INCREASING, I DECIDED TO BUY LAND AND EQUIPMENT. I BORROWED MONEY FROM BANKS AND FROM MY FAMILY, I APPLIED FOR FUNDING IN PORTUGAL AND ABROAD...



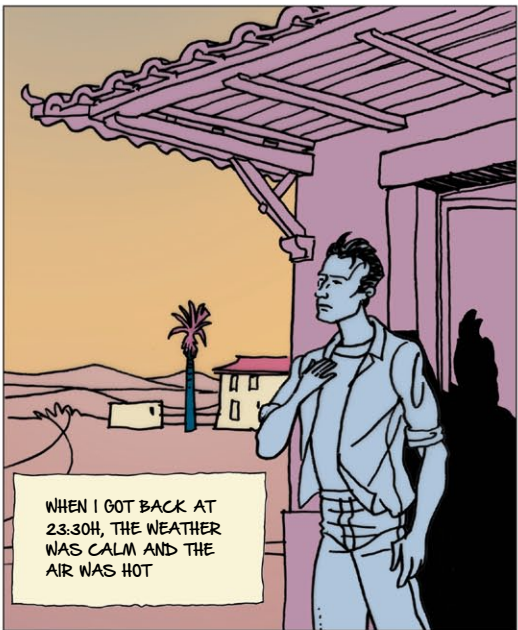


YES, JUST A MINUTE. I'M UPLOADING SOME PHOTOS ON THE WEBSITE

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



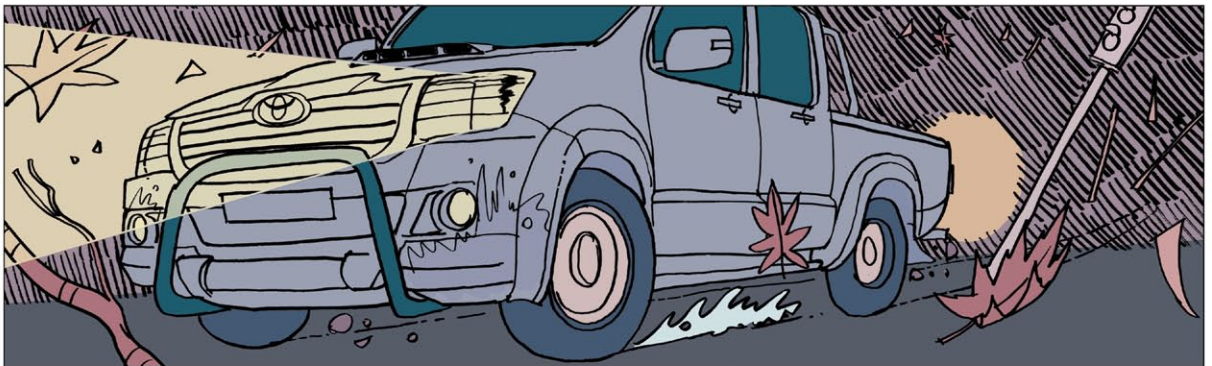
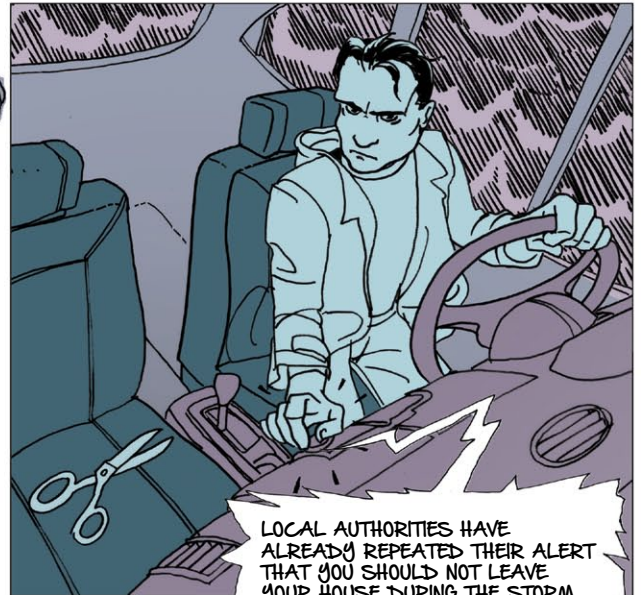
ON THAT NIGHT, I HAD GONE TO A MEETING AT THE HORTICULTURAL ASSOCIATION TO WHICH I BELONG

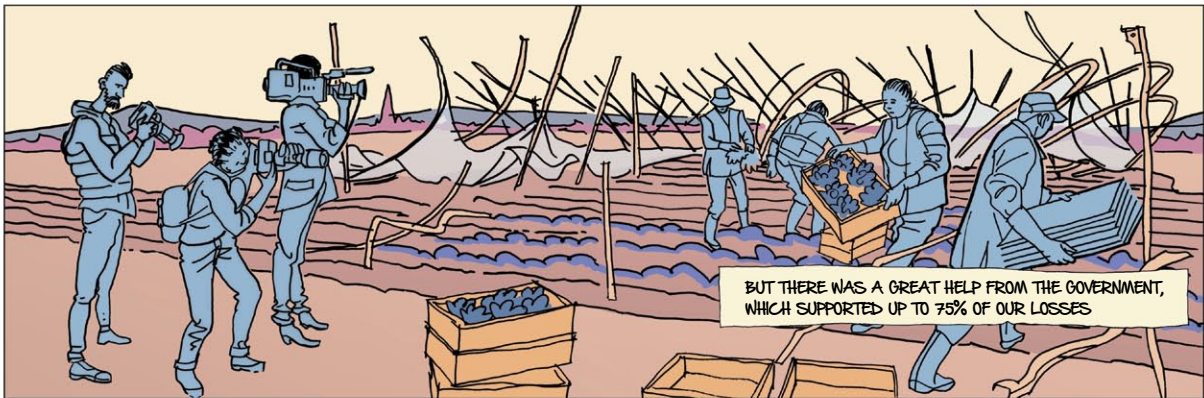


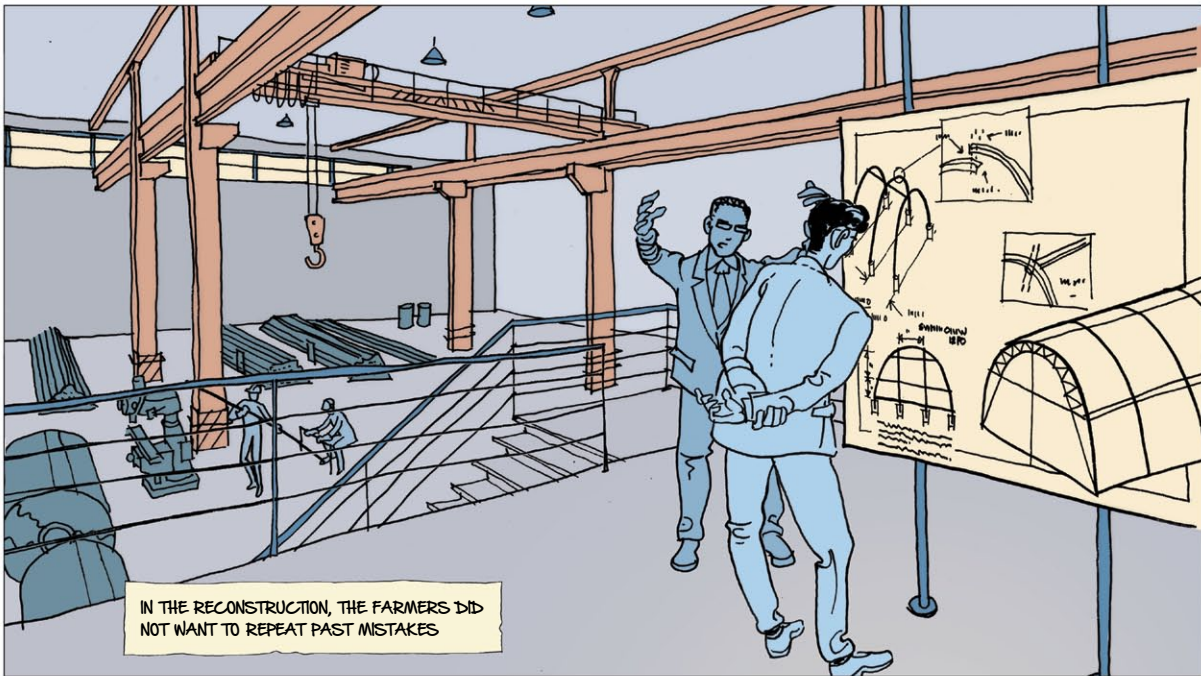
WHEN I GOT BACK AT 23.30H, THE WEATHER WAS CALM AND THE AIR WAS HOT



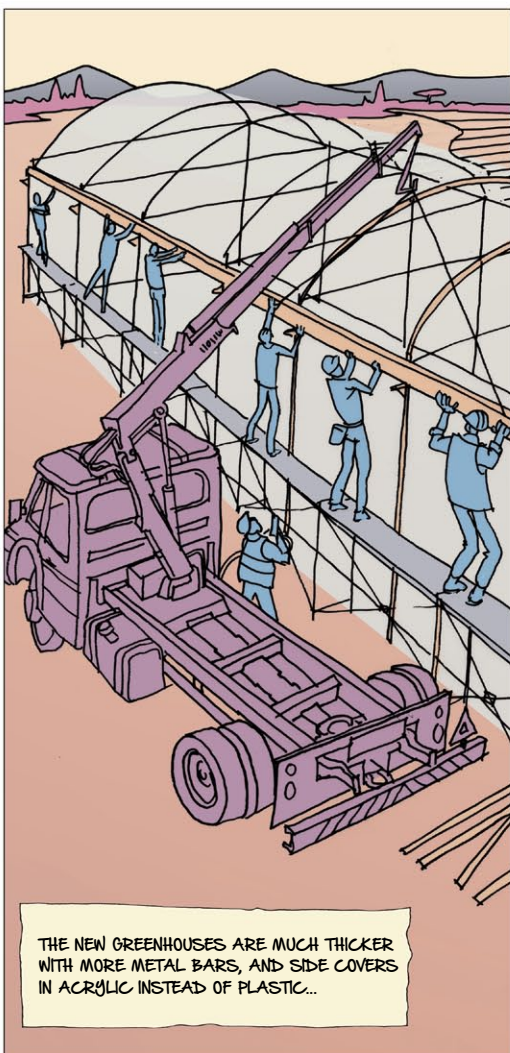
AROUND 3:30 AM, I WOKE UP WITH THE SOUND OF GALES. AND THEN I KEPT THINKING ABOUT THE GREENHOUSES



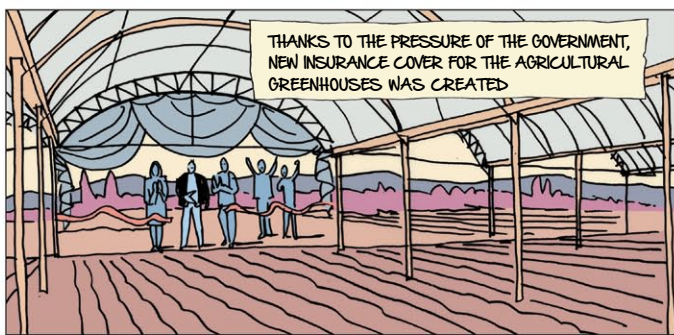




IN THE RECONSTRUCTION, THE FARMERS DID NOT WANT TO REPEAT PAST MISTAKES



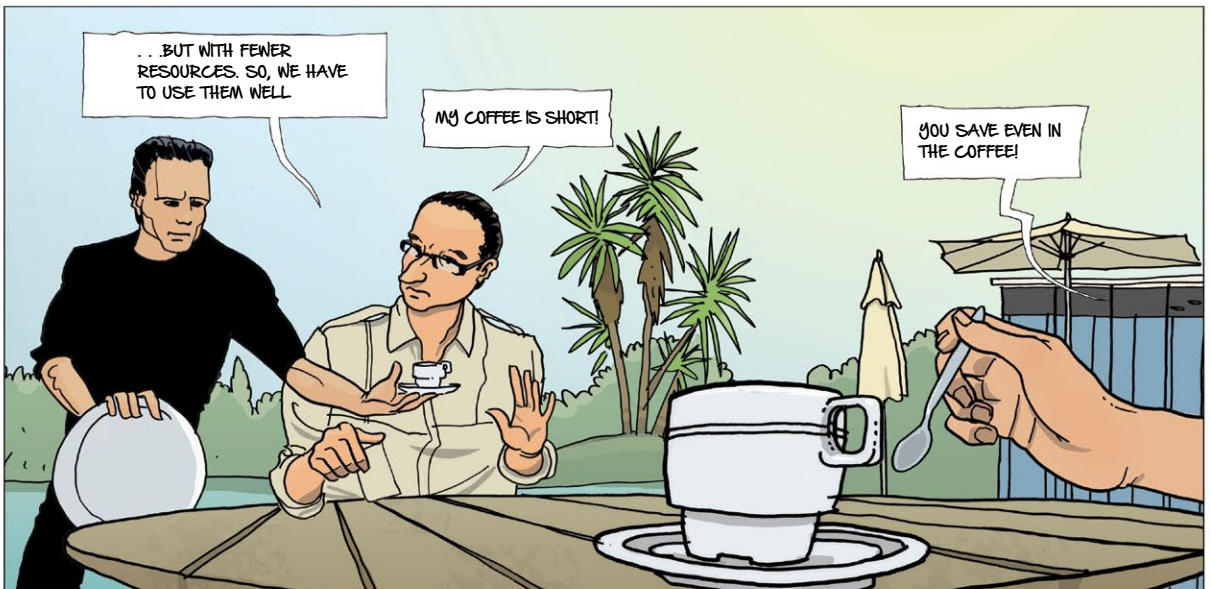
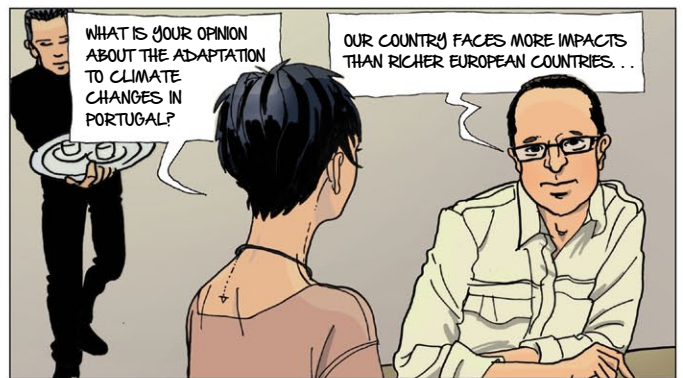
THE NEW GREENHOUSES ARE MUCH THICKER WITH MORE METAL BARS, AND SIDE COVERS IN ACRYLIC INSTEAD OF PLASTIC...

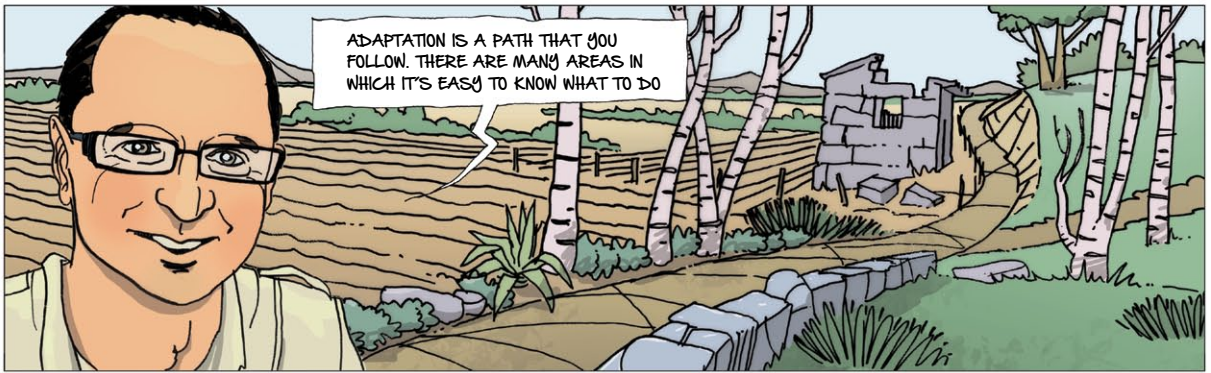


THANKS TO THE PRESSURE OF THE GOVERNMENT, NEW INSURANCE COVER FOR THE AGRICULTURAL GREENHOUSES WAS CREATED

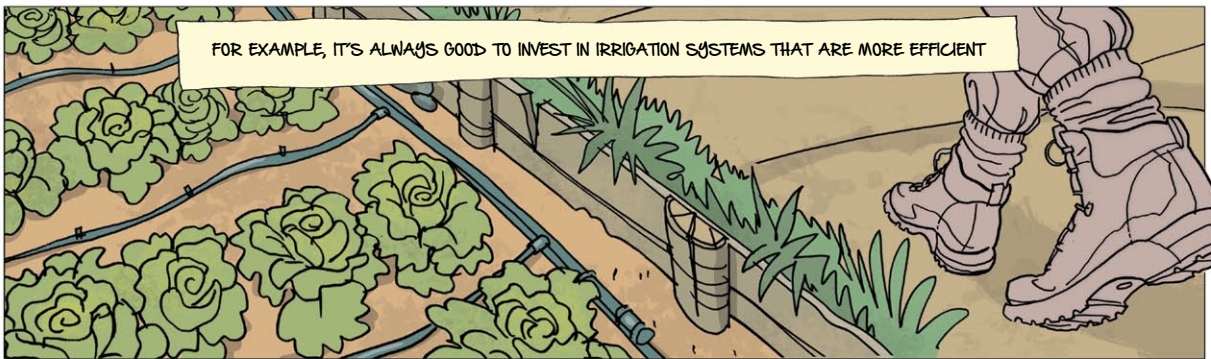


SO I BEGAN TO SLEEP MUCH BETTER ON WINDY NIGHTS





ADAPTATION IS A PATH THAT YOU FOLLOW. THERE ARE MANY AREAS IN WHICH IT'S EASY TO KNOW WHAT TO DO



FOR EXAMPLE, IT'S ALWAYS GOOD TO INVEST IN IRRIGATION SYSTEMS THAT ARE MORE EFFICIENT



BUT THERE ARE OTHER AREAS WHERE THERE IS MUCH LESS INFORMATION. AND WHAT WE CONSIDER A GOOD OPTION TODAY MAY NOT BE SO 10 YEARS AHEAD



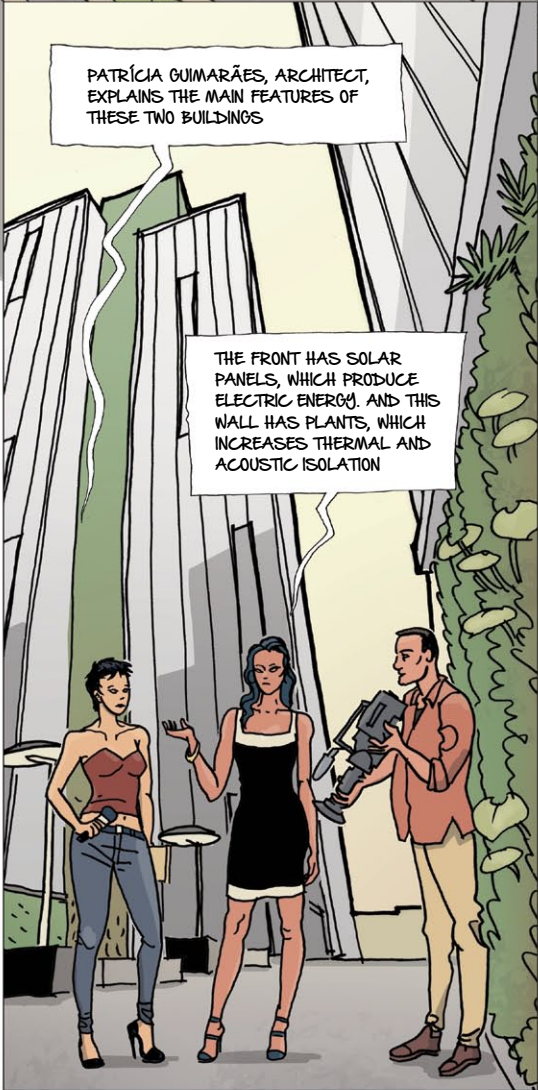
SO, AS WE KEEP GETTING MORE INFORMATION, WE HAVE TO REVIEW THIS PATH...



...TO GUARANTEE THAT WE ARE DOING WHAT IS BEST

# 4 ADAPTATION

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

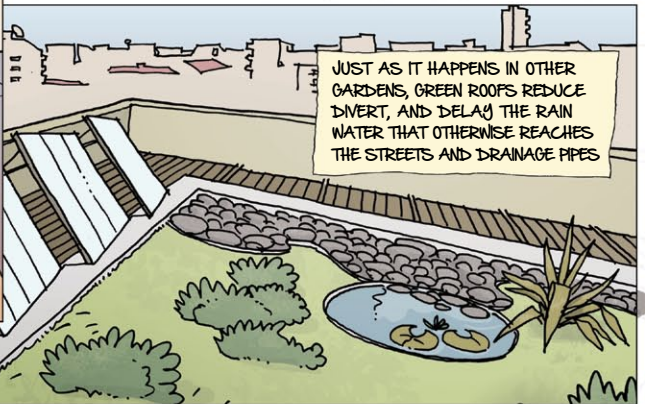




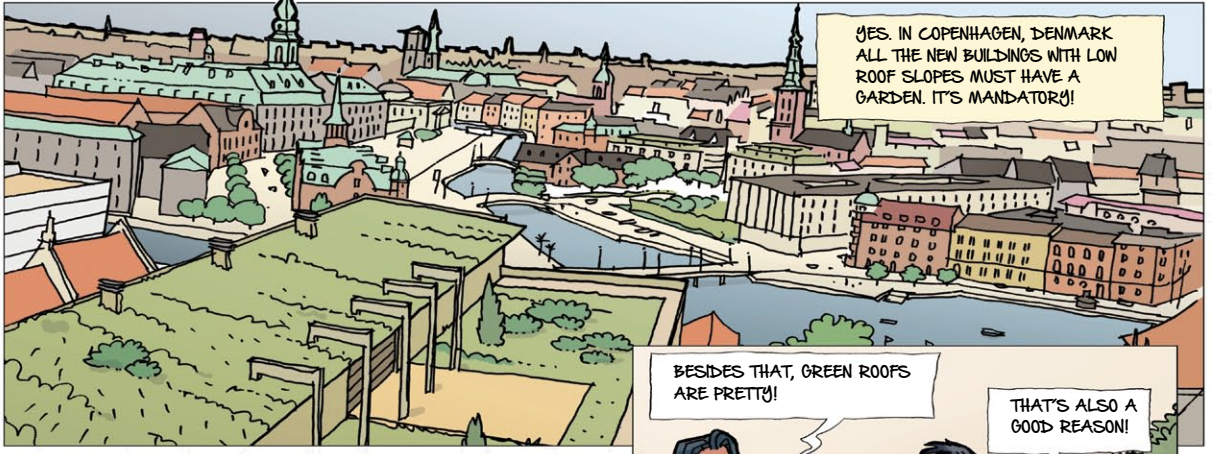
UP HERE, WE HAVE A GARDEN

WE COLLECT WATER FROM THE RAIN, WHICH IS USED FOR IRRIGATION

IN SOME CITIES, THERE ARE LOTS OF GREEN ROOF BUILDINGS, RIGHT?



JUST AS IT HAPPENS IN OTHER GARDENS, GREEN ROOFS REDUCE DIVERT, AND DELAY THE RAIN WATER THAT OTHERWISE REACHES THE STREETS AND DRAINAGE PIPES



YES. IN COPENHAGEN, DENMARK ALL THE NEW BUILDINGS WITH LOW ROOF SLOPES MUST HAVE A GARDEN. IT'S MANDATORY!

BESIDES THAT, GREEN ROOFS ARE PRETTY!

THAT'S ALSO A GOOD REASON!



THEY ALSO HELP TO LOWER THE TEMPERATURE IN HOT SUMMER DAYS



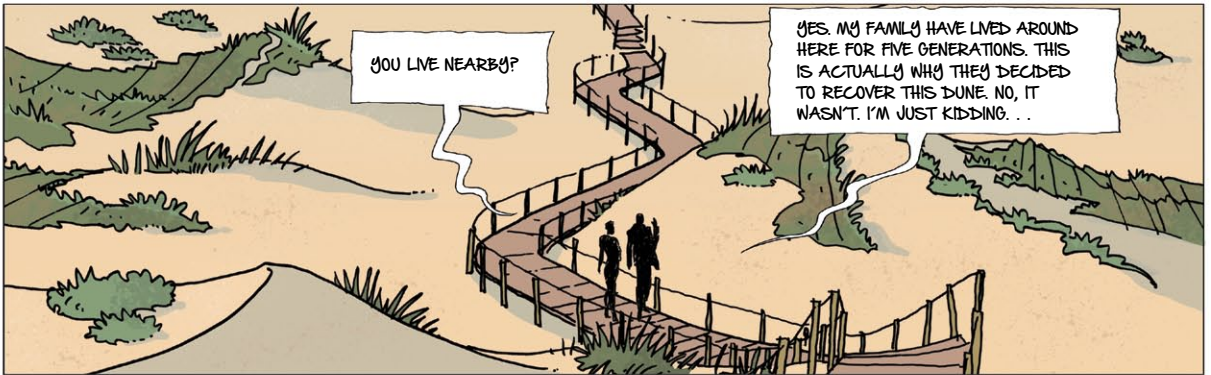
AFTER THIS, WE VISITED A DUNE NEAR CASCAIS. JOÃO DINIS, A TECHNICIAN OF THIS MUNICIPALITY, IS OUR GUIDE

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. . .

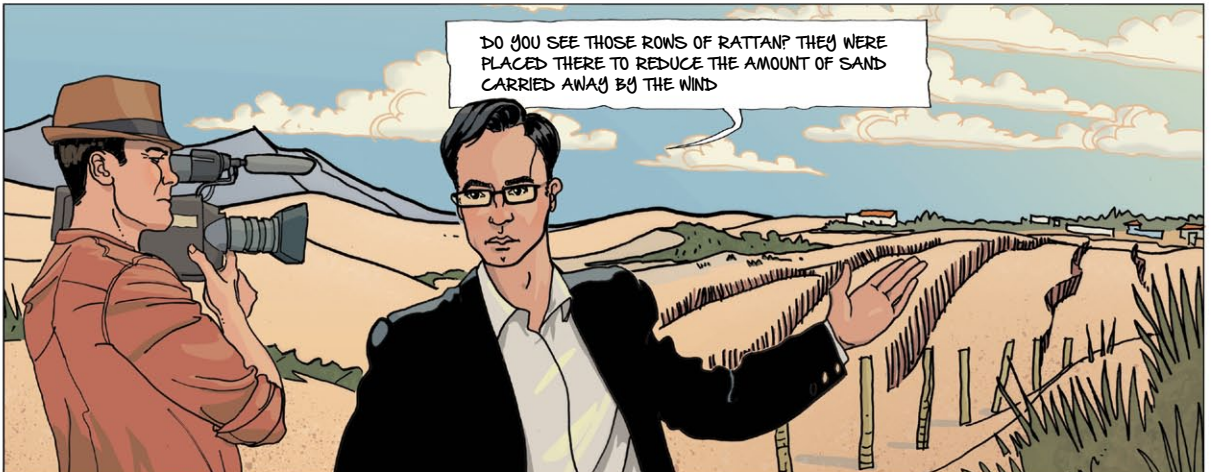


BUT ANYWAY IT SHOULD BE GOOD FOR FAMILY VISITS

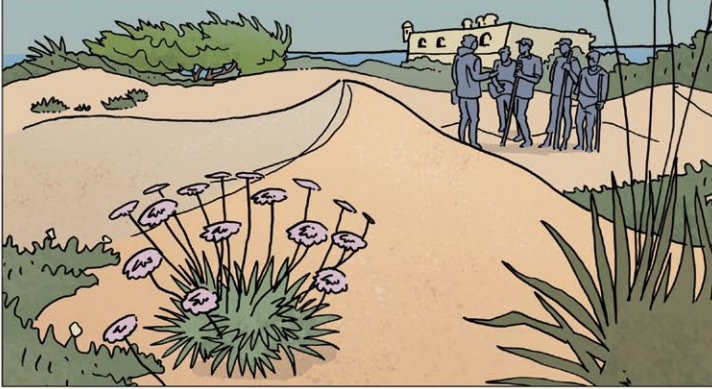
YES, AND IT'S GOOD FOR TOURISM. AND THAT IS ONE OF THE MAIN ACTIVITIES OF THIS REGION



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



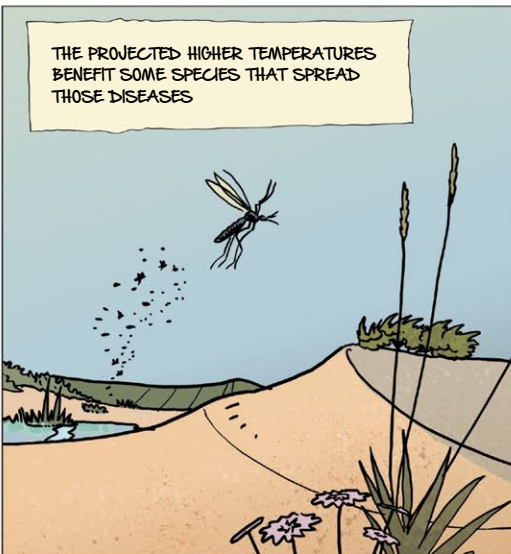
THIS IS A NATURE CONTACT AREA, WHICH ALSO PROVIDES SAND TO THE BEACH AND HELPS TO PROTECT THE COAST AGAINST SEA LEVEL RISE AND STORMS



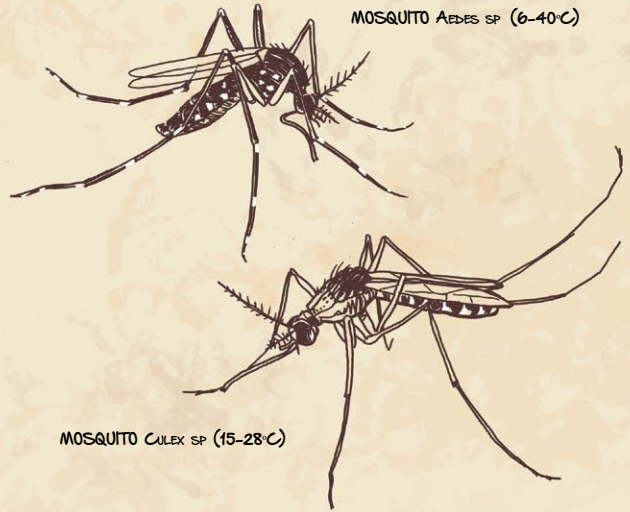
ANOTHER EFFECT OF CLIMATE CHANGE IS THE INCREASE OF TROPICAL DISEASES



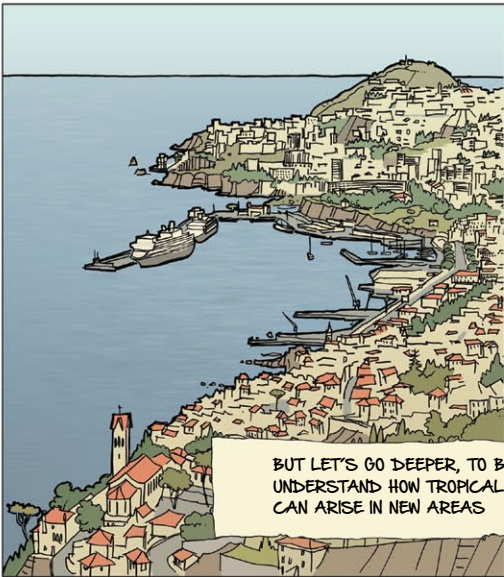
THE PROJECTED HIGHER TEMPERATURES BENEFIT SOME SPECIES THAT SPREAD THOSE DISEASES



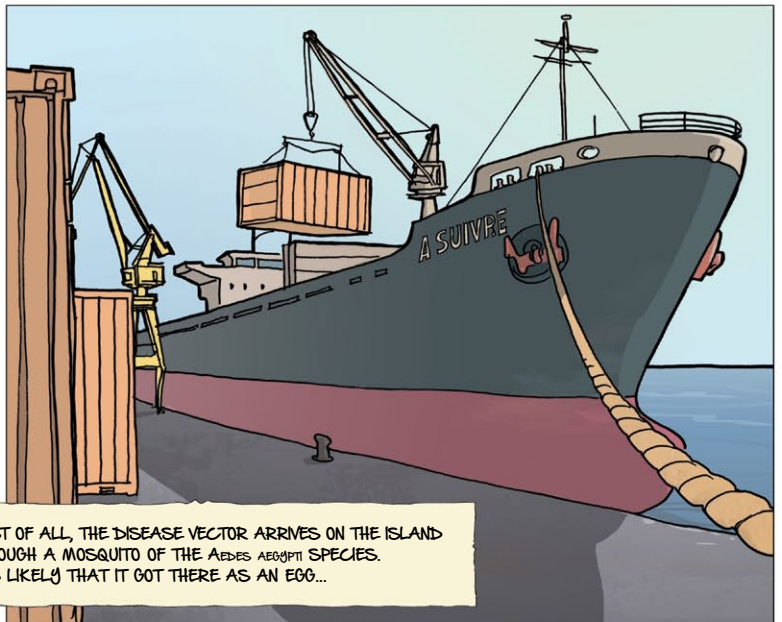
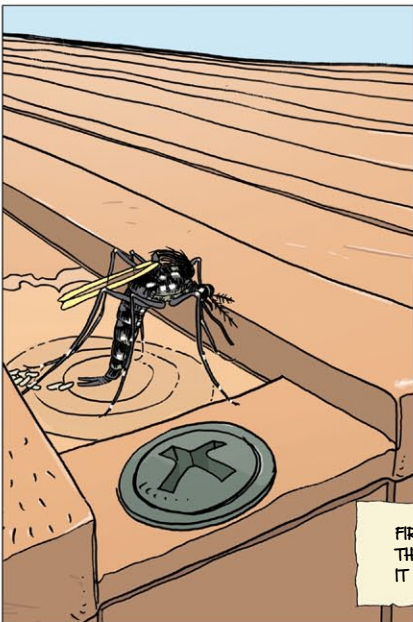
MOSQUITO Aedes sp (6-40°C)



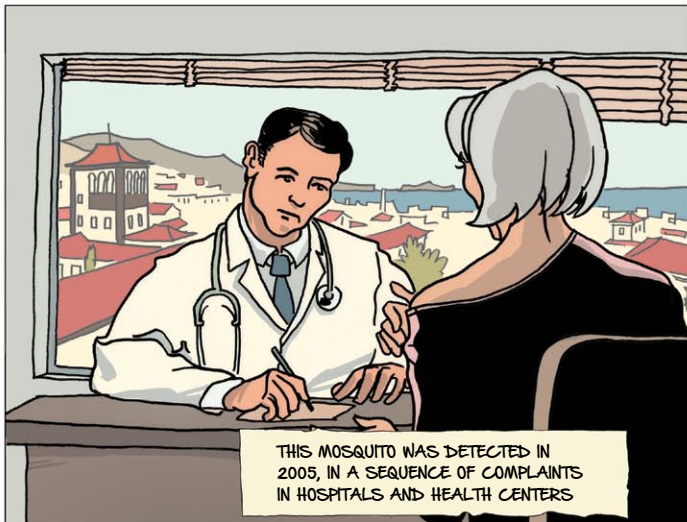
IN MADEIRA ISLAND, THERE WAS AN OUTBREAK OF DENGUE FEVER IN 2012. THIS CAN BE EXPLAINED BY INCREASED TRAFFIC OF PEOPLE AND CARGO, RATHER THAN BY CLIMATE CHANGE



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



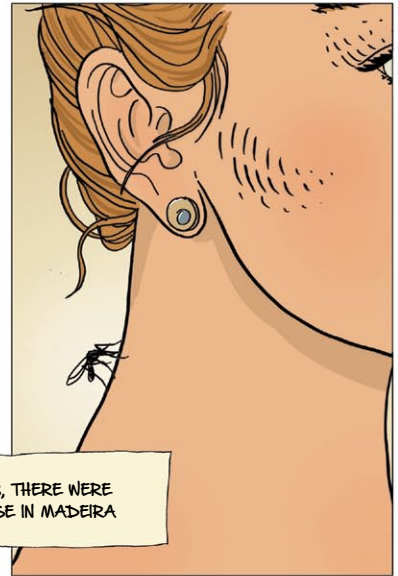
THE FIRST ACTION AGAINST THE MOSQUITO BEGAN ONLY IN 2007. UNFORTUNATELY, THIS VARIETY IS PARTIALLY RESISTANT TO INSECTICIDES



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

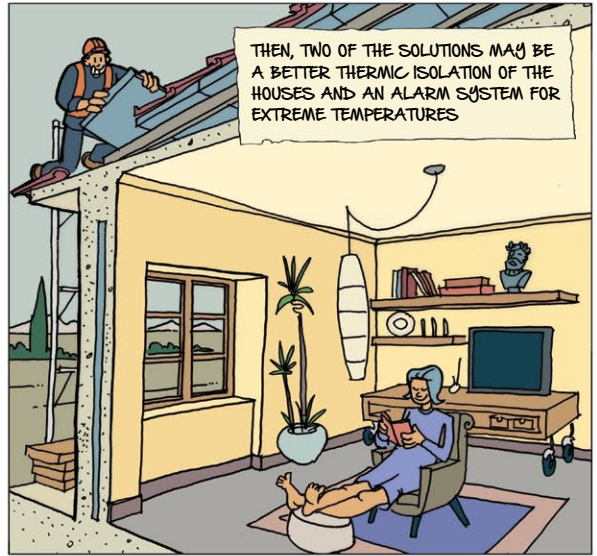
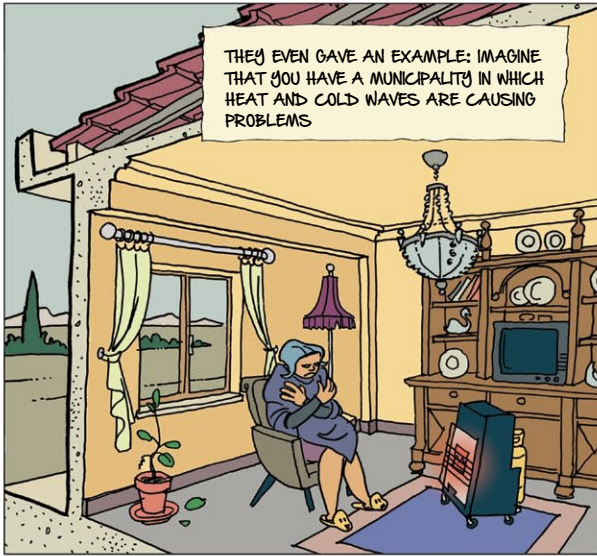
WHY IS THAT?

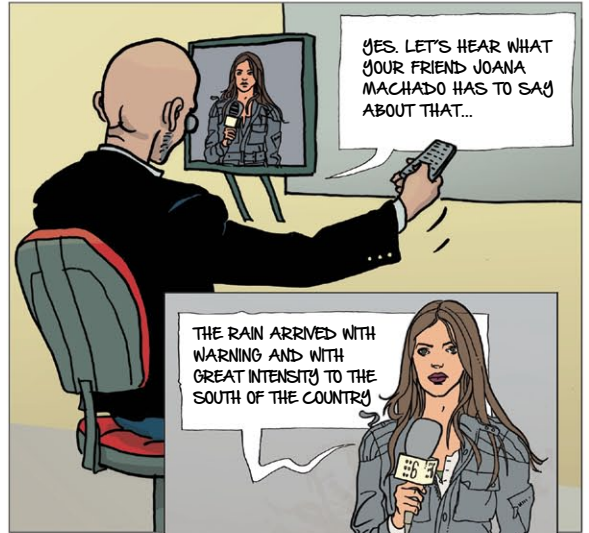
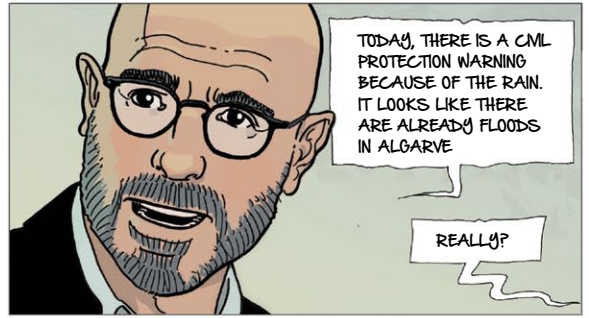
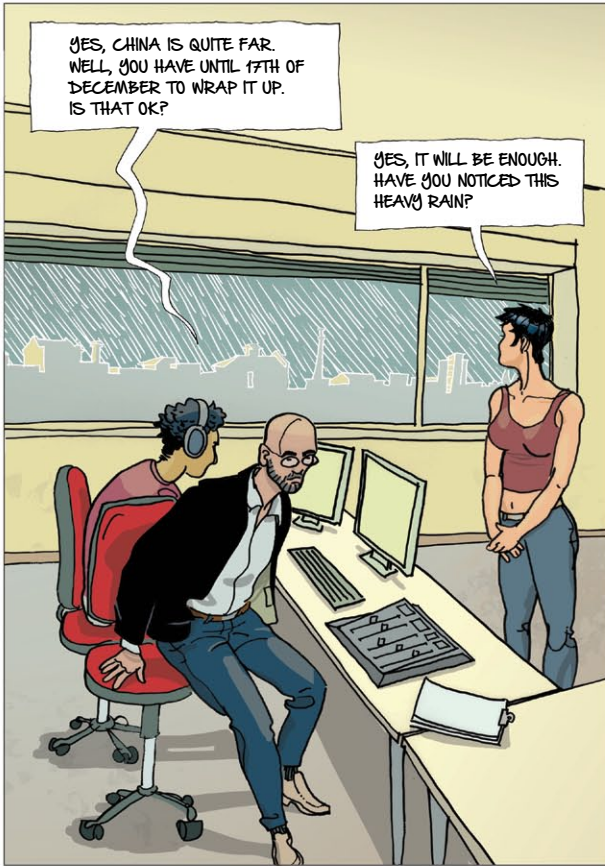
I WENT TO A WORKSHOP FOR JOURNALISTS ABOUT THE CLIMATE SUMMIT IN PARIS AND FOUND OUT ABOUT A PROJECT CALLED "CLIMADAPTLOCAL"

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

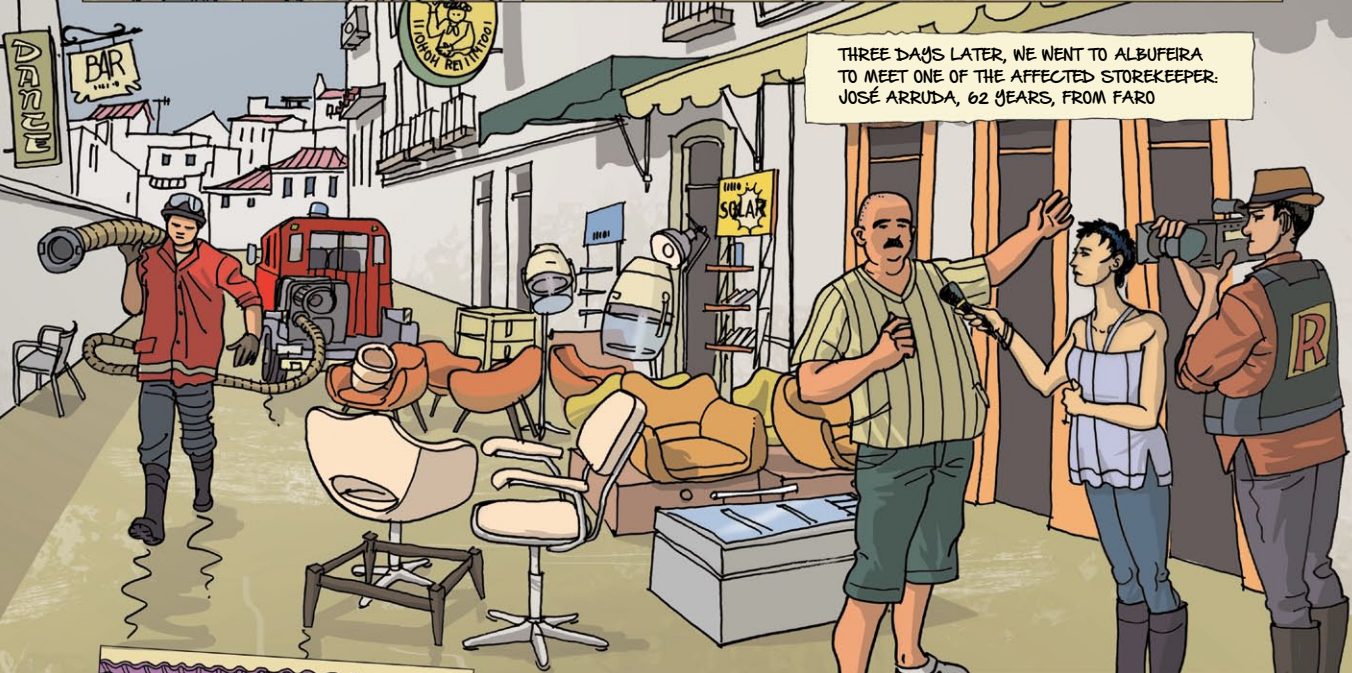




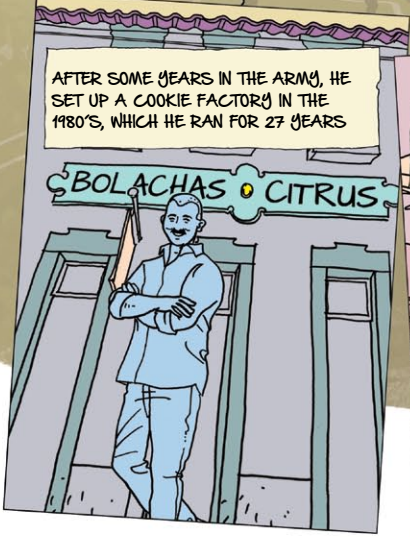




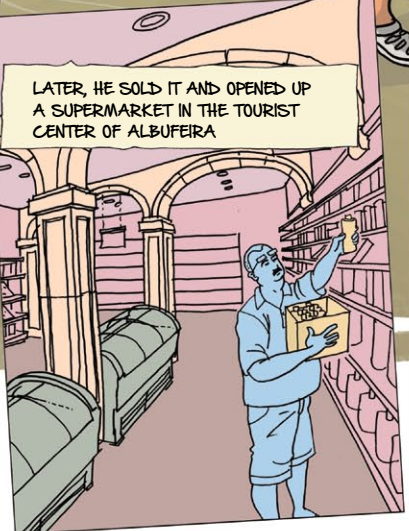
WHILE WE WERE PREPARING THIS SPECIAL REPORT, THERE WAS FLOODING IN SEVERAL AREAS OF ALGARVE



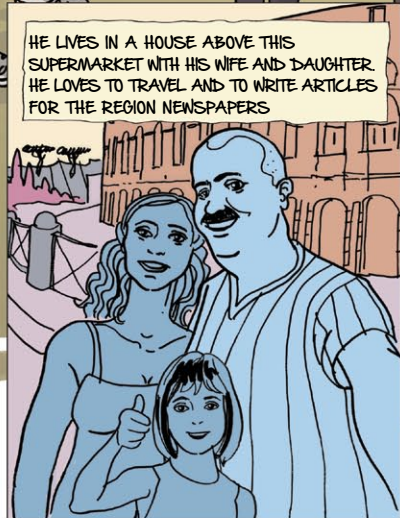
THREE DAYS LATER, WE WENT TO ALBUFEIRA TO MEET ONE OF THE AFFECTED STOREKEEPER: JOSÉ ARRUDA, 62 YEARS, FROM FARO



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



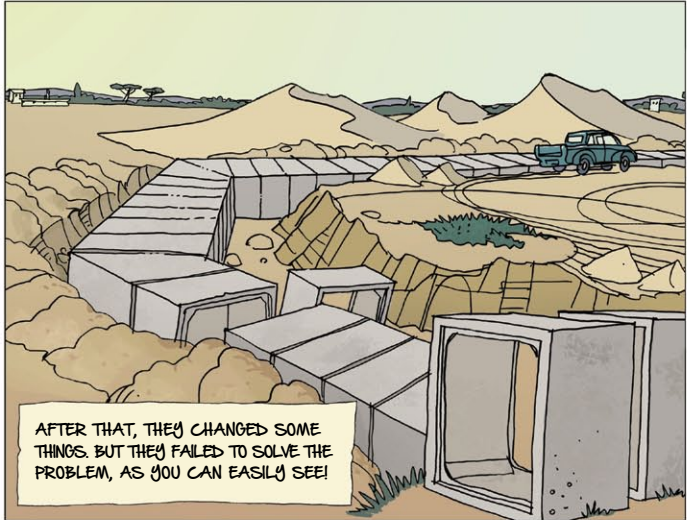
LATER, HE SOLD IT AND OPENED UP A SUPERMARKET IN THE TOURIST CENTER OF ALBUFEIRA



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



THERE HAD BEEN ALREADY DAMAGE HERE BECAUSE OF THE FLOODS OF 2008



AFTER THAT, THEY CHANGED SOME THINGS. BUT THEY FAILED TO SOLVE THE PROBLEM, AS YOU CAN EASILY SEE!



ON THE DAY OF THE FLOODING, I NOTICED THAT THE WATER WAS GETTING INSIDE THE SHOP



... AND IT WAS RISING FAST



THE RAIN DID NOT SLOW DOWN AND WE REALIZED THAT WE HAD LITTLE TIME TO SAVE OUR STUFF





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

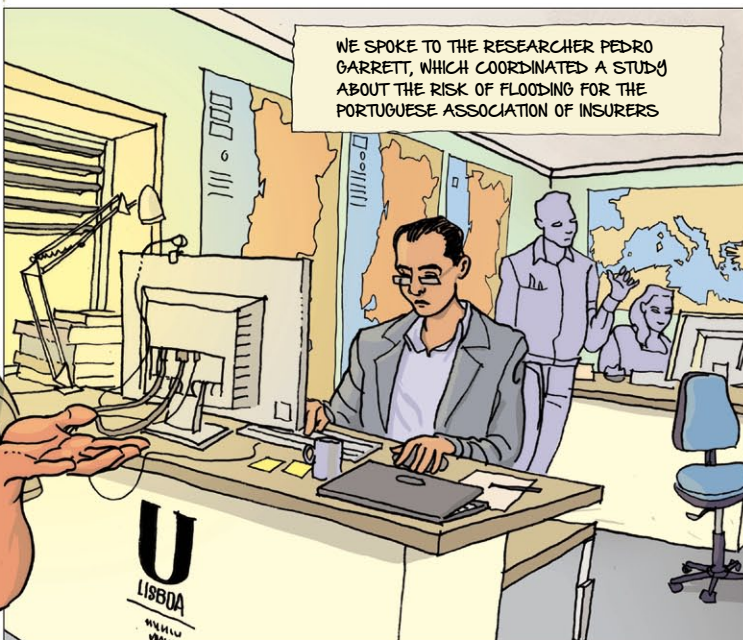


WHAT WILL YOU DO NOW?

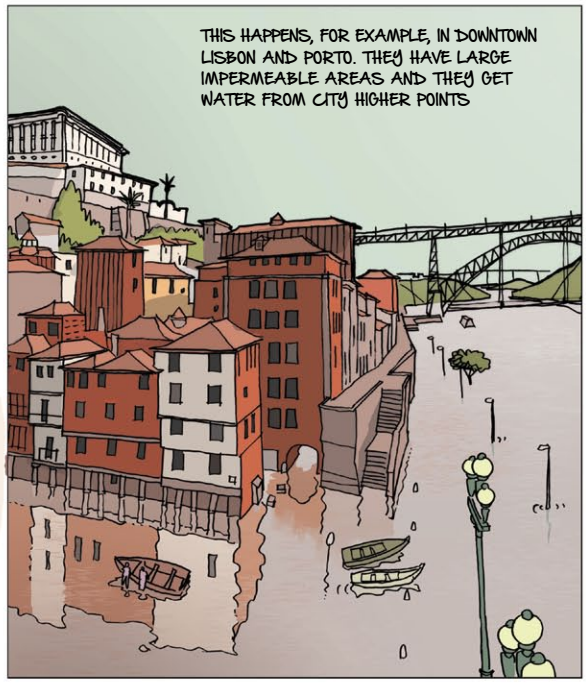
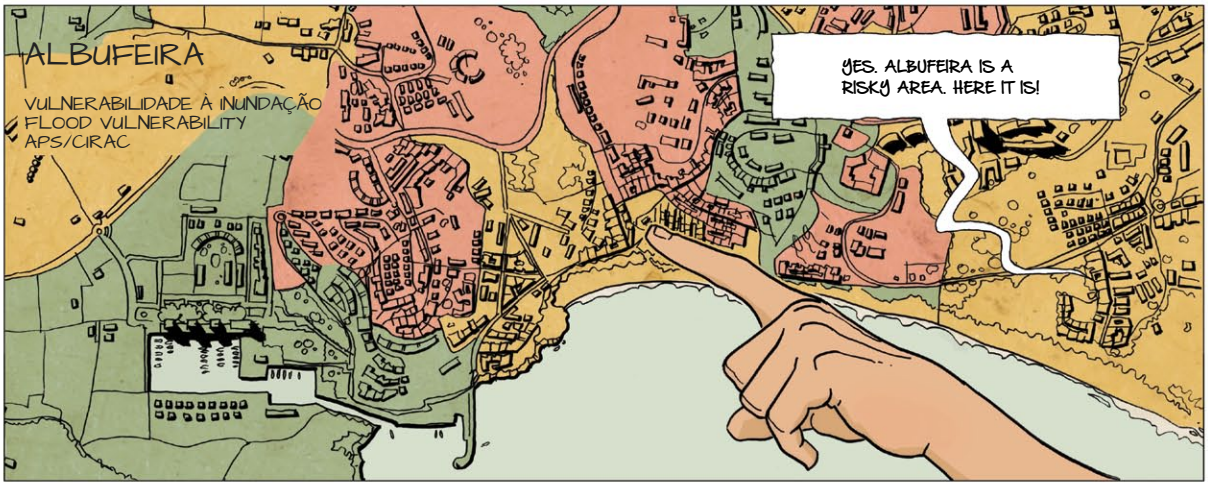
I'M NOT QUITE SURE HOW MUCH SUPPORT WE ARE GOING TO GET. UNTIL NOW, THERE AREN'T GUARANTEES

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



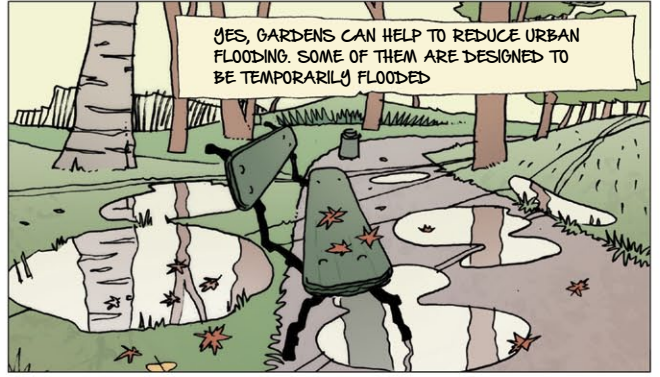
WE SPOKE TO THE RESEARCHER PEDRO GARRETT, WHICH COORDINATED A STUDY ABOUT THE RISK OF FLOODING FOR THE PORTUGUESE ASSOCIATION OF INSURERS



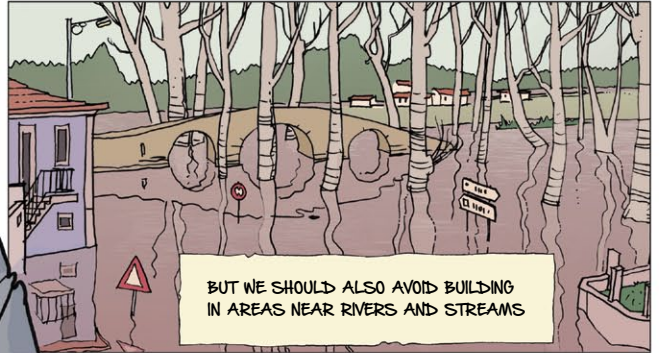
IT WOULD BE GOOD TO ADAPT OUR CITIES TO DIFFERENT CLIMATIC CONDITIONS, IN WHICH INTENSE RAIN IS MORE USUAL AND PREPARED FOR



HOW CAN WE DO THAT? WITH MORE GARDENS?



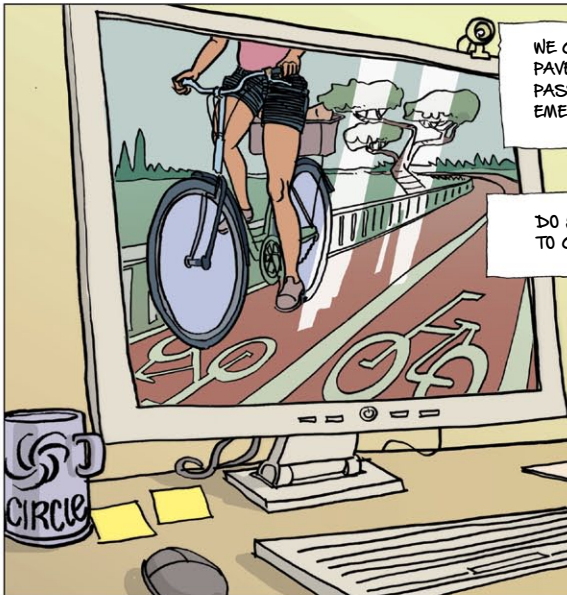
YES, GARDENS CAN HELP TO REDUCE URBAN FLOODING. SOME OF THEM ARE DESIGNED TO BE TEMPORARILY FLOODED



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

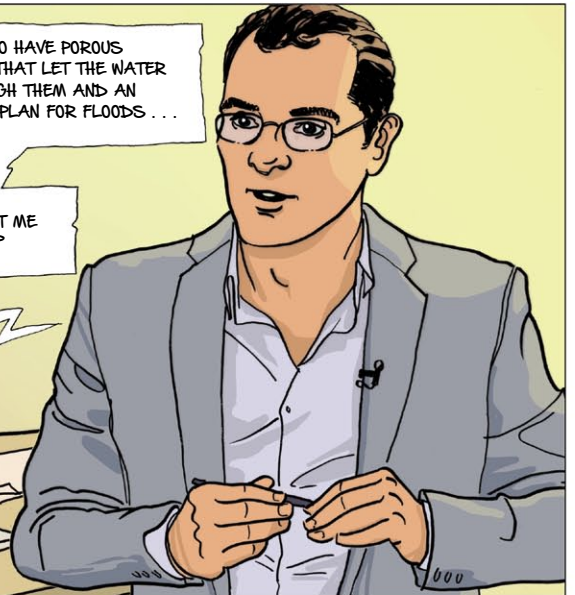


AND IF THE WATER DOES NOT PASS AT THE SURFACE, IT CAN PASS UNDER THE GROUND WITH AN APPROPRIATE DRAINAGE SYSTEM

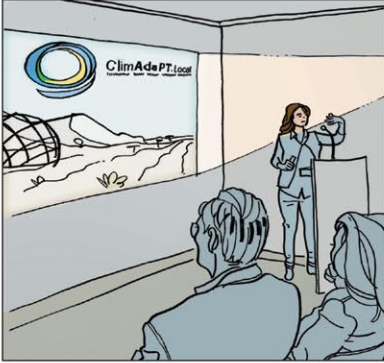
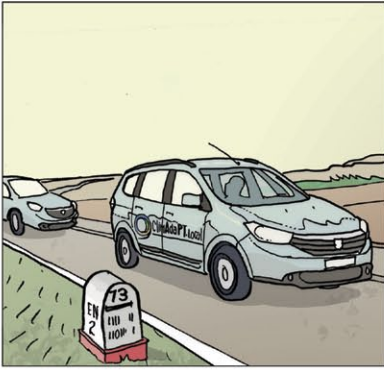


WE CAN ALSO HAVE POROUS PAVEMENTS THAT LET THE WATER PASS THROUGH THEM AND AN EMERGENCY PLAN FOR FLOODS ...

DO YOU WANT ME TO CONTINUE?

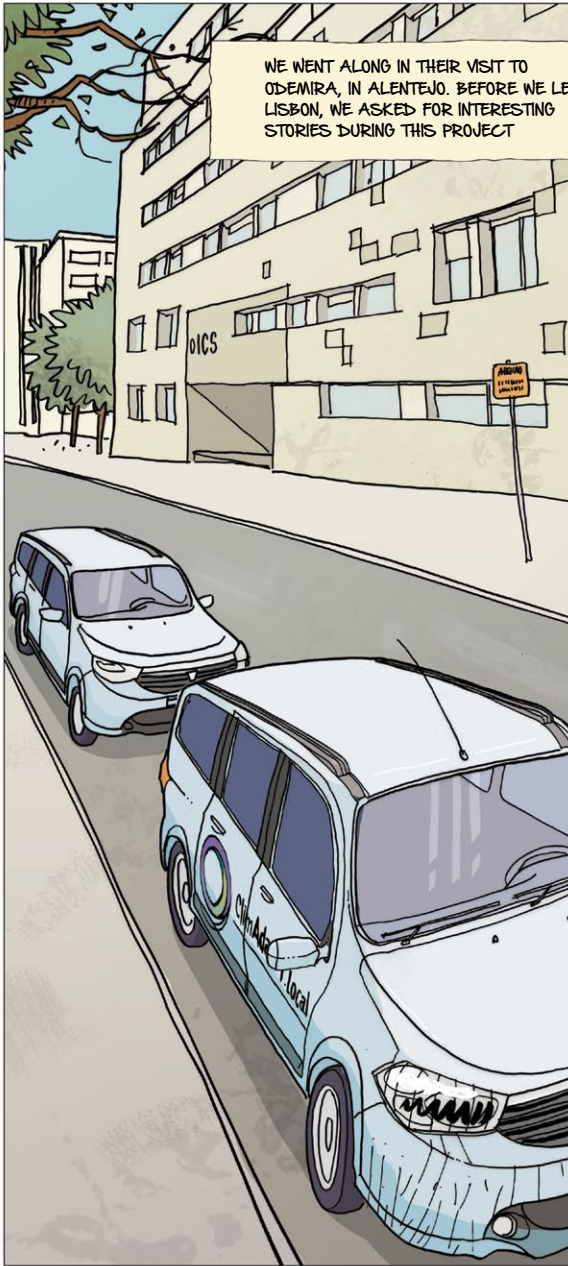


# 6 ON THE ROAD



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 ...

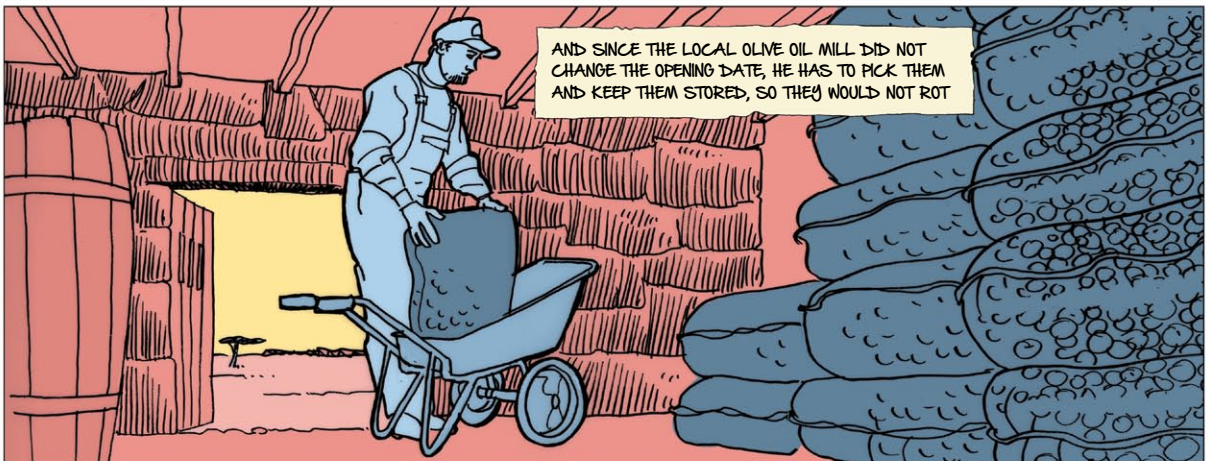


HOW? DO YOU WORK IN A HOSPITAL?

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

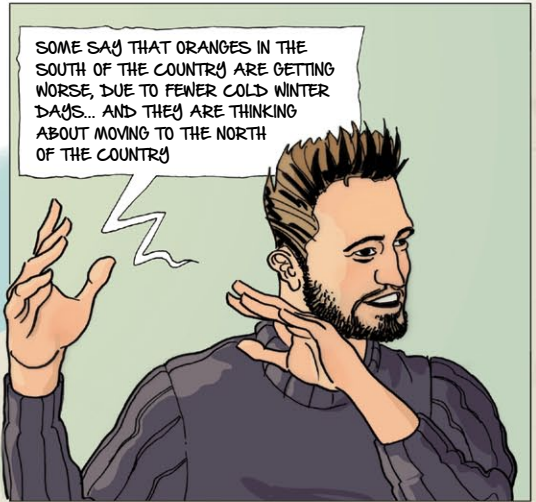


AND SINCE THE LOCAL OLIVE OIL MILL DID NOT CHANGE THE OPENING DATE, HE HAS TO PICK THEM AND KEEP THEM STORED, SO THEY WOULD NOT ROT

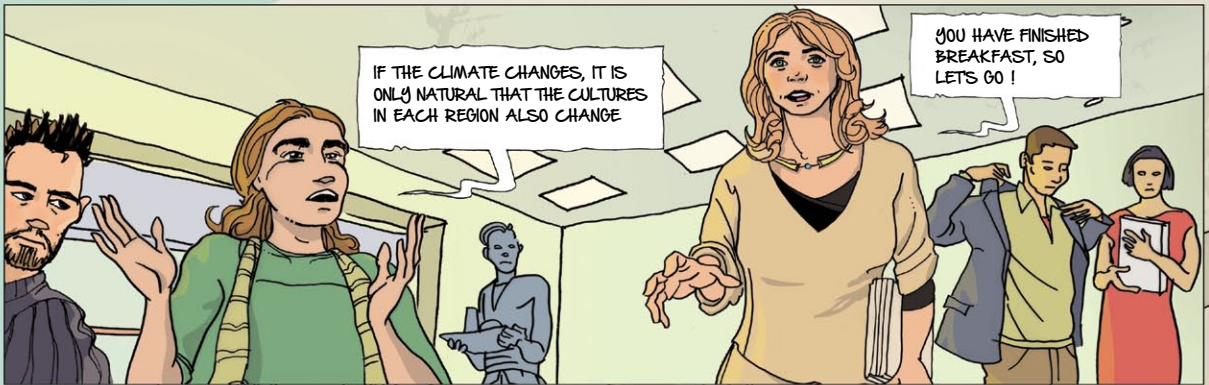




HE ONLY TAKES THEM THERE WHEN THIS MILL OPENS, WHICH IS NOT VERY GOOD FOR THE QUALITY OF THE OIL...



SOME SAY THAT ORANGES IN THE SOUTH OF THE COUNTRY ARE GETTING WORSE, DUE TO FEWER COLD WINTER DAYS... AND THEY ARE THINKING ABOUT MOVING TO THE NORTH OF THE COUNTRY

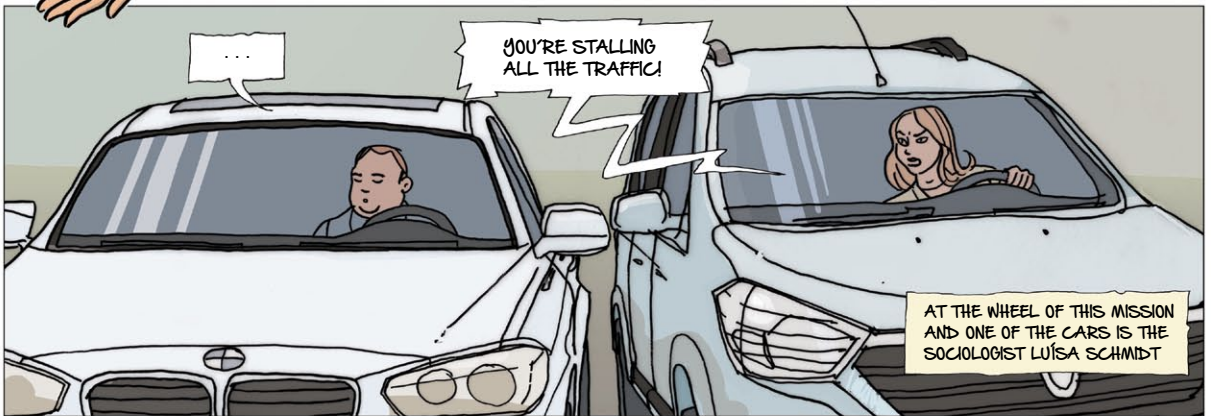
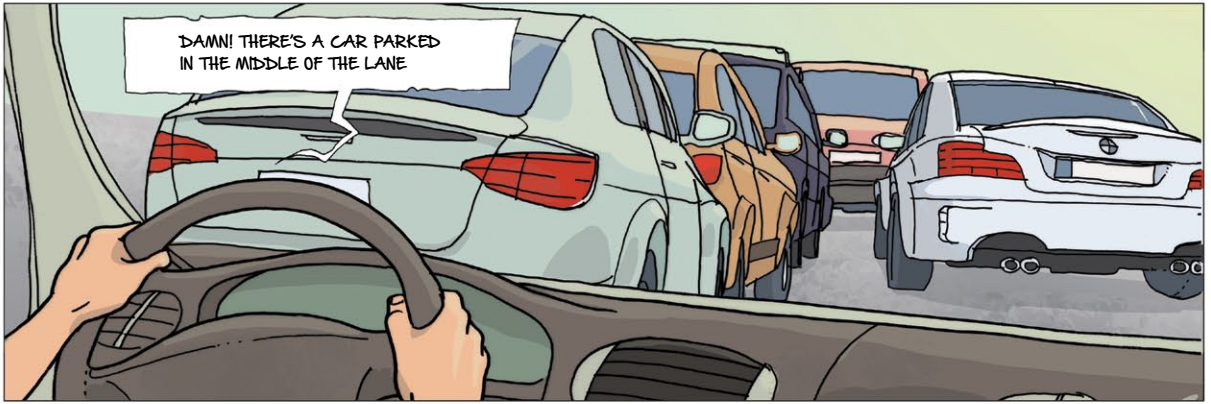


IF THE CLIMATE CHANGES, IT IS ONLY NATURAL THAT THE CULTURES IN EACH REGION ALSO CHANGE

YOU HAVE FINISHED BREAKFAST, SO LETS GO !

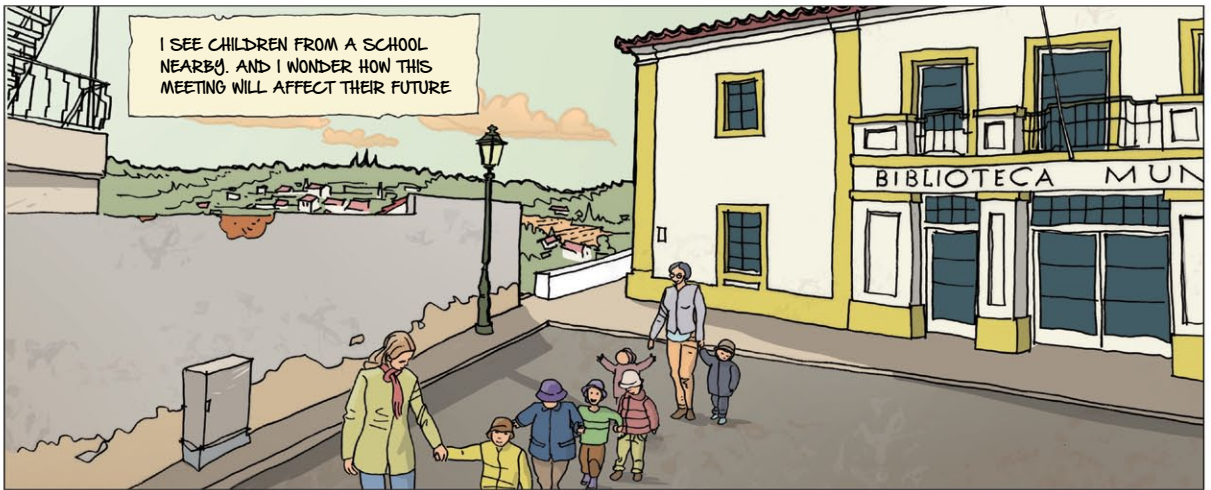


LET'S HEAD SOUTH!

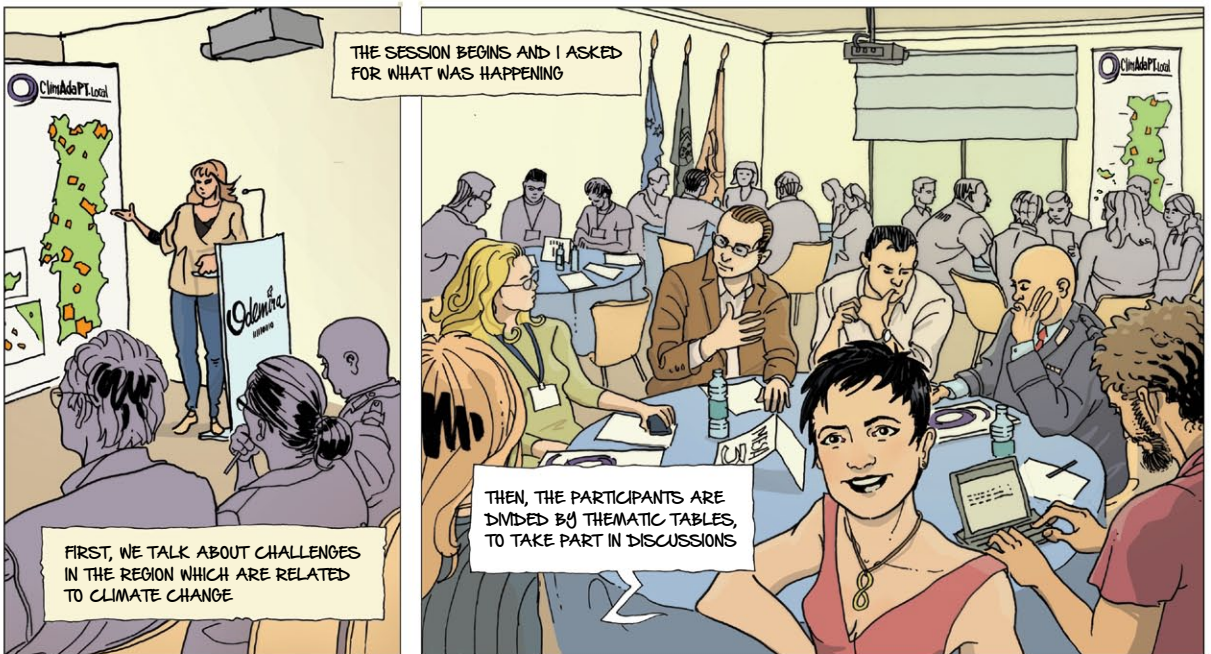




AFTER THE TRIP AND THE LUNCH, WE GO TO THE MUNICIPAL LIBRARY OF ODEMIRA, WHERE THE SESSION WILL START SOON



I SEE CHILDREN FROM A SCHOOL NEARBY, AND I WONDER HOW THIS MEETING WILL AFFECT THEIR FUTURE

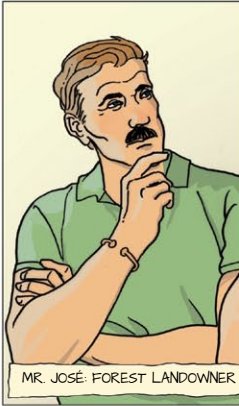


THE SESSION BEGINS AND I ASKED FOR WHAT WAS HAPPENING

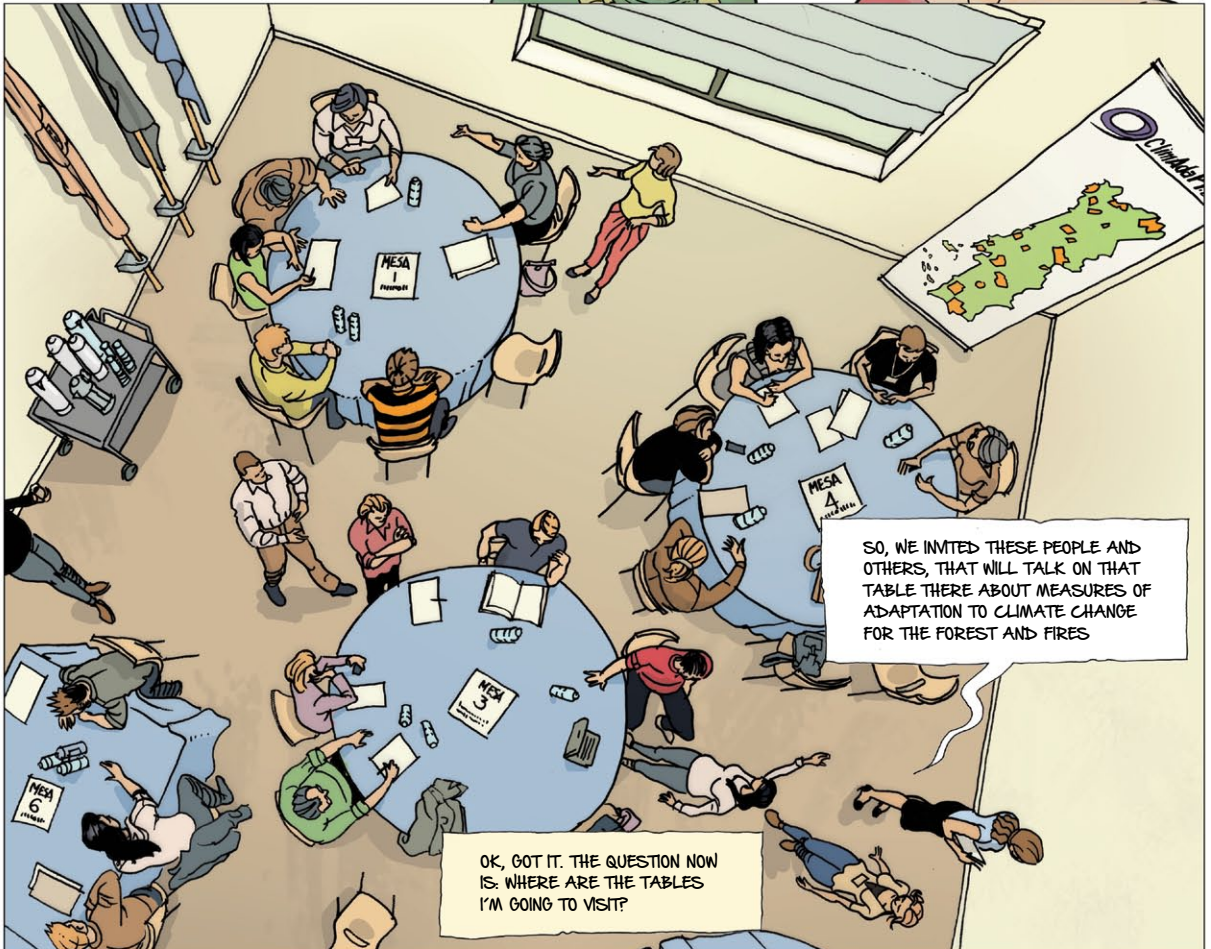
FIRST, WE TALK ABOUT CHALLENGES IN THE REGION WHICH ARE RELATED TO CLIMATE CHANGE

THEN, THE PARTICIPANTS ARE DIVIDED BY THEMATIC TABLES, TO TAKE PART IN DISCUSSIONS

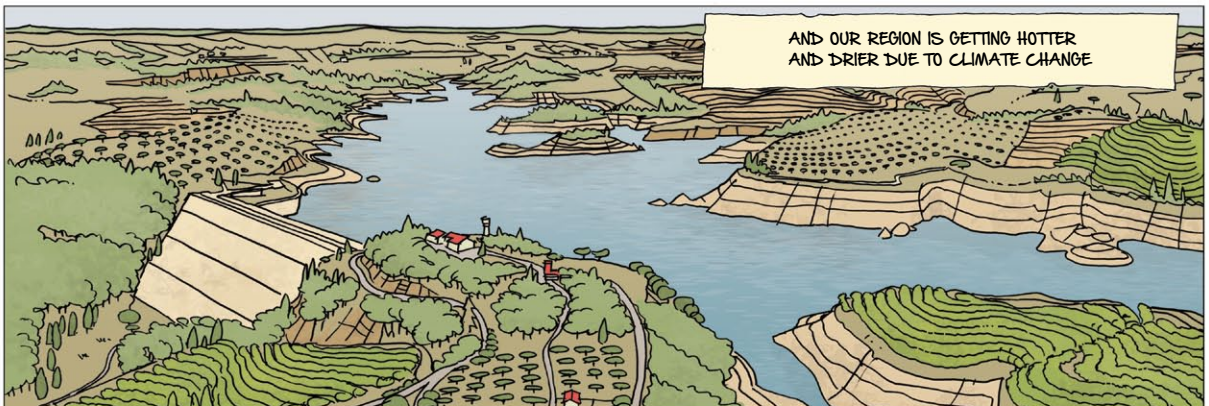
BUT HOW ARE THIS THEMATIC TABLES DONE?

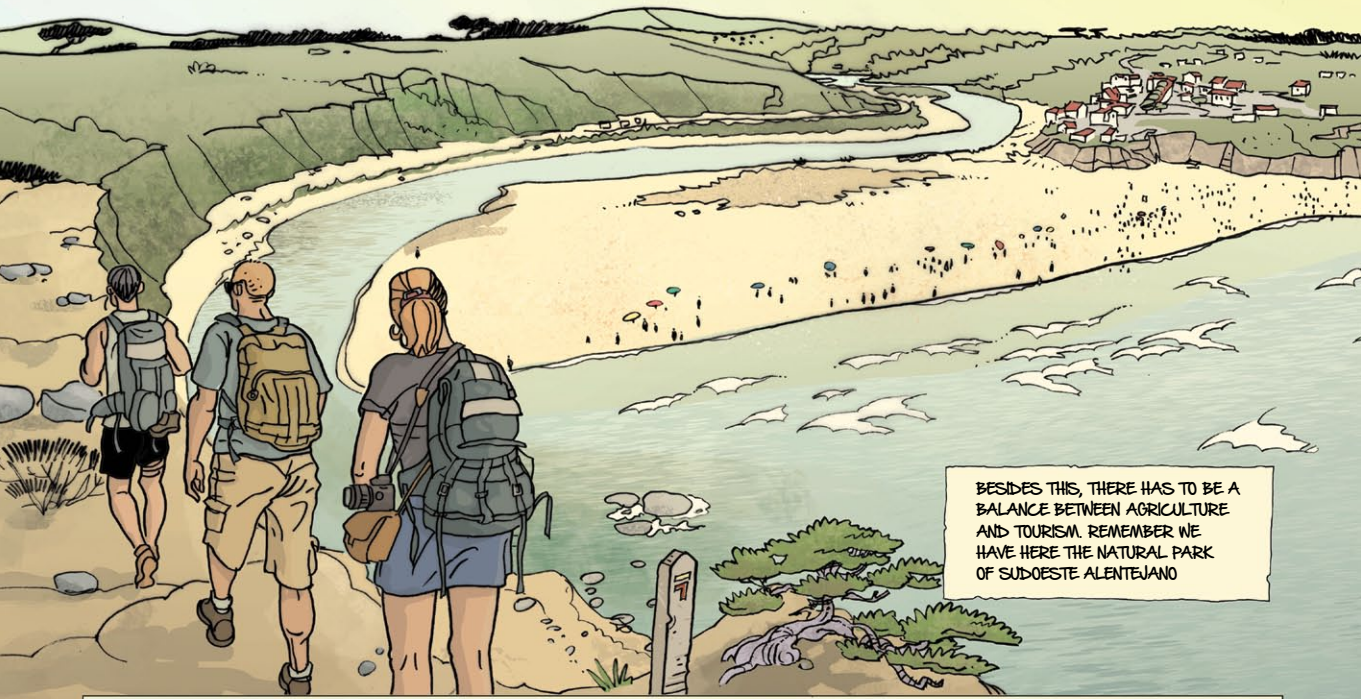


LET'S SEE . . . A FOREST LANDOWNER, A FIRE CHIEF, SOMEONE FROM A LOCAL MUNICIPALITY AFFECTED BY FIRE . . .









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

CONSTRUCTION OF GOOD QUALITY BUILDINGS

SHOPS WITH LOCAL CERTIFIED PRODUCTS

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

LACK OF PREVENTION FOR EXTREME WEATHER

WATER LINES WITH REDUCED VOLUME AND A LOT OF DEBRIS



# 7 SUSTENTABILITY



SO, YOU ARE ALREADY AN EXPERT IN CLIMATE SUMMITS?

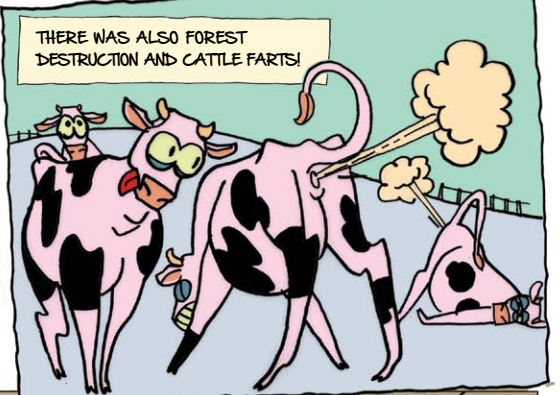


ALMOST! I SPENT THE LAST 3 DAYS READING ABOUT THEM. DO YOU WANT TO HEAR ABOUT IT?

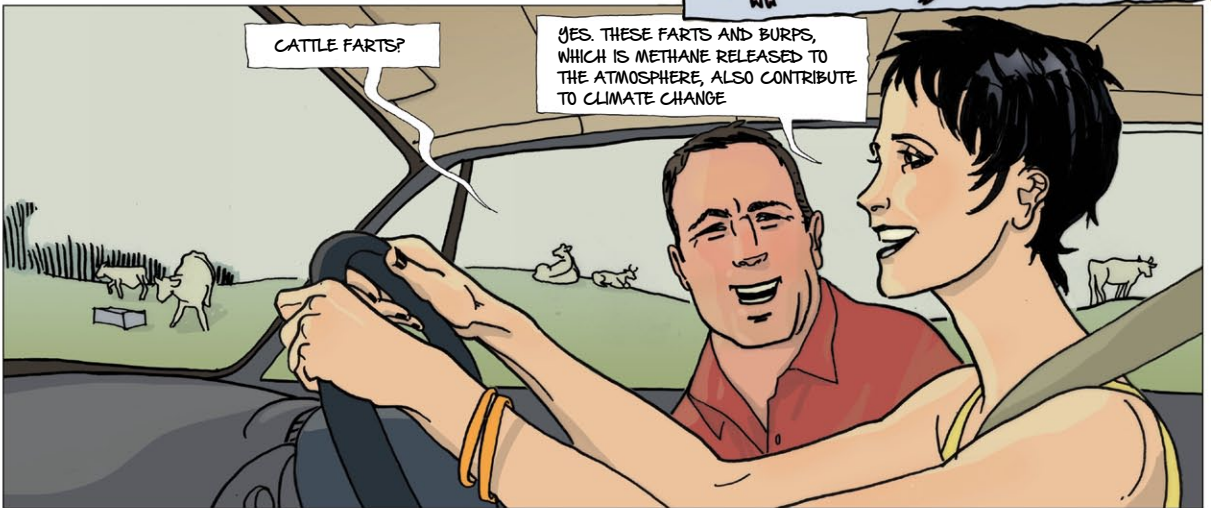
I'M ALL EARS!



OK. SO... THERE WAS ONCE PLANET EARTH, WHERE SOME OF THE INHABITANTS REALIZED THAT THINGS WERE HEATING UP. WAS THERE SOMETHING BURNING? YES! FOSSIL FUELS



THERE WAS ALSO FOREST DESTRUCTION AND CATTLE FARTS!



CATTLE FARTS?

YES. THESE FARTS AND BURPS, WHICH IS METHANE RELEASED TO THE ATMOSPHERE, ALSO CONTRIBUTE TO CLIMATE CHANGE



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

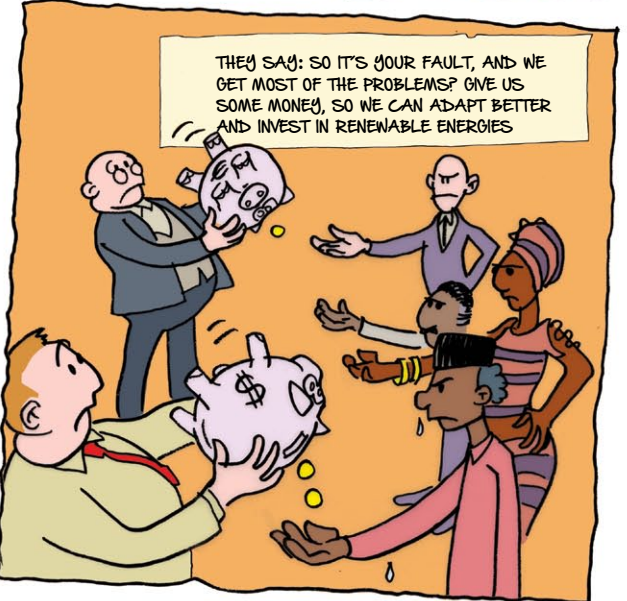


SO, THE OTHER COUNTRIES SAY: YOU HAVE ALREADY EATEN A LOT! NOW, IT'S OUR TURN, SINCE WE ARE GROWING UP

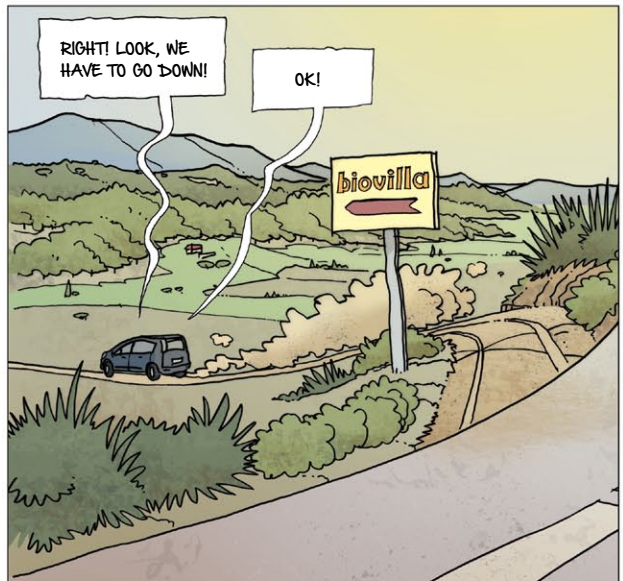
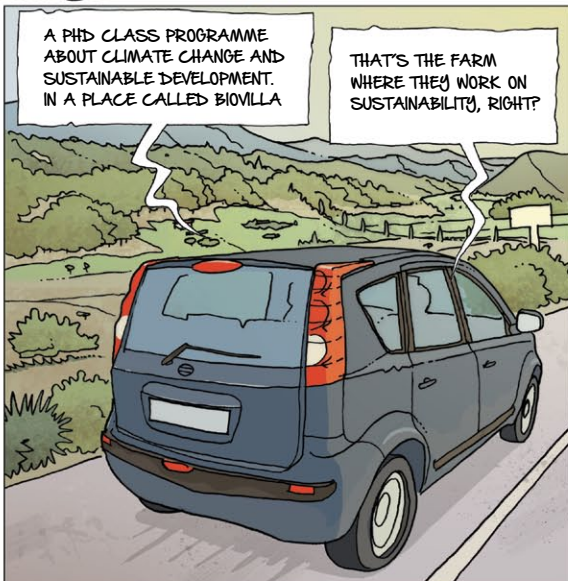
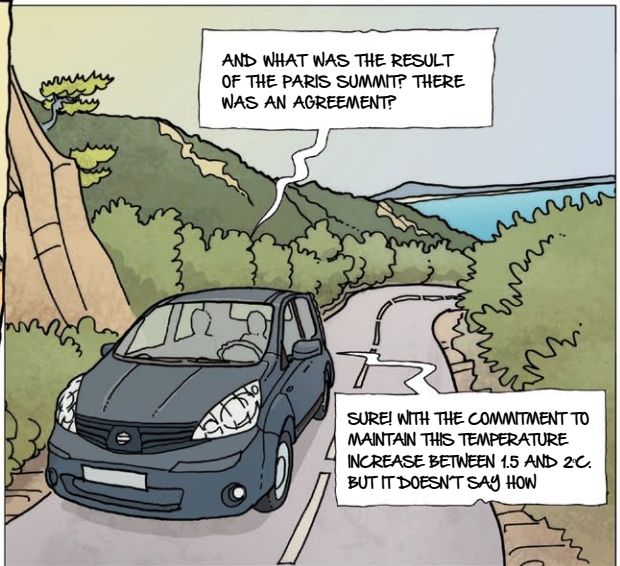
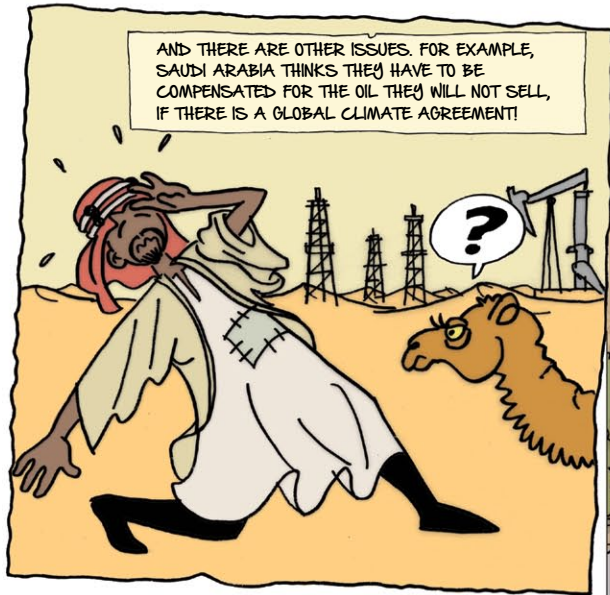


EVEN WORSE, THE POOR COUNTRIES ARE THE ONES THAT WILL SUFFER MORE WITH THE IMPACTS OF CLIMATE CHANGE!

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



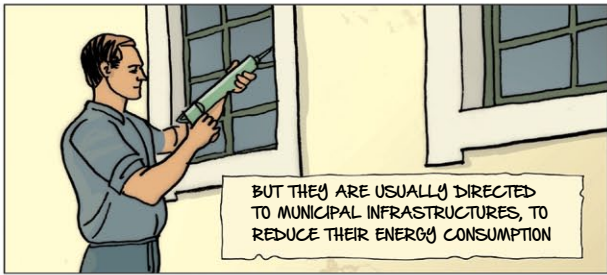


AT THE END OF THE CLASS

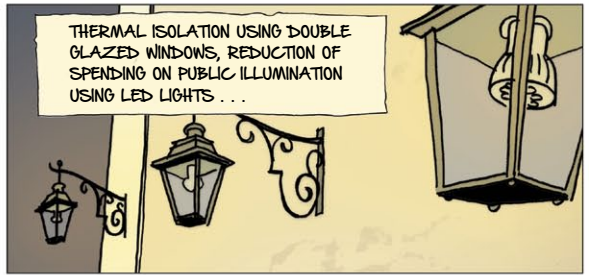
YOU TALKED ABOUT AN INQUIRY TO THE PORTUGUESE MUNICIPALITIES ABOUT ACTIONS RELATED TO CLIMATE CHANGE. WHAT DID YOU CONCLUDE?

10/10/11

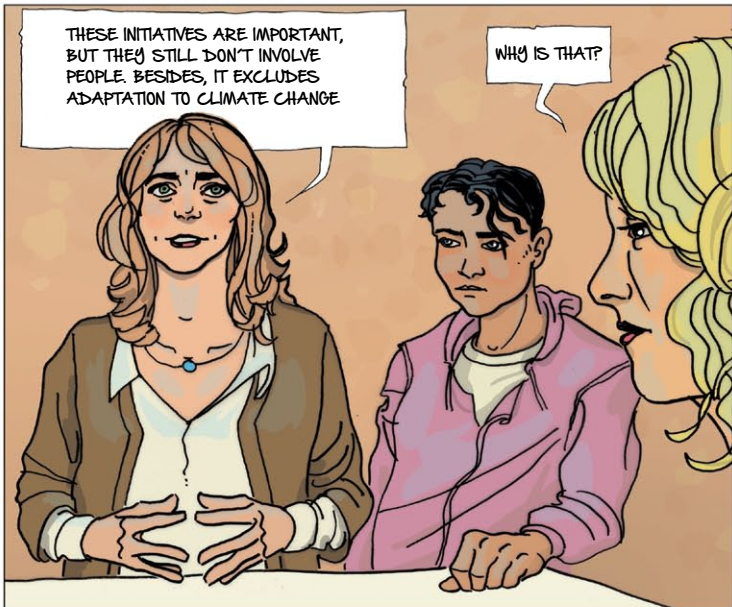
WELL, ABOUT HALF HAVE THESE KINDS OF ACTIONS



BUT THEY ARE USUALLY DIRECTED TO MUNICIPAL INFRASTRUCTURES, TO REDUCE THEIR ENERGY CONSUMPTION



THERMAL ISOLATION USING DOUBLE GLAZED WINDOWS, REDUCTION OF SPENDING ON PUBLIC ILLUMINATION USING LED LIGHTS ...

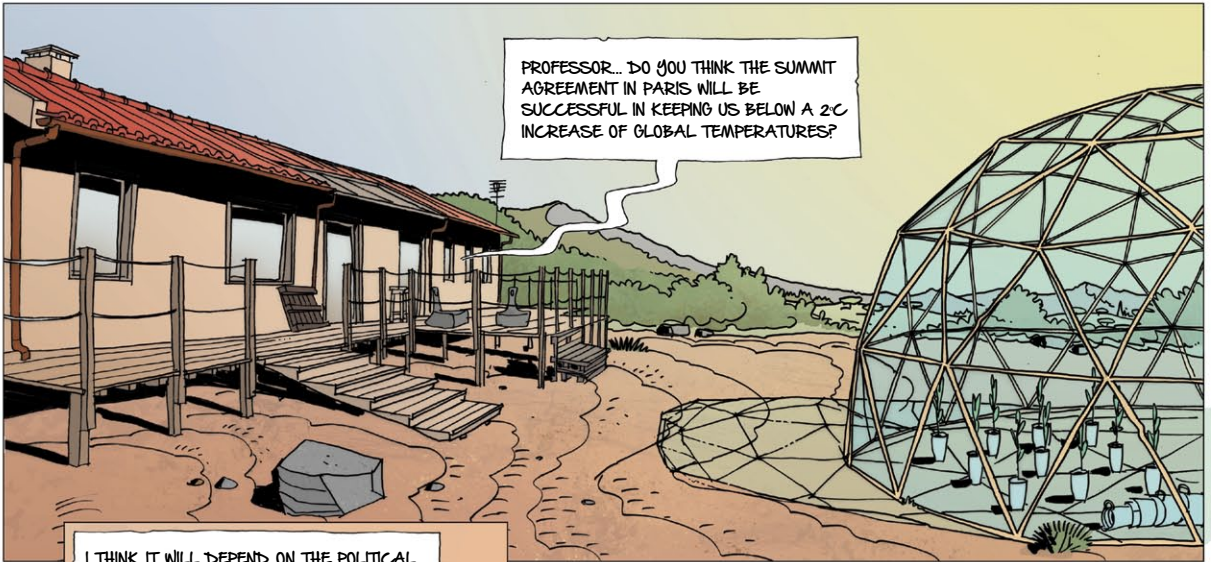


THESE INITIATIVES ARE IMPORTANT, BUT THEY STILL DON'T INVOLVE PEOPLE. BESIDES, IT EXCLUDES ADAPTATION TO CLIMATE CHANGE

WHO IS THAT?



ONE OF THE REASONS IS THAT WE NEED TO PLAN AT MEDIUM AND LONG TERM FOR ADAPTATION. IT'S HARDER TO DO

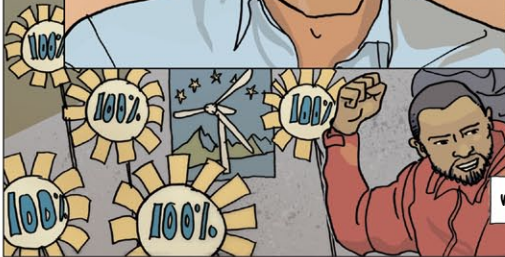


PROFESSOR... DO YOU THINK THE SUMMIT AGREEMENT IN PARIS WILL BE SUCCESSFUL IN KEEPING US BELOW A 2C INCREASE OF GLOBAL TEMPERATURES?

I THINK IT WILL DEPEND ON THE POLITICAL PRESSURE OF THE CITIZENS, THE ACTIONS OF NGOs AND THE GOVERNMENTS...



BUT ALSO ON THE WAY WE LIVE



WHAT DO YOU MEAN?



IT HAS TO DO WITH THE IDEA OF VOLUNTARY SIMPLICITY, WITH THE ADOPTION OF A SIMPLE LIFESTYLE, IN COMMUNITY, AND LESS CONSUMPTION



DOING OUTDOOR ACTIVITIES THAT MAKE US HAPPY... UNITING EFFORTS FOR A COMMON CAUSE



ARE THERE MORE QUESTIONS? NO?  
SO, LET'S TAKE A WALK NEARBY



SHALL WE GO AS WELL,  
AND ENJOY A BIT OF A  
SIMPLER LIFESTYLE?



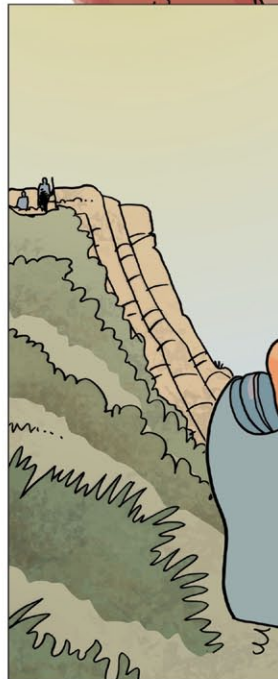
YES PLEASE!



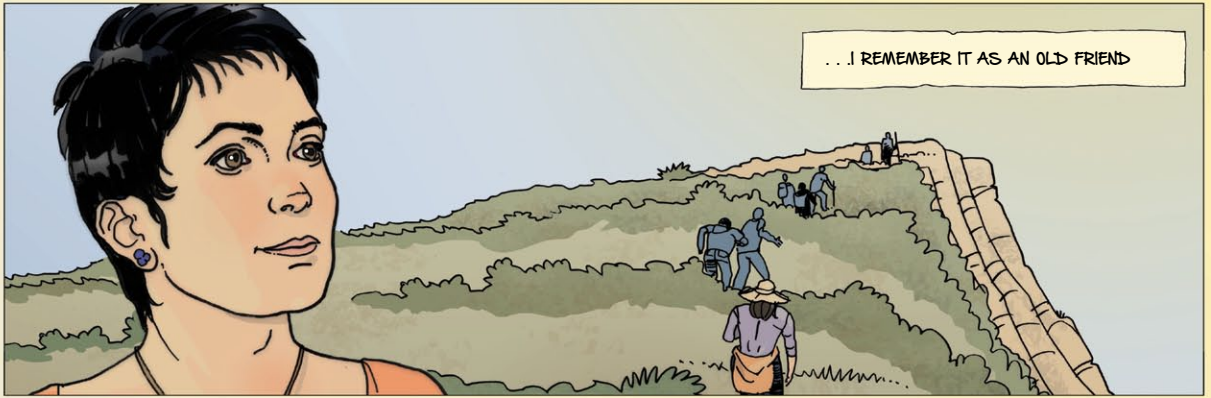
I ENDED THIS SPECIAL  
REPORT A FEW DAYS AFTER  
THE VISIT TO BIVOLLA



IT WAS AIRED ON THE 19  
DECEMBER 2015 AND IT HAD  
A GOOD VIEWING AUDIENCE



AFTERWARDS, WHENEVER I  
DID SOME WORK ON  
CLIMATE CHANGE, I  
RECALLED THIS SPECIAL  
REPORT...



... I REMEMBER IT AS AN OLD FRIEND



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

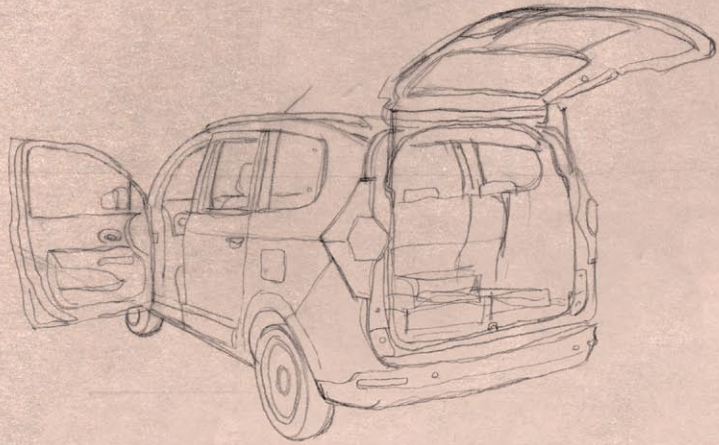


AND WHAT I REMEMBERED THE MOST WAS THAT WALK UP THE HILL. THE LANDSCAPE. THE LIGHT.

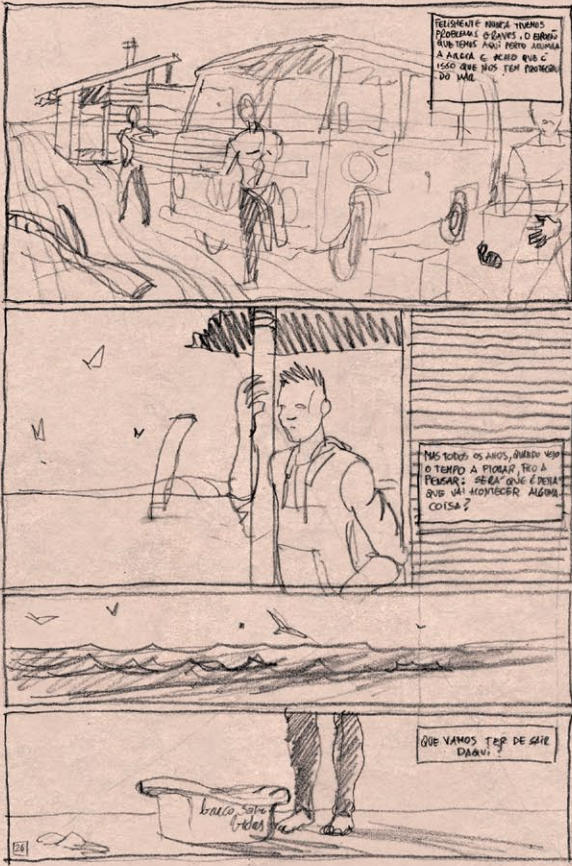


AND THAT GORGEOUS VIEW FROM THE TOP...  
**THE END**

# Sketches









**ClimAdaPT.Local**  
Estratégias Municipais de Adaptação às Alterações Climáticas



Fundo português de Carbono



**AGÊNCIA  
PORTUGUESA  
DO AMBIENTE**