

WHAT is
CLIMATE CHANGE?

HOW does it work?
And WHY bother reading impenetrably
dense scientific journals when this

FUNKY CARTOON BOOK

will tell you all you need
to know, and
a lot you'll
wish you
didn't...

For more info or transport, call
Manchester Earth First!, 0161-226 6814

(a rising tide production)

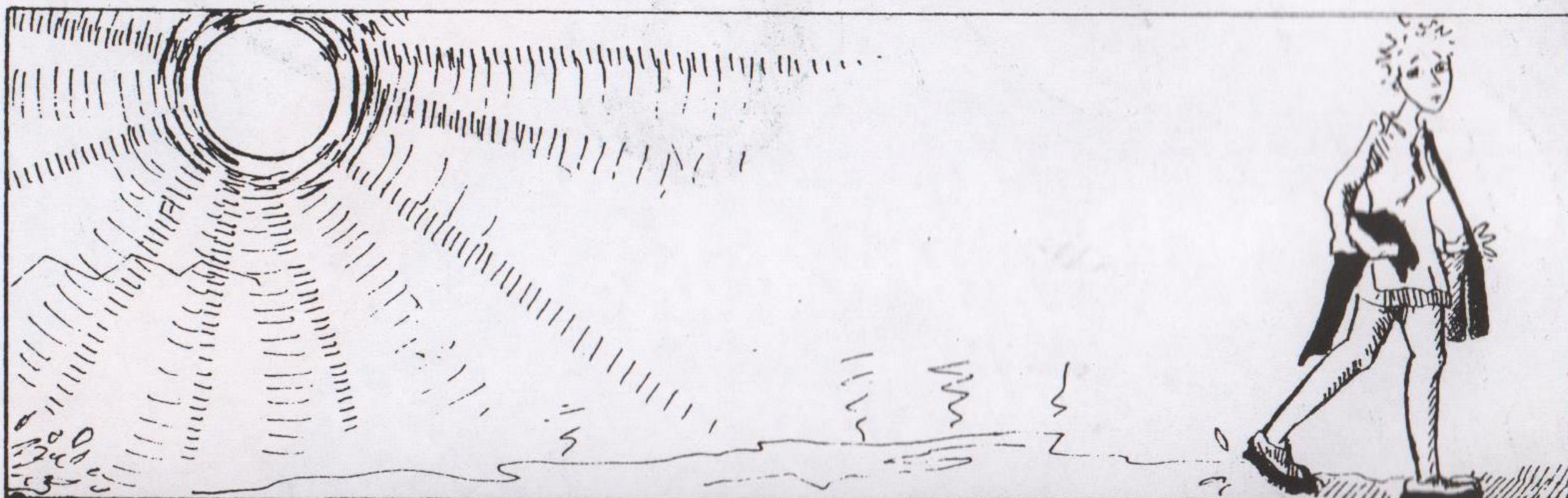
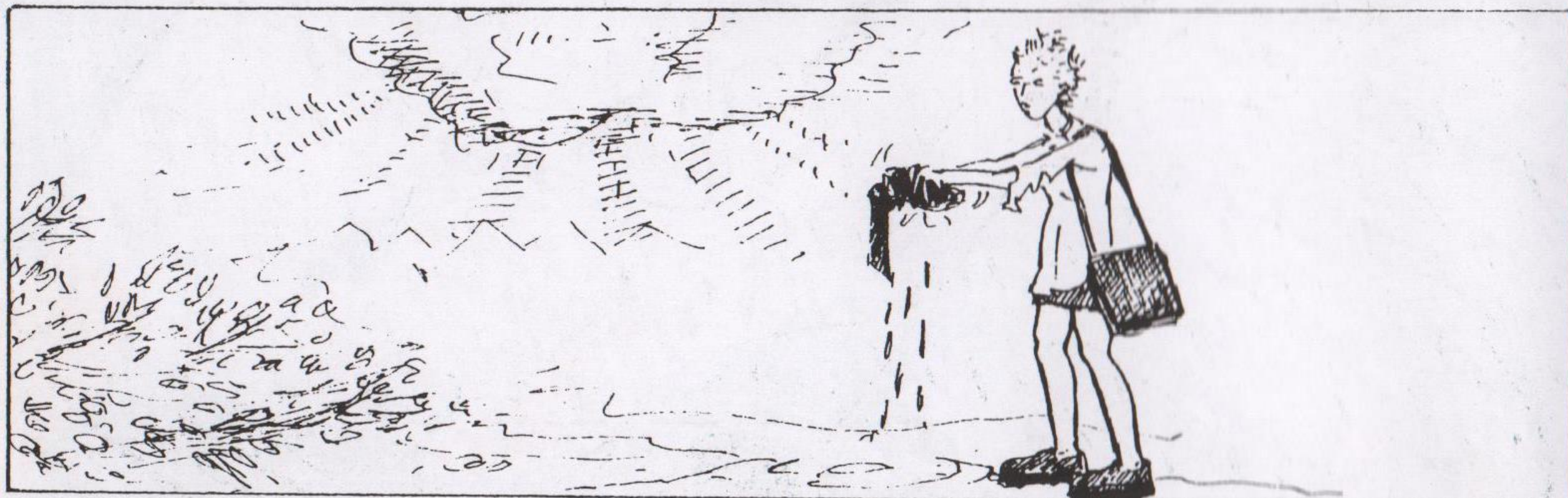
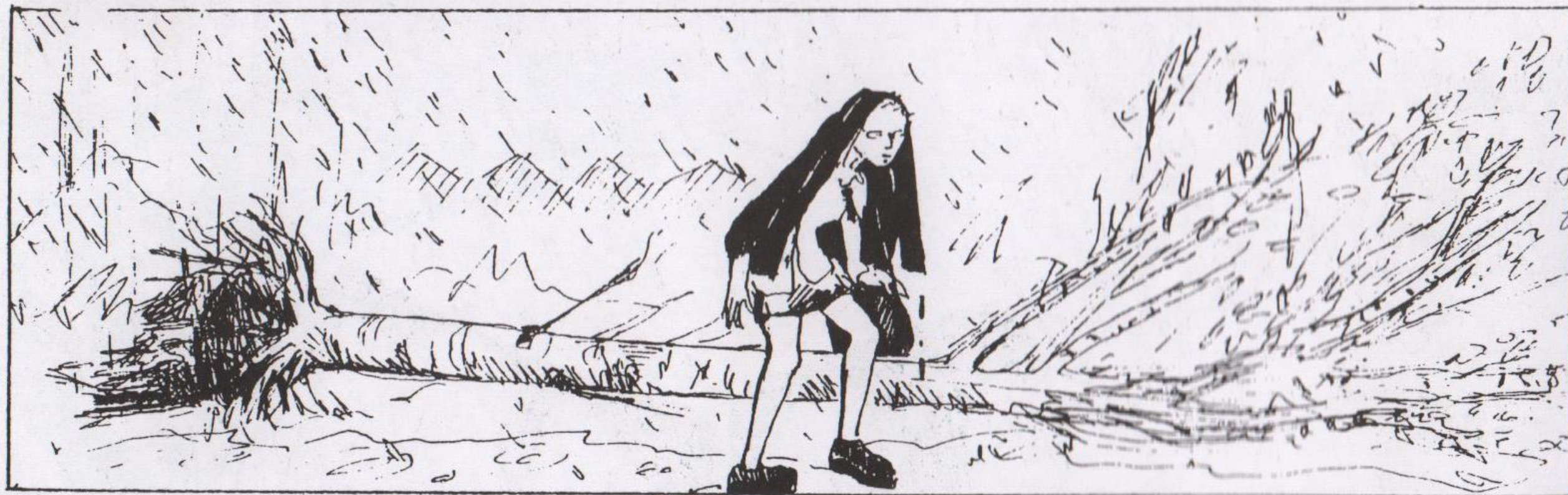


FUNNY WEATHER WE'RE
HAVING AT THE MOMENT
ISN'T IT DEAR?

by Kate
Evans

everything you didn't want to know
about climate change
but probably should find out





HAVE YOU NOTICED THAT WE DON'T SEEM TO GET SEASONS ANYMORE, JUST WEATHER...

...everything you didn't want to know about climate change, but probably should find out. kate evans 2000

SO WHAT IS THIS GREENHOUSE EFFECT THEN?

FIRST, THE SUN SHINES

THEN RADIATIVE GASES, PRINCIPALLY WATER VAPOUR AND CARBON DIOXIDE TRAP THE SUN'S HEAT AND PREVENT IT RETURNING BACK TO SPACE

WITHOUT THIS NATURAL PROCESS, THE EARTH WOULD BE -18°C , AND WE WOULDN'T BE HERE.

1893 SVANTE ARRHENIUS, SWEDISH SCIENTIST WORKOUT THAT PUMPING **EXTRA CO_2** INTO THE AIR WITH THE LARGE SCALE BURNING OF FOSSIL FUELS IS **ADDING TO THE NATURAL INSULATING PROPERTY OF THE ATMOSPHERE...**
 ... 2000 NO-ONE SEEMS TO HAVE LISTENED VERY MUCH. **CARBON DIOXIDE** CONCENTRATIONS ARE UP MORE THAN 30%, FROM 280 PARTS PER MILLION TO 365 ppmv. **METHANE (CH_4)** HAS MORE THAN DOUBLED, FROM 700 TO 1,720 PARTS PER BILLION (ppbv) SINCE PRE-INDUSTRIAL TIMES. **NITROUS OXIDE** IS UP FROM 275 ppbv TO 310 ppbv AND NEW CHEMICALS **CFC11** AND **CFC12** HAVE REACHED LEVELS OF 280 AND 484 PARTS PER TRILLION. ①

AT THE SAME TIME AS CO_2 (FROM FOSSIL FUEL BURNING) IS HOTTING THINGS UP, SO_2 , THAT'S **SULPHUR DIOXIDE** (ALSO FROM FOSSIL FUEL BURNING) FORMS SULPHATE PARTICLES WHICH **COOL** THE PLANET DOWN BY REFLECTING INCOMING LIGHT BACK INTO SPACE. THESE TWO PROCESSES HAVE TO BE CONSIDERED TOGETHER TO GET AN ACCURATE PICTURE OF GLOBAL TEMPERATURE, BUT WHEN THEY ARE IT'S CLEAR THAT THINGS ARE GETTING WARMER.

ASK YOURSELF; WILL YOUR GREENHOUSE BE AFFECTED? THE ANSWER IS ALMOST CERTAINLY YES

WHERE DO GREENHOUSE GASES COME FROM?



METHANE LASTS FOR 12 YRS IN THE ATMOSPHERE, NITROUS OXIDE LASTS 120 YEARS AND CO₂ FOR 200 YEARS.

NITROUS OXIDE COMES FROM NITROGEN BASED COMMERCIAL FERTILISERS, AND BURNING FOSSIL FUELS

AND CFC'S ARE EMMITTED BY VITAL, SOCIALLY NECESSARY, LIFE ENRICHING SOFT DRINKS DISPENSERS



CFC'S LAST FOR SEVERAL THOUSAND YEARS

Hey, we can sort that. We could switch to renewable electricity production, introduce energy conservation measures, fund cheap, efficient public transport, start running vehicles on biodiesel, plant trees, go organic, eat curry and chips instead of rice and drink warm lemonade.



WHAT! ARE YOU SOME KIND OF DANGEROUS ENVIRONMENTAL EXTREMIST?

WHERE DO GREENHOUSE GASES REALLY COME FROM?

WHAT CLIMATE CHANGE? WE NEED MORE PROOF.



122 PRIVATE AND STATE OWNED CORPORATIONS ARE RESPONSIBLE FOR NEARLY 80% OF CO₂ EMISSIONS. ⑥

THE USA, WITH 4% OF THE WORLD'S POPULATION EMITS 24% OF GLOBAL GREENHOUSE GASES. ⑥

PROOF?

...IN 1988, THE UNITED NATIONS SET UP THE INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE (IPCC). AN INTERNATIONAL TEAM OF 2000 TOP SCIENTISTS AND CLIMATE MODELLERS WHO TRACK AND PREDICT TRENDS IN CLIMATE CHANGE.



THEIR THIRD ASSESSMENT REPORT (DUE OUT 2001) STATES THAT: ...there has been a discernable human influence on global climate.



NO, IT'S NOT REALLY GLOBAL WARMING WE'RE GOING TO SEE SO MUCH AS...

CLIMATE CHAOS!

- THE SHIFT IN TEMPERATURE THAT HAS ALREADY OCCURRED HAS LED TO MORE EXTREME WEATHER:
- In 1998, 300 million people were affected by storm surges, torrential rain, landslips, mudslides, and tidal waves, and 45 countries were stricken by drought.
 - The costs of climate related disasters have doubled every decade, from \$50 billion in the 1960's, to \$400 billion in the 1990's.
 - In the 1960's there were 16 climate related disasters, in the 1990's there were 70. Between 2000 and 2020 another 245 large disasters are predicted.

THE WORLD IS NOW 0.6°C WARMER THAN IT WAS IN PRE-INDUSTRIAL TIMES. FOR THE LAST 20 YRS, GLOBAL TEMPERATURE HAS BEEN RISING 0.2°C PER DECADE.

0.6°C? THAT'S NOTHING! TINY! TINY! TINY!



Well, it isn't much, but since most of the planet is covered in deep water it takes a long time to heat up. At least 40 years. So what we're seeing now is the effect of CO₂ emissions in the 1950's.



THE IPCC PREDICTS THAT BY 2080, CO₂ LEVELS WILL DOUBLE AND GLOBAL TEMPERATURE WILL RISE BY 2.5°C or maybe 1°C, or maybe 4°C THEN, EVEN IF EMISSIONS HALT, THE TEMPERATURE WILL RISE A BIT MORE.

TINY! TINY! NOT VERY MUCH AT ALL!

No, you see raising the temperature of the world by just 1°C means pumping an incredible extra amount of energy into the weather system. A 6°C rise could be on the cards...

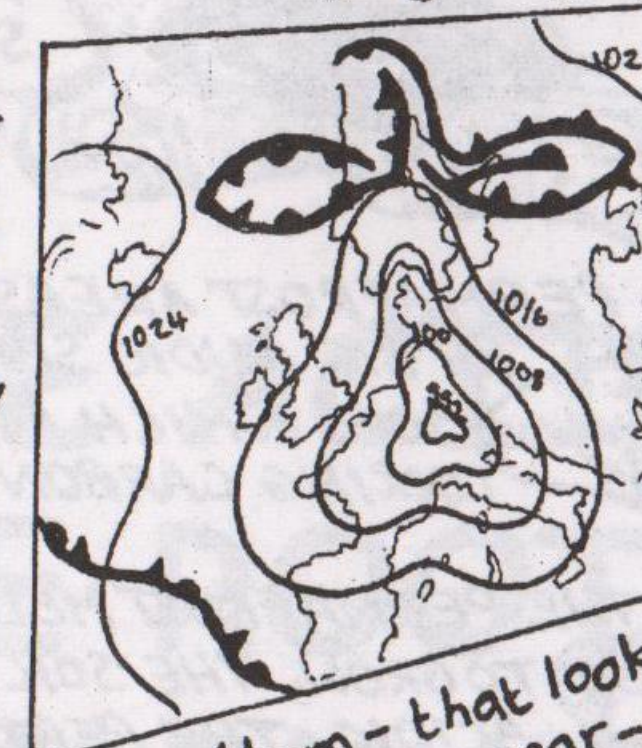
...and during the last Ice Age the planet was only 5°C colder than today.

What are you reading? Oh - that's not on the National Curriculum.



It's just going to get a bit **WINDIER** and **STORMIER**...

WIND IS CAUSED BY THE DIFFERENCE BETWEEN ATMOSPHERIC HIGH AND LOW PRESSURE. WITH MORE ENERGY (FROM HEAT) BUZZING AROUND IN THE SYSTEM, THE HIGHS GET HIGHER, THE LOWS GET LOWER AND THE WINDS GET STRONGER.



ALSO, HEAT SOAKS INTO THE SEA, AND BOUNCES OFF LAND. THIS MAKES THE AIR ABOVE THE SEA COOLER THAN ABOVE LAND. MORE HEAT MAKES FOR A BIGGER TEMPERATURE DIFFERENCE AND STRONG WINDS + CYCLONES RESULT.

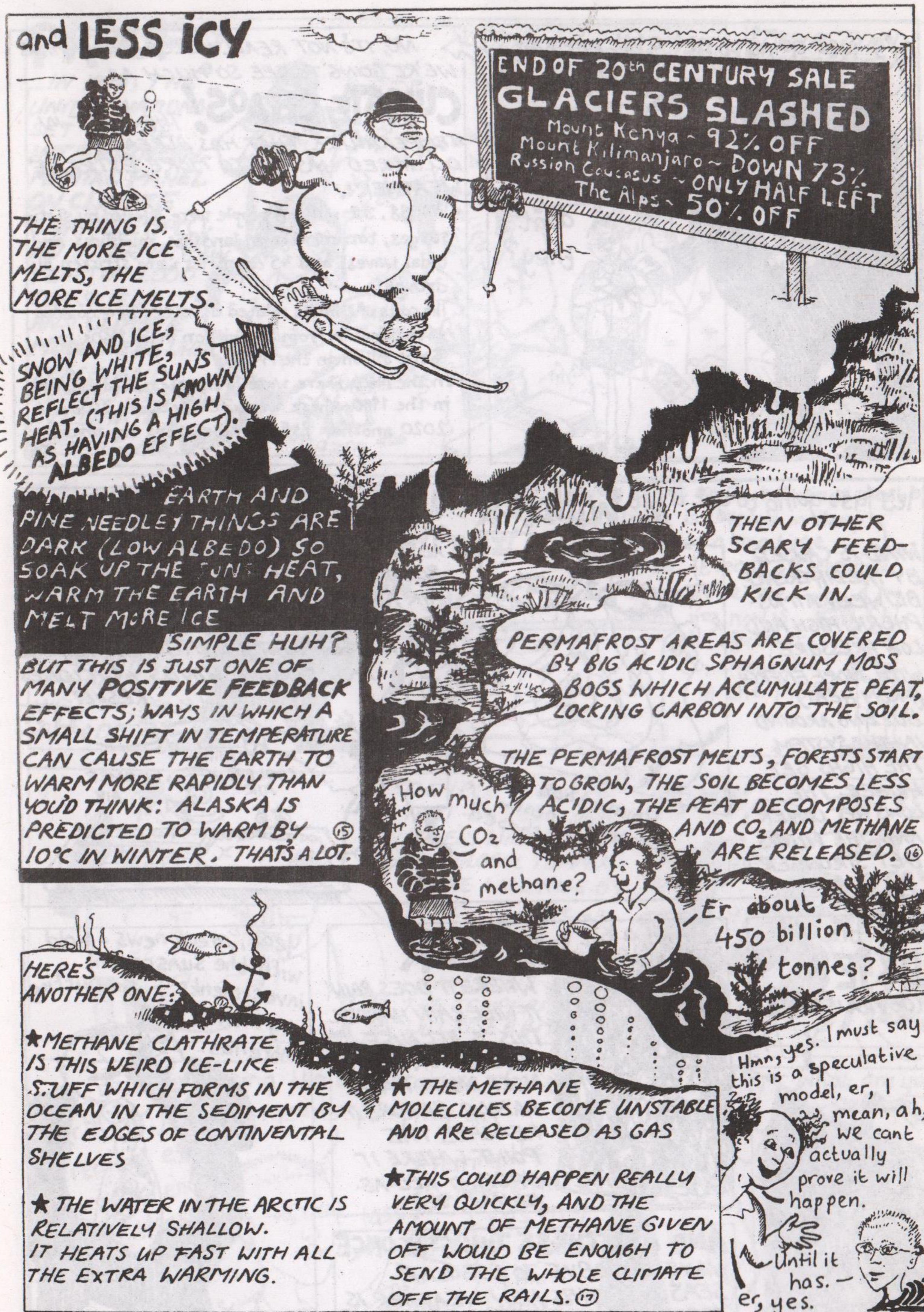


... a bit **DRIER** (OBSVIOUSLY) SOON 3 BILLION PEOPLE WILL BE AFFECTED BY DROUGHT AND DESERTIFICATION.

... and a bit **WETTER** WHERE IT DOES RAIN IT WILL RAIN HARDER. THIS IS BECAUSE WARMER AIR CAN HOLD MORE WATER VAPOUR BEFORE IT REACHES THE POINT WHERE IT DROPS IT ALL AS RAIN.

AND ALL THESE THINGS AT ONCE HAVE GOODBYE TO REGULAR SEASONS, THIS NEW WEATHER IS ESSENTIALLY UNPREDICTABLE.

Yeah, great news - hold with the sunscreen investments - I'm putting my money into umbrellas.



Rising Tide

is a coalition of groups and organisations committed to a grassroots approach to fighting climate change. The coalition believes that the official United Nations negotiations are failing to resolve the climate change crisis. Instead, global equity and the environment are being marginalised by the dominance of corporate interests.

Full Rising Tide political statement at www.risingtide.nl

TAKE ACTION AGAINST THE ROOT CAUSES OF CLIMATE CHAOS!

visit www.risingtide.org.uk
for climate action news, resources,
inspirations, information and details of local
UK and international contacts,
email: info@risingtide.org.uk
Oxford Rising Tide tel: 01865 241097

Rising Tide is active in the UK in Oxford, Leeds, Manchester, Newcastle, York, Calderdale, North and West Wales, London, Brighton, Edinburgh

IDEAS FOR ACTION

organise a critical mass bike ride with a climate chaos theme



Subvertise - distort the messages on adverts for climate criminals, such as car ads and flights. see www.subvertise.org for some ideas



Organise a 90% for 90% action, using the train-like 90% tickets – Experiences of using the tickets, legal advice and tickets themselves all on www.risingtide.org.uk
Why not get it together on a train strike day?

LINK UP WITH OTHER GROUPS/CAMPAIGNS WORKING ON CONNECTED ISSUES - SUCH AS FUEL POVERTY GROUPS, LOCAL REFUGEE AND ASYLUM SEEKER SUPPORT NETWORKS. PLAN JOINT WORK, SUPPORT EACH OTHER.

Declare a car-free zone in your town, or organise a green transport week. Support with posters, leaflets, actions.

React to events - when there is the next, unseasonal flooding, record weather, drought, or unexpected storm, get out and make the links for people. Prepare a local phone tree to pull together people at short notice to do this.

Be a local contact for Rising Tide

see
www.risingtide.org.uk
or email
info@risingtide.org.uk

Take action to reduce your own energy consumption - set yourself a target. Tell everyone about it - your family, friends, neighbours, and get their support (like giving up smoking!).

Set hosepipes on offices of oil and airline companies and flood them!

Get out there and start talking! Rising Tide has detailed materials to support talks, and do speaker trainings. Also plenty of ideas and materials from Rising Tide tours.

Guerilla energy reduction! Put a brick in the cistern, turn down heating, reduce the thermostat by 2 degrees, swap old lightbulbs for energy efficient ones.



Put up displays at events, public spaces (the library, public noticeboards), or create your own space by flyposting. Basic display packs available from Rising Tide



Stop! Climate Chaos Ahead

Paint cycle lanes or Think Bike! signs on the road

Grow at least some of your own food. Reclaim some space to do this with others, get an allotment, grow food in pots. See www.primalseeds.org

Consider who is feeling the impacts of extreme weather conditions outside of the UK - who are they, what links do they have to this country, how can you provide solidarity? For international links check out www.agp.org and all the many indymedia sites <http://climate.indymedia.org/>

Contact your local energy efficiency centre 0800 512 012 to find out about grants available for energy reduction measures, and ask about other support, such as a home visit to look at how you can save energy, save money and reduce carbon dioxide emissions.

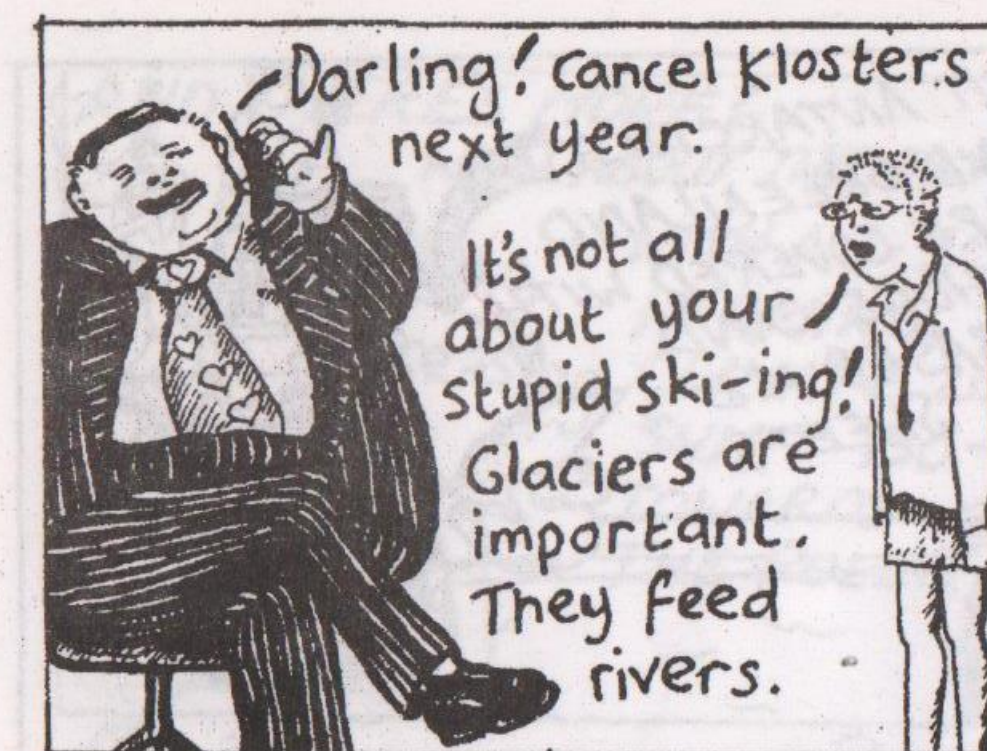


Resources available from Rising Tide in the UK

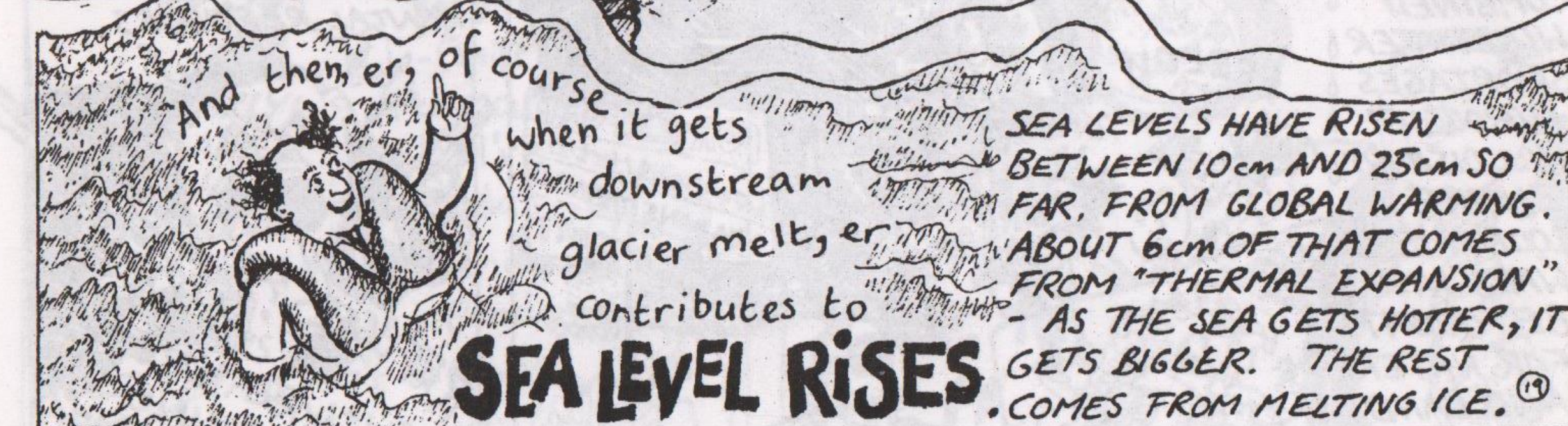
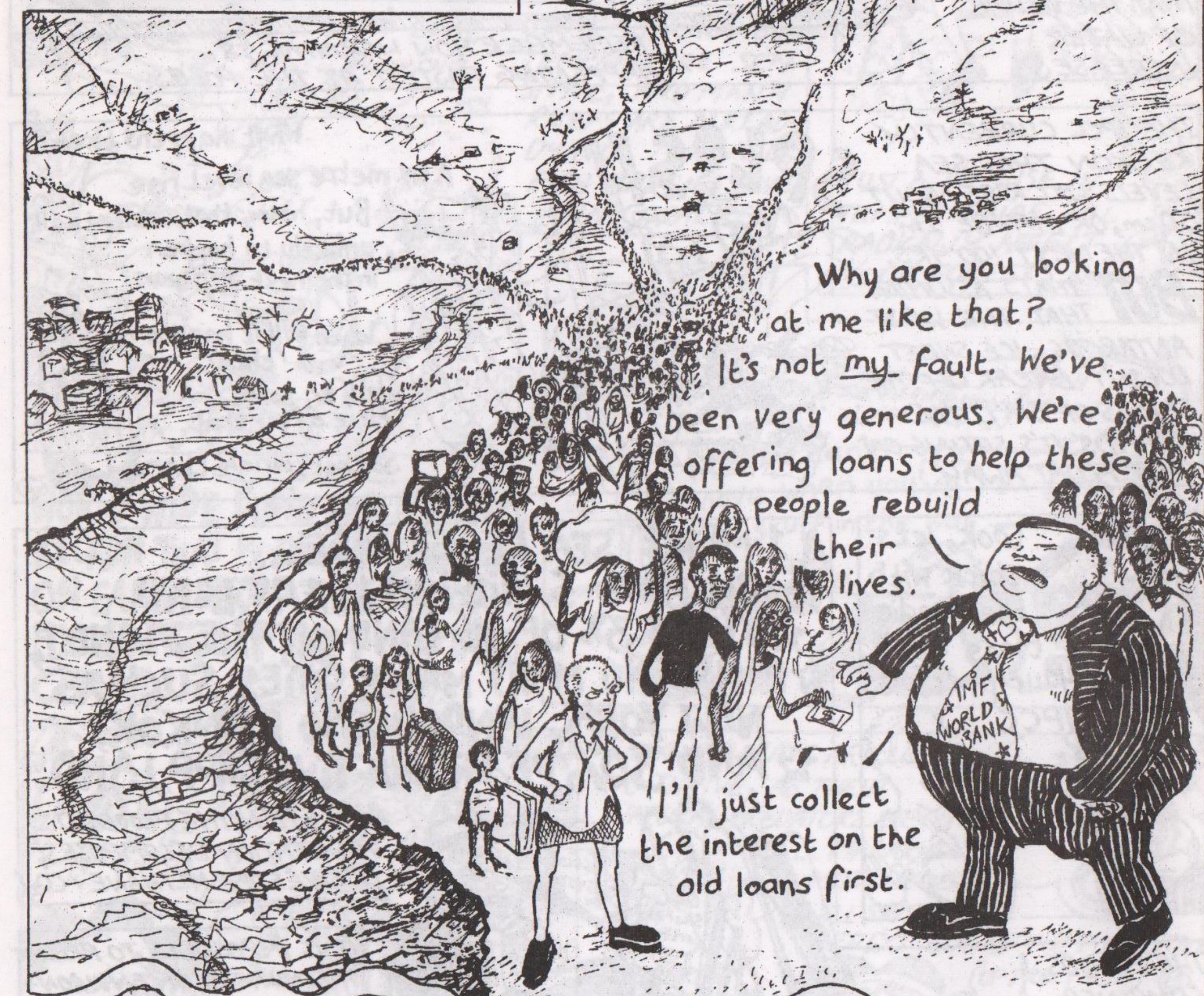
- Copies of this comic
- Infosheets on domestic action, involving people in community action, climate change conferences, contact details, Rising Tide political statement, denial, greenwash and others
- Public speaking training events
- Videos produced by Rising Tide and others
- 90% for 90% cards, see www.risingtide.org.uk for info
- Display banners for loan
- "Wheel of Misfortune" prop for street theatre
- Support for local groups and active individuals

REFERENCES

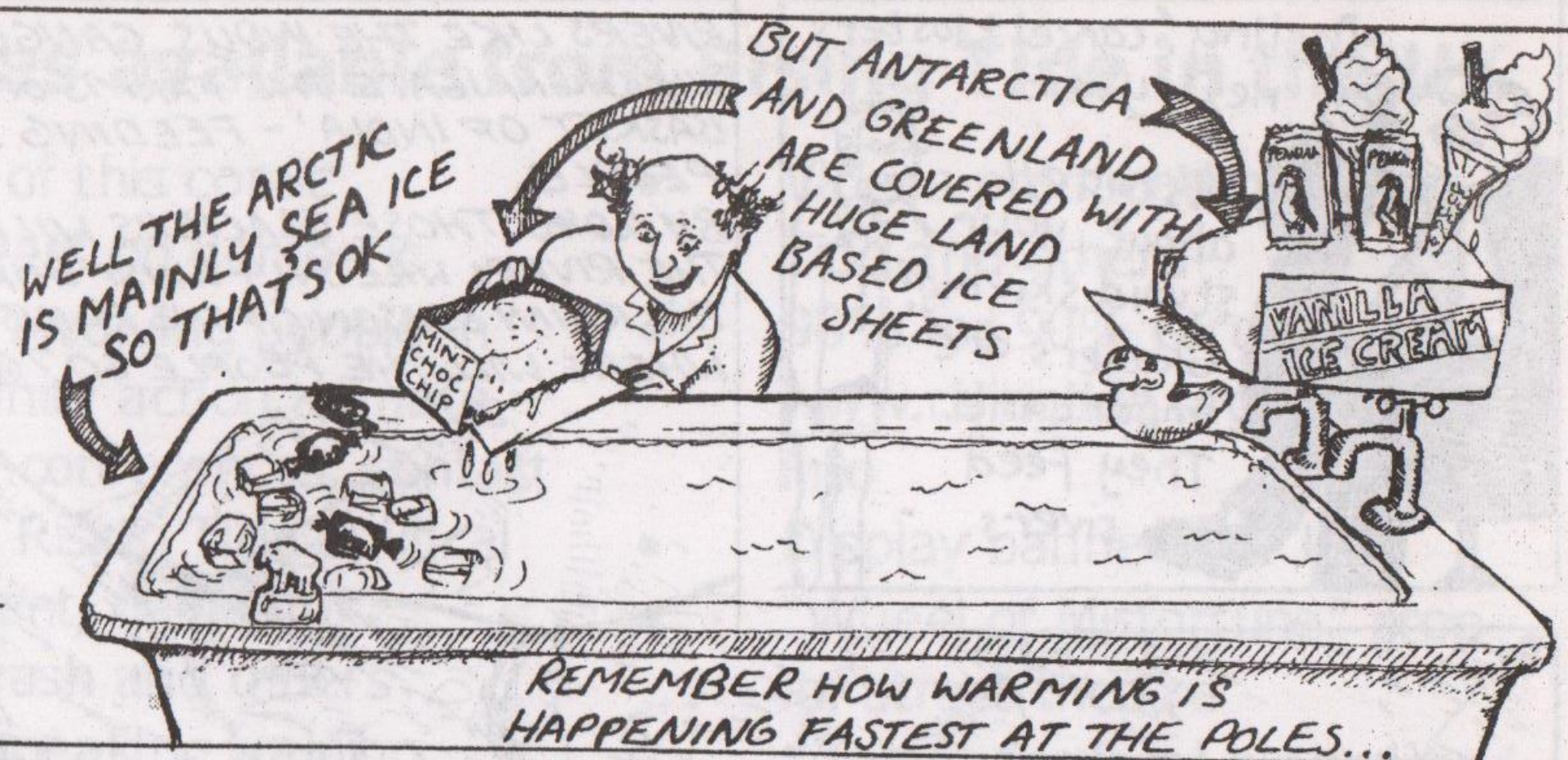
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2. *Climate Crisis Issue*, The Ecologist again
3. *United Nations Climate Change Information Kit*, UNEP, July 1999 www.unep.ch/iuc
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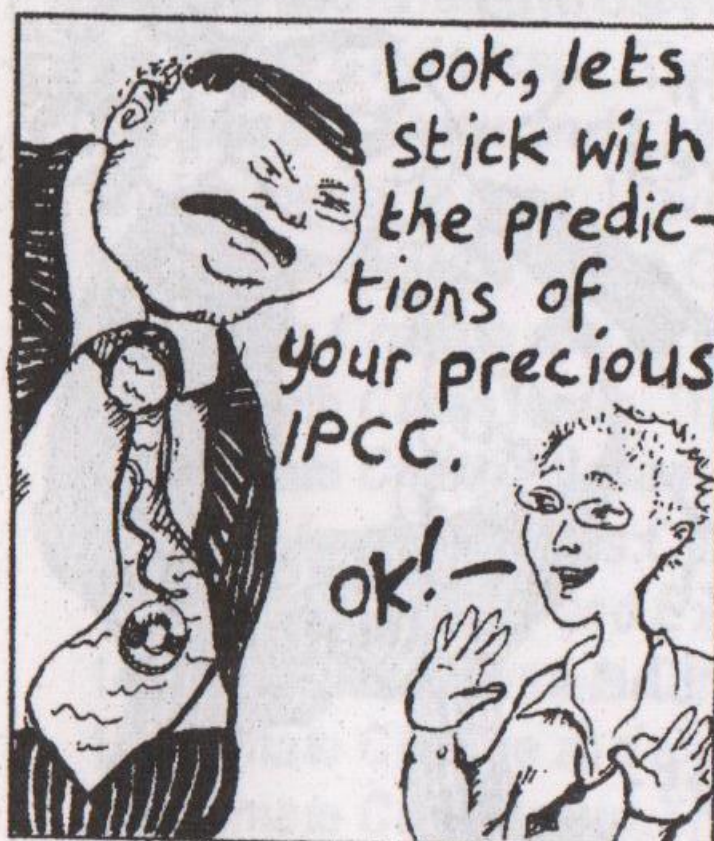
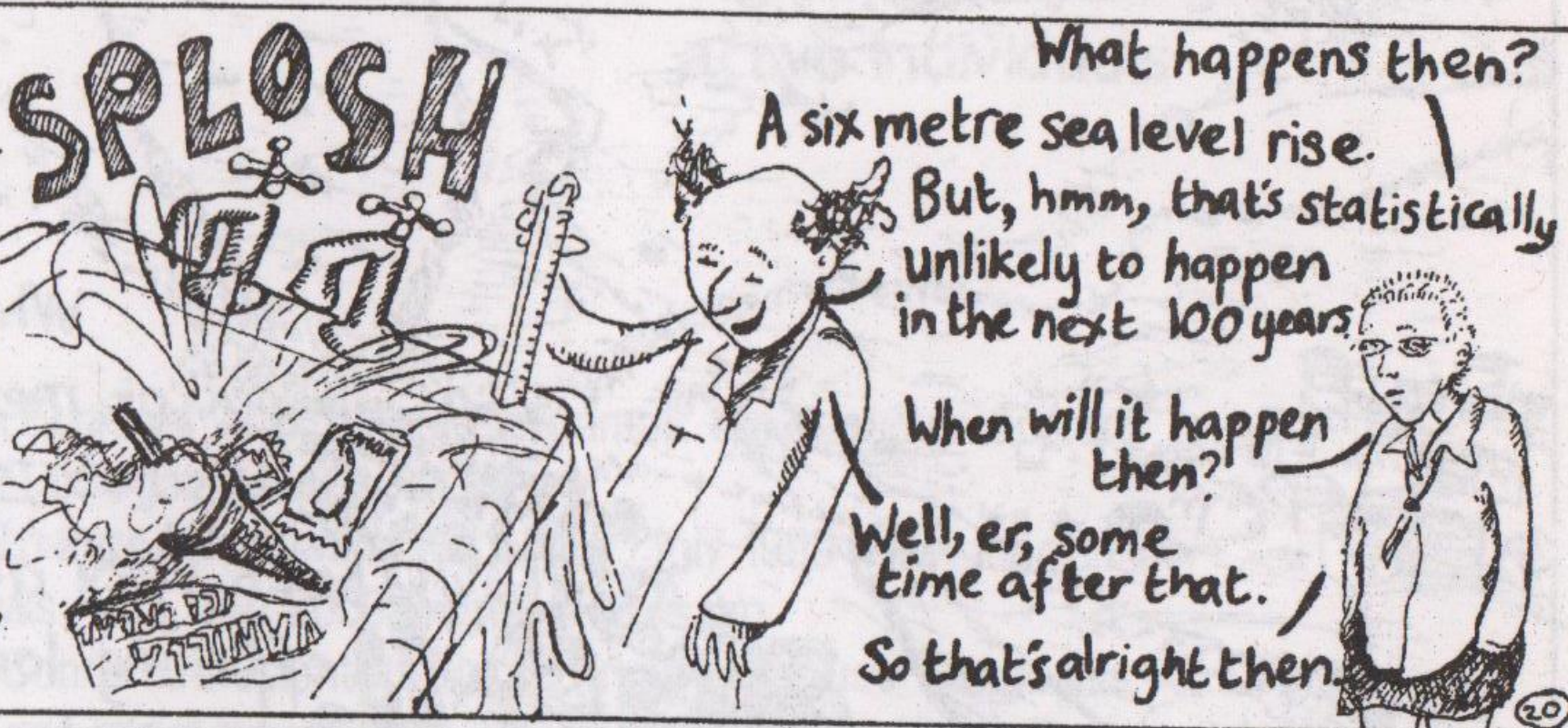
RIVERS LIKE THE INDUS, GANGES + BRAMAPUTRA WHICH IRRIGATE THE FARMS OF 'THE BREAD BASKET OF INDIA' - FEEDING 1 BILLION PEOPLE.
BY 2040 THOSE GLACIERS WILL BE GONE. THE RIVERS WILL ONLY EXIST DURING THE RAINY SEASON (IF THE RAINS COME). WHERE WILL THE PEOPLE GO? ⑧



SEA ICE MELTING IS OK: WHEN ICE CUBES MELT IN A DRINK, THE DRINK DOESN'T OVERFLOW. IT'S WHEN ICE ON THE LAND MELTS INTO SEA WATER THAT THE VOLUME OF WATER INCREASES.

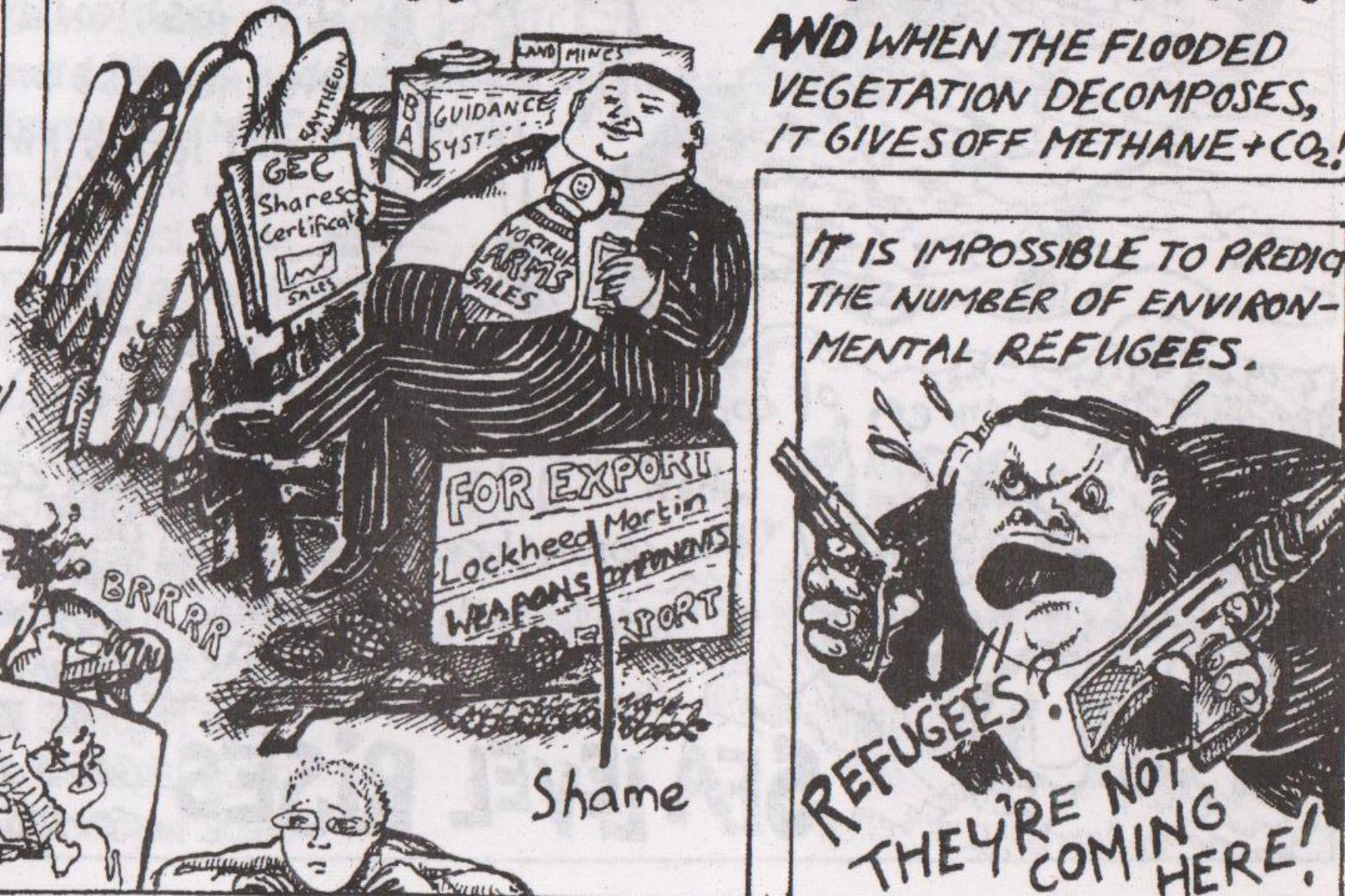


THE IPCC CURRENTLY RECKON THAT SEA LEVELS WILL RISE ABOUT 50cm, OR MAYBE 1m, IN THE NEXT 100 YRS. BUT THAT'S ASSUMING THAT THE WEST ANTARCTIC ICE SHEET DOESN'T BREAK OFF THE SERIES OF SIX LITTLE ISLANDS IT'S SITTING ON AND FLOAT AWAY.



A 1 METRE SEA LEVEL RISE...

- ★ WILL FLOOD 5 MILLION km² OF LAND.
- ★ THAT'S 3% OF ALL LAND ON THE PLANET,
- ★ INCLUDING MANY MAJOR CITIES SUCH AS NEW YORK, LONDON AND BANGKOK,
- ★ AND 30% OF PRODUCTIVE CROP LAND.



THE FLOODS, COMBINED WITH WATER SHORTAGES + DROUGHT WILL DISRUPT ENTIRE COUNTRIES. WARS WILL BE FOUGHT FOR WATER AND LAND.

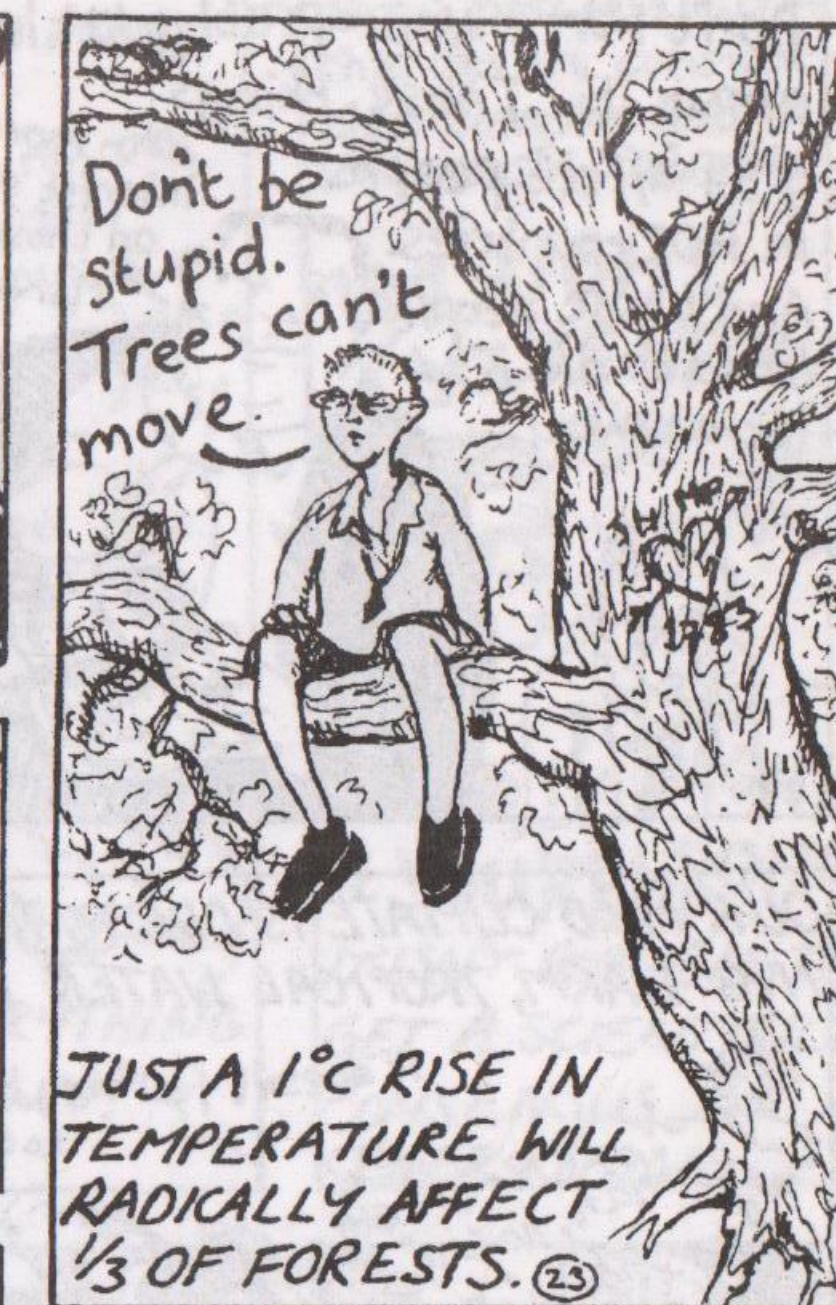
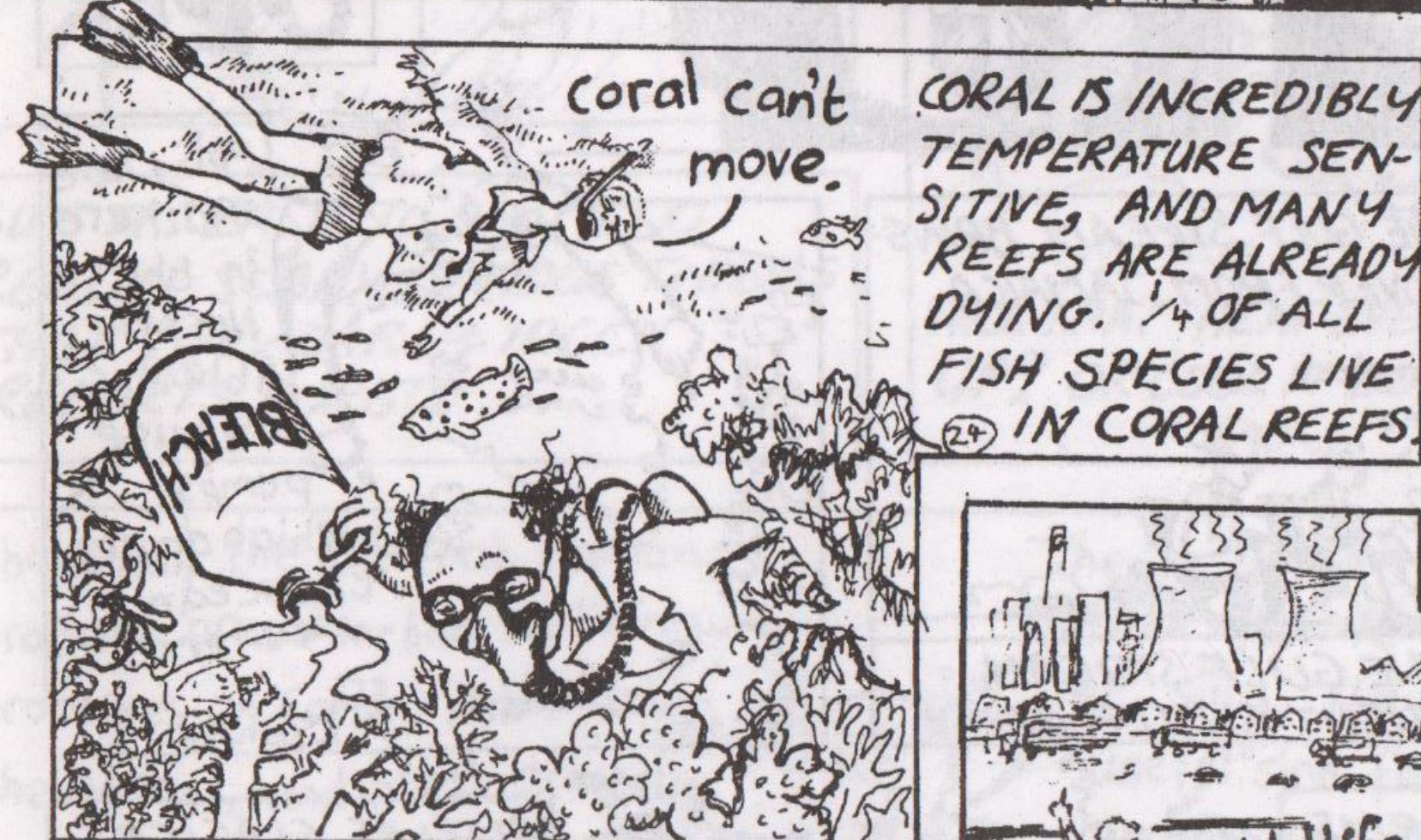
NEEOW

BRRR

AND THERE'S MORE! Oh no! WHAT ABOUT THE EFFECT ON **WILDLIFE?** This is getting really depressing.

WITH A 1-3.5°C WARMING, THE CLIMATE ZONES SHIFT 150-550km TOWARDS THE POLES.

Well, things can just move then.



WORLD WIDE FUND FOR NATURE RECKON THAT 1/3 OF ALL SPECIES ON EARTH ARE AT RISK OF EXTINCTION FROM CLIMATE CHAOS.



Don't worry your pretty little head about it. These things only affect people in HOT countries. And those people tend to die a lot anyway.

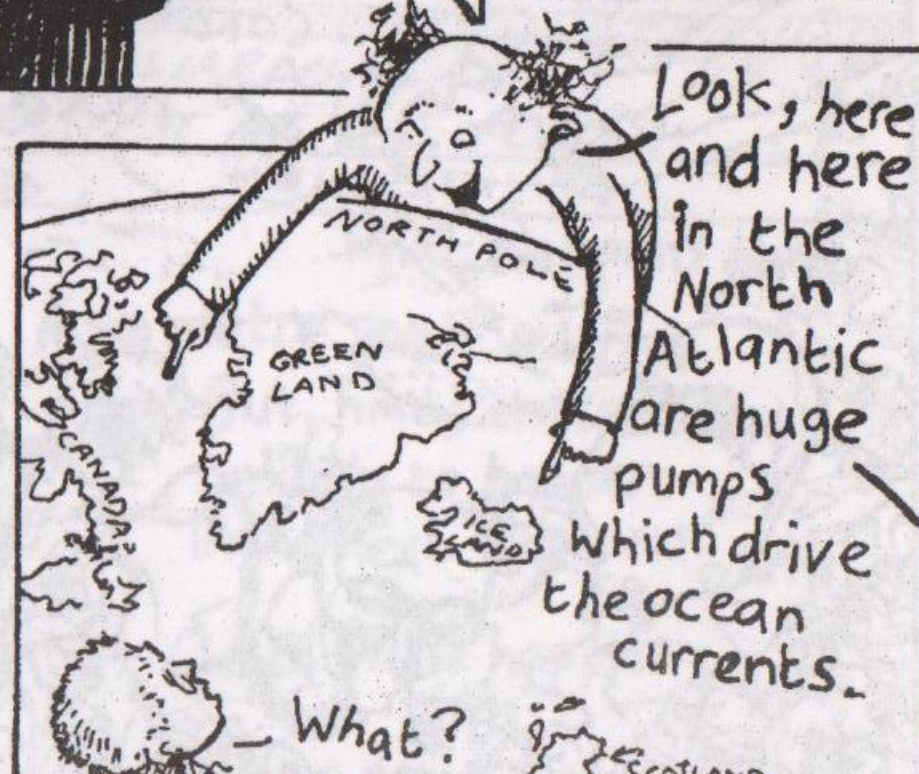


Here in England it will be balmy...
...Mediterranean...



STRANGELY ENOUGH, GLOBAL WARMING MAY WELL MAKE NORTHERN EUROPE MUCH COLDER

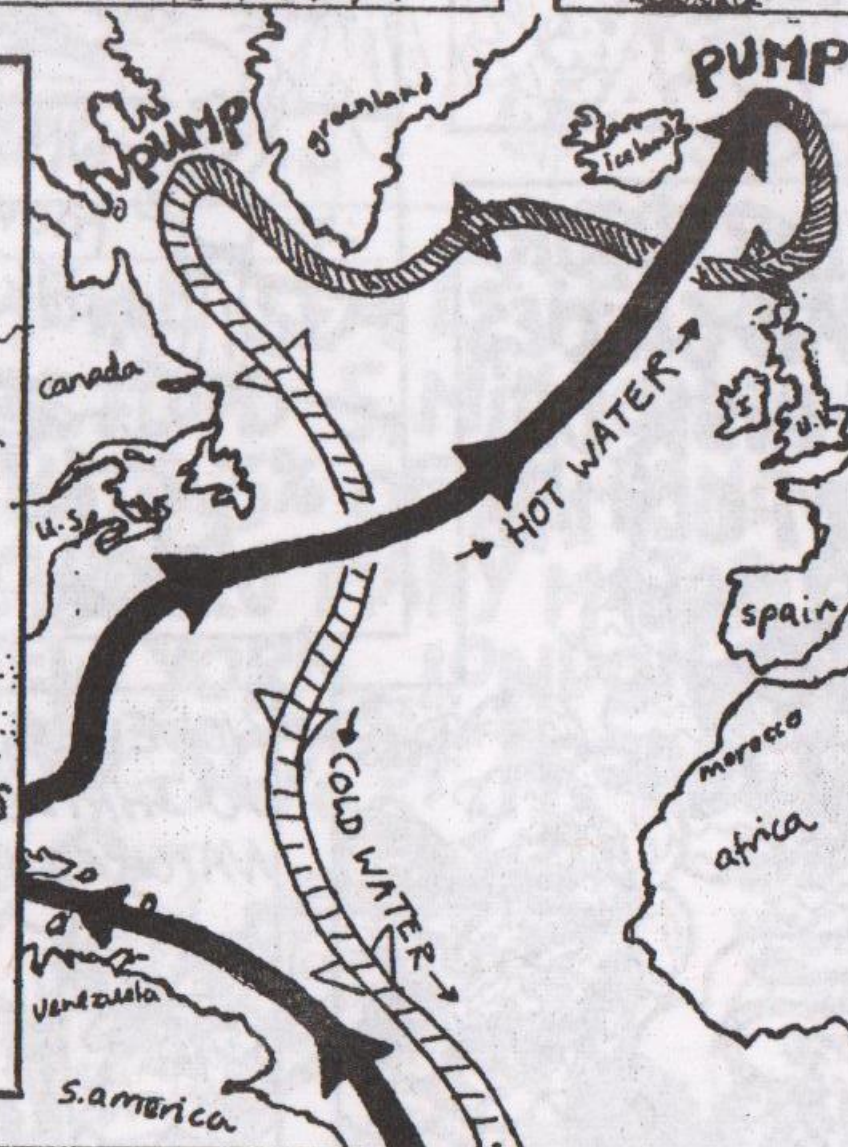
OUR MILD CLIMATE IS DUE TO THE GULF STREAM BRINGING WARM, TROPICAL WATER OVER FROM JAMAICA.



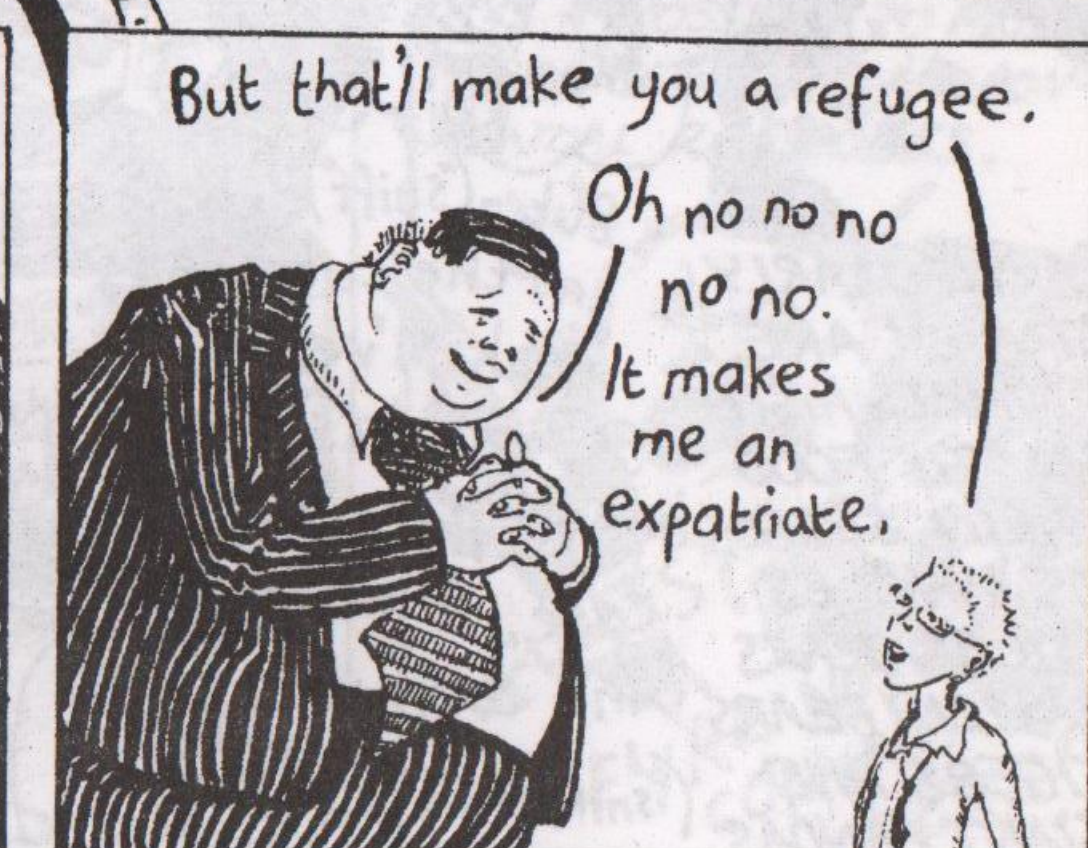
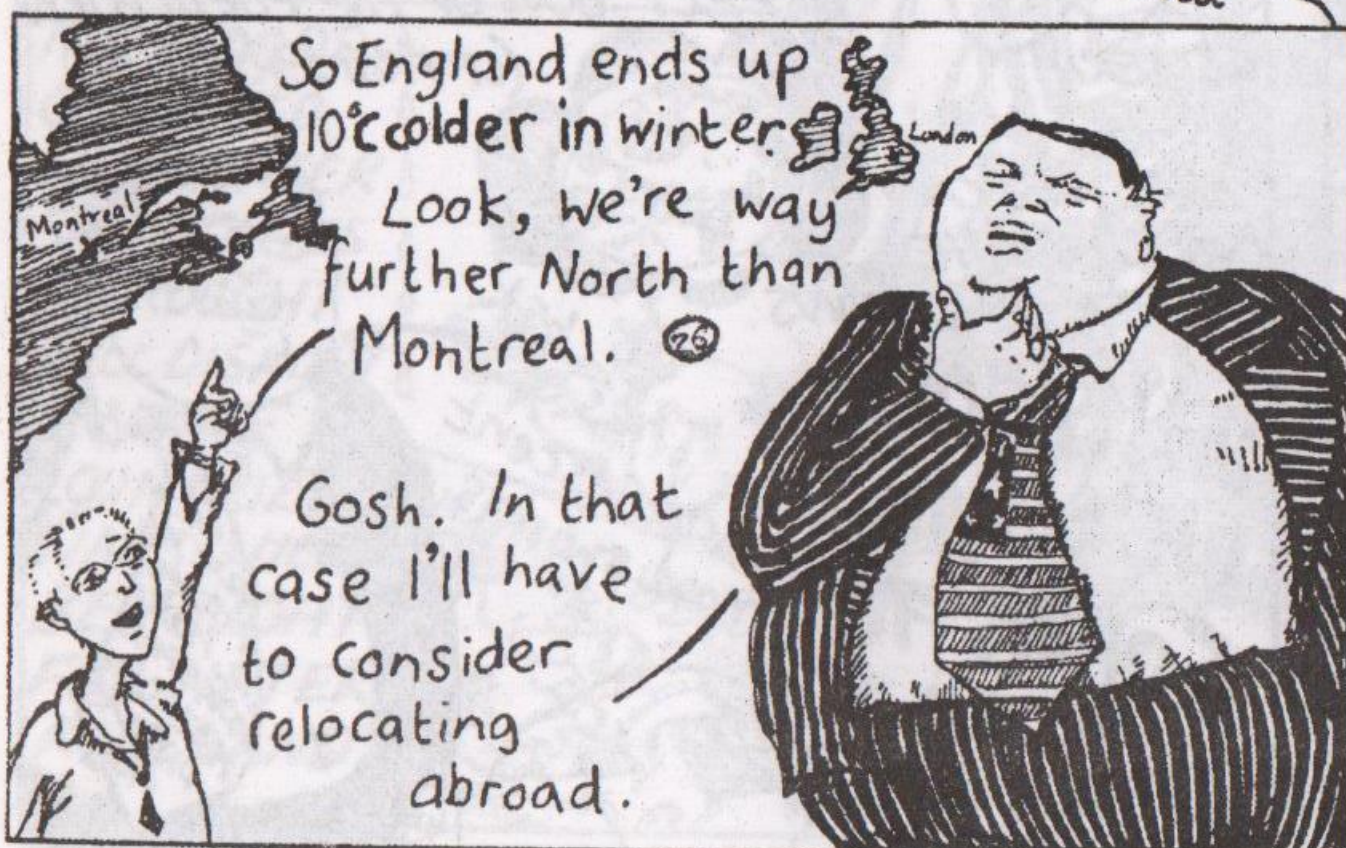
WHAT HAPPENS IS, AS ICE FORMS IT LEAVES BEHIND SALTIER, DENSER SEA WATER...



THIS FLOWS OUT OVER AN ENORMOUS SHELF IN THE BOTTOM OF THE SEA, PULLING WARMER WATER FROM THE TROPICS BACK IN ITS PLACE. (THAT'S THE "PUMP").



BUT, AS GLACIERS MELT IN CANADA AND GREENLAND, MORE FRESH WATER WILL DILUTE THE SALTIER DENSE SEA WATER. IT WON'T SINK, JUST MINGLE AND THE CURRENTS WILL STOP. SOME SCIENTISTS RECKON JUST 0.25% MORE FRESH MELT WATER WILL MAKE THIS HAPPEN.



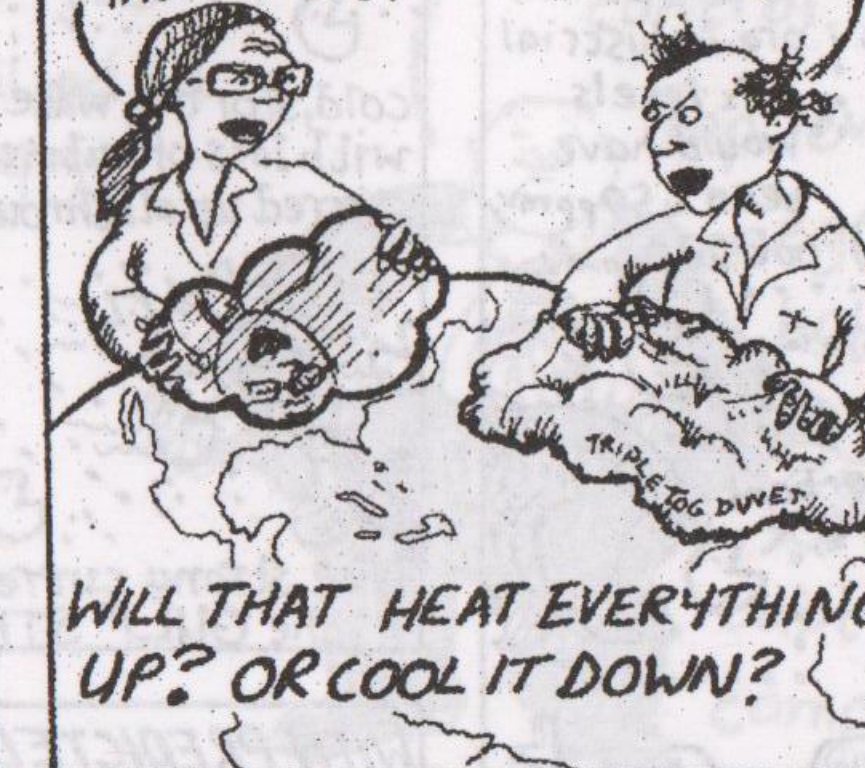
ULTIMATELY, SCIENTISTS CAN'T TELL US EXACTLY WHAT'S GOING TO HAPPEN BECAUSE LIVING THINGS ARE INFINITELY MORE COMPLEX THAN MODELS.



BUT IT'S EASY TO SPOT TWO REALLY SCARY OBVIOUS THINGS THAT THE EARLY IPCC. REPORTS FORGOT...

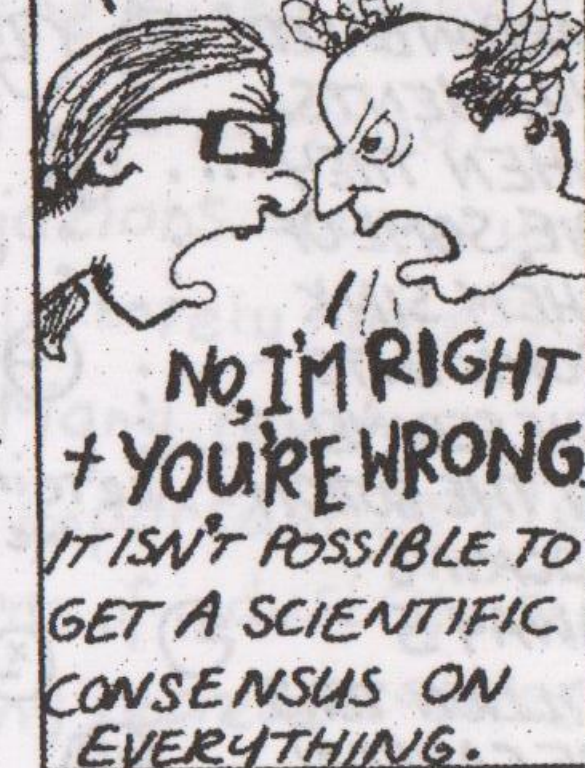
FOR EXAMPLE, THE WARMER ATMOSPHERE WILL HOLD MORE MOISTURE...

The clouds will reflect the sun's heat back into space.



"The interpretations about past and future changes are considerably complex and in some cases contradictory."

I'M RIGHT (YOU'RE WRONG)



About half the CO₂ that humans produce are absorbed by living processes on Earth; plankton in the oceans, and plant growth such as that, er, that occurs, er, in big, mature tropical rainforests.



They're getting chopped down? How remarkably er, silly. They're a very useful "sink" for CO₂ emissions, and a vital climate stabiliser.



Look - tell him that. At this rate we'll have totally done them in by 2030.



THIS IS THE OTHER THING: So your calculations are based on CO₂ levels doubling by 2080.



But look, business is booming. CO₂ emissions are growing far faster than that.



My goodness A 10-14°C temperature rise over major land masses.



THEN THERE'S ONE GREAT BIG **WHOPPER** OF A POSITIVE FEEDBACK: THE OCEANS AND FORESTS SOAK UP CO₂ EMISSIONS, BUT THEY CAN'T DO IT IF THEY GET TOO HOT.

PHYTOPLANKTON SWIM AROUND IN THE SEA CHOMPING UP CARBON BASED NUTRIENTS. WHEN THEY DIE, SOME OF THEM SINK DOWN INTO THE SEDIMENT AT THE BOTTOM LOCKING AWAY 5 BILLION TONS OF CARBON A YEAR.

Without us, pre-industrial CO₂ levels would have been 450ppmv, not 280ppmv.

We're important we are!

THINGS PLANKTON LIKE

Yum!

cold, stormy water with lots of nutrients stirred up all through it.

Nice strong currents - like the GULF STREAM!

THINGS PLANKTON DON'T LIKE

Heated up water which forms a layer at the top of the sea and stops the nutrients mixing in.

UV radiation ~ like what comes through the hole in the ozone layer.

WITH PREDICTED LEVELS OF WARMING, PLANKTON POPULATIONS WILL CRASH. THE OCEANS WILL ONLY BE ABLE TO 'FIX' HALF THE AMOUNT OF CO₂

THEN, IF CO₂ LEVELS QUADRUPE, THE SEAS WILL GET SO MUCH HOTTER THAT THE CO₂ DISSOLVED IN THEM @ WILL START TO BUBBLE OUT.

But plants love CO₂. They'll grow extra fast and soak up the emissions.

I think you're wrong.

And why is that?

Well, you've been wrong about everything else so far in this cartoon.

NOW LET'S GET THIS STRAIGHT.

- ★ MOST PLANTS DON'T AFFECT CO₂ LEVELS BECAUSE THEY DECOMPOSE QUICKLY + THE CARBON GOES BACK IN THE AIR.
- ★ TREES DO 'STORE' CARBON IN THEIR TRUNKS, BUT ONLY UNTIL THEY ROT OR BURN.
- ★ AND, YES, HIGHER CO₂ CONCENTRATIONS WILL MAKE TREES GROW FASTER, BUT...

Now listen.

Listen to me very carefully.

BUT... (SINCE SEAS ABSORB HEAT + LAND REFLECTS IT) THE GREATEST WARMING WILL HAPPEN OVER LARGE LAND MASSES. THE OLD IPCC FORECASTS SAY AN 8°C RISE. TREES CAN'T COPE WITH THAT AMOUNT OF HEAT + DROUGHT, AND BY 2050, THE TROPICAL FORESTS ALL DIE OFF. THE CO₂ RELEASED INCREASES ATMOSPHERIC LEVELS BY 1/3.

WE HAVE TO DO SOMETHING TO STOP THIS

WHAT DO WE NEED TO DO?

Let's see, hm, well, an initial cut of 60% in greenhouse gas emissions followed by er, er, an 80 or 90% drop. That would stabilize things.

AND WHAT ARE WE DOING?

Calm yourselves. It's all under control. The Kyoto protocol. Top level international negotiations. Luxury hotels. Lovely hostesses. Many really important people: Captains of industry, oil company representatives, shaping the future of the world...

AND COMMITTING US TO?

A 5.2% cut in emissions! (Not counting international air and road freight and anything from the developing world).

HOW WILL WE ACHIEVE THIS?

Clean development mechanisms. Activities implemented jointly. Carbon offsets. **WHAT?**

Planting trees to soak up the carbon dioxide.

WHICH WON'T WORK.

No, but it sounds good.

NEVER DOUBT THAT A SMALL GROUP OF THOUGHTFUL COMMITTED CITIZENS CAN CHANGE THE WORLD INDEED IT'S THE ONLY THING THAT EVER DOES. MARGARET MEAD.