

# One Degree Matters

Prominent scientist and environmental leader Jacqueline McGlade, PhD, explains how just one degree of temperature change impacts the Earth and discusses how we can change our behavior to adapt to the realities of climate change. McGlade serves as executive director of the European Environment Agency.

<http://video.esri.com/watch/472/one-degree-matters>

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## Video Transcription

**00:01** Our next and final keynote speech will be from Jacqueline McGlade.

**00:07** Jacqueline is head of the European Environmental Agency.

**00:11** And before I introduce her fully, I'd like to run a short video, which begins to tell the story of her work.

**00:19** She's amazing.

**00:21** But let's see the video, please.

**00:24** (Music playing)

**00:33** The last 10,000 years have been one of the most stable climate periods in the history of the earth.

**00:39** It has been a time when average temperatures have rarely strayed beyond one degree centigrade.

**00:45** And in this Nirvana, humans have developed a technology regime that is dependent on this stability.

**00:53** Straying out of this zone, by even one degree centigrade, matters.

**01:01** But now our climate is getting warmer.

**01:04** We are producing more greenhouse gasses than ever before...

**01:07** ...and this is moving us off any safe pathway and into a future unlike anything we have experienced before.

**01:18** Scientific studies are showing us that we are fast approaching the two-degree world...

**01:23** ...which is one degree warmer than today...

**01:25** ...a planet on which dangerous climate change is almost certain to happen.

**01:31** It is in remote locations such as the Arctic where climate change is having its biggest impact...

**01:38** ...the highest and fastest temperature change, and where the effects will have the biggest global impact.

**01:46** The latest data show that the net loss of mass from the Greenland Ice Sheet is accelerating...

**01:51** ...much faster than predicted by the International Panel Of Climate Change.

**01:56** Last year alone, there were 50 more melting days on the ice sheet...

**02:00** ...than on average, meaning we now see a net loss of mass of 200 gigatons...

**02:06** ...a level that is four times higher than back in the year 2000.

**02:21** The accelerated melting of the Greenland Ice Sheet now means that our estimates...

**02:26** ...of a minimum global sea level rise by the end of the century have had to be reestimated...

**02:32** ...at 90 centimeters compared to 16 centimeters just three years ago.

**02:39** And this is at the low end of the global sea level rise that we can expect.

**02:52** With the pathway of increasing global warming, the future is likely to be very different.

**02:58** There will be huge challenges and changes.

**03:02** Ice sheets will have become unstable.

**03:07** Many species will have become extinct.

**03:14** Ocean warming and acidification will bring the death of 80 percent of the world's coral reefs.

**03:21** Global temperature increases are joined by the mounting threats of population growth, soil loss, and aquifer depletion.

**03:31** Agriculture will no longer be reliable, and people will start to move to regions where food is still available.

**03:46** We are now entering a new reality called the Anthropocene...

**03:50** ...a geological era in which human activities are changing planetary processes.

**03:55** We need to think in a completely different way if we are to avoid gambling with the future of the human race.

**04:01** Inaction is a luxury we can no longer afford, because now even one degree matters.

**04:18** (Applause)

**04:26** Amazing. Jacqueline McGlade.

**04:30** Jacqueline is head of this agency, but she has a long, distinguished career...

**04:34** ...in other organizations both in the UK and across Europe...

**04:38** ...and was originally an academic researcher by training.

**04:43** It's not all doom and gloom, is it, Jacqueline?

**04:45** No, no. No.

**04:46** You going to tell us about that?

**04:47** I'm going to tell you, yeah.

**04:48** Okay. Good.

**04:49** Thank you, Jack. Thank you. Good afternoon, everyone.

**04:53** And thank you, Jack, for the privilege of being able to come here...

**04:56** ...and share with you some of the work of the agency.

**05:00** It is a very gloomy picture, and one which I hope that we can mitigate.

**05:06** And we're going to do that, I think, collectively, by giving people information...

**05:10** ...that will enable them to act, that will enable them to feel secure in the future...

**05:15** ...and behave in a way which is meaningful for their personal lives and meaningful for society.

**05:21** One of the ways the agency has done that is, in fact, to take us very much from today's setting...

**05:28** ...where we have to change and the world is changing around us to one where we find inspiration...

**05:34** ...in stories from people all around the world who are reacting more and more quickly...

**05:40** ...but whose shared intelligence we can use to solve some of our local problems.

**05:46** About three years ago, we started a program with UNEP and with European Space Agency.

**05:51** And the idea was to make a living testament of people who were genuinely using their wisdom...

**05:57** ...and reacting to change and to share those experiences with others around the world.

**06:03** The first story is up in the north in Lapland, in the Swedish part.

**06:08** And it's about the reindeer herders. Reindeer herders are extremely resilient people.

**06:15** They have a world in which they are able to resist enormous changes and fluctuations in storms.

**06:21** But over the last few years, those same reindeer herders have been finding it increasingly difficult to survive.

**06:27** In fact, the reindeer herds have had up to 90-percent mortality rates...

**06:33** ...because as the warming days and the freezing days go through the winter...

**06:38** ...it makes it increasingly difficult for the reindeer to actually break through to find the lichen that they feed on.

**06:45** One family, though, is very, very successful. The two sons...one on the left...has an MBA from Harvard...

**06:51** ...one on the right is an experienced engineer.

**06:54** Together with their father, have been able to make sure that their herds have survived.

**06:59** And they've done that literally in a landscape which is as severe as any I can image people living in.

**07:07** They've done it because of this man, their father.

**07:09** [Unintelligible] is about 89 years old, as far as we can tell.

**07:14** And he has the wisdom of many decades where he remembered places where they used to take the reindeer...

**07:20** ...up onto the sides of the valley where the freezing and thawing was not so bad...

**07:26** ...and where now, in fact, he can secure the future for his reindeer herds.

**07:31** So it is very likely that by sharing this knowledge of the old ways and where they used to herd...

**07:37** ...and take reindeer that this particular way of life will be able to survive in the future.

**07:43** Our next story takes us at the same latitude that really moves us to the east into Russia.

**07:52** Here the story is quite different. It's one of drought.

**07:56** And you can see in this picture already islands emerging...

**07:59** ...in the middle of what are major rivers connecting the five oceans.

**08:04** And what the city has had to do, in fact, is to already renegotiate the shipping lanes...

**08:09** ...to secure what are very vital links from north to south.

**08:15** What they're looking at are innovative ways of not simply dredging...

**08:18** ...but actually trying to find new shipping lanes that will take them around the different problems.

**08:24** A more inspirational story about living can't be found, I think, other than here in the Netherlands.

**08:30** People have decided that living on water, and certainly architects and engineers...

**08:34** ...is more stable than living on soil which has been inundated with marine waters.

**08:40** You get not only stability but you get energy from water, and you also get your drinking water.

**08:46** So already, we can see large areas inside Rotterdam and other places...

**08:50** ...creating these wonderful living spaces where people travel to and fro each other by boat.

**08:56** And in the future, we can already see some of our architects, French architects and others...

**09:01** ...designing places to live that are out into the coastal areas, that can actually float.

**09:08** But we have other stories about climate.

**09:11** After the collapse of the Soviet Union, some of the places, particularly in Georgia...

**09:15** ...were left with a desolate, desolate future where there was no fuel.

**09:20** And so they ripped up all the hedgerows and actually removed the possibility of the windbreaks.

**09:26** And along with that, then, came a massive shift in the landscape.

**09:30** And what had been the wheat basket of Russia very quickly became a place of very low productivity.

**09:39** The wheat was very stunted and, simply, it did not survive and did not sustain the populations there.

**09:46** And there were successive failures.

**09:49** And then two men came along and they looked at the maps...

**09:52** ...and they looked at the wind direction and they looked and where the water was.

**09:56** And very carefully, they reconstructed the hedgerows...

**09:59** ...and in the space on only 5 years that productivity went back up again...

**10:03** ...10 times what it had been only 10 years before.

**10:07** So the wheat basket of Europe was once again reestablished.

**10:13** The final story has very much a similar style to our coffee story, but it's one of a reengagement, I guess...

**10:21** ...with the landscape, in a very ancient landscape in Italy...

**10:25** ...where a valley had been almost left with nobody in it.

**10:30** And three men decided to retake the valley and to reengage...

**10:36** ...but taking climate change into account, knowing how little water there was, thinking about what they could grow.

**10:42** And more importantly, making themselves not only fossil fuel-free...

**10:46** ...but also carbon negative, absorbing more carbon on the farm than they actually used.

**10:53** They put in solar power, they have actually done tremendous things with soil.

**10:58** So the soil actually traps more carbon.

**11:01** And they've created a whole new business model, taking their food that they produce directly to the customer...

**11:07** ...and then also creating a wonderful set in which more than 150 people are employed, and so on.

**11:14** And these three brothers, I think, show us that by adapting to climate change now...

**11:19** ...you can create a future which is not only prosperous but also very beneficial and sustainable.

**11:25** So these are some of the stories that we like to share.

**11:28** And they are inspirational.

**11:29** There are many of them on our website, and I hope that you'll take an opportunity to look at them.

**11:34** But we would like more stories.

**11:35** We want to capture those ideas which can be transplanted all over the world and used by others in similar situations.

**11:44** So who are we?

**11:45** The audience, I'm sure, has thought very much about the idea of an agency.

**11:49** But the European Environment Agency is very different from pretty much any other one in the world.

**11:54** We're situated in Copenhagen, we have a dynamic team...200 people.

**12:00** We cover all areas of the environment...

**12:02** ...including air quality, water, biodiversity, agriculture, transport, energy, it just goes on.

**12:09** And our job, really, is to make sure that countries do what they're supposed to do.

**12:15** We're sort of like a very nice police force or an audit.

**12:19** So we go along and say, well, yeah, you sent us the data...

**12:22** ...and it looks as if it's working; or, you didn't, and we're going to ask you again.

**12:27** So we quality assure all the information that countries send regarding the environment.

**12:32** We started out with the European Union member states, we grew in advance of the new member states joining us...

**12:40** ...and then we work now in the Balkans as our associate members.

**12:44** So collectively, together with the EFTA countries...

**12:47** ...we have a membership of about 38 countries.

**12:51** We have a special agreement with Greenland.

**12:53** And then, in the last two years, we've taken on a neighborhood program, which means we work comprehensively in Russia...

**13:00** ...out towards the caucuses, and through North Africa.

**13:03** So we're on the ground helping those countries really transform themselves.

**13:08** But jumping over, I would say, 30 years of environmental measurement...

**13:13** ...and reporting into a completely new and novel way of working.

**13:18** What do we ask of our countries?

**13:20** Well, we ask them to send us information about biodiversity, about the quality of their soils, the quality of air.

**13:28** We ask them to genuinely make efforts to do more, to report on more things...

**13:34** ...to give voluntary information, not only the compliance information.

**13:40** And over the years, we have found more and more that they have reached out for the spatial tools...

**13:45** ...that we can now provide with Esri and others, and really trying to situate themselves in the minds of their citizens.

**13:52** And it truly has been a transformation of those countries.

**13:56** Yes, we have legislation.

**13:58** Many of you all know about the INSPIRE directive.

**14:00** We believe in quality assurance and trying to settle all the differences so that we have harmonized reporting.

**14:07** But at the root of it, Europe has to take account of not only what it does inside its own borders...

**14:12** ...but the impact that we have on the rest of the world.

**14:16** So over the last two or three years...

**14:17** ...the agency in Copenhagen has been tracking the resources that Europe uses outside of its borders.

**14:24** In fact, we use 5/6 of our resources that come from outside of our own borders.

**14:32** So we are tremendously dependent on those countries...

**14:35** ...where we actually derive our rare earths, our timber, our food, and so on.

**14:41** So part of our mandate, I guess, and part of our role...

**14:45** ...is now to become part of the global nexus of how information flows around the world...

**14:50** ...to quality assure it and to assess the impact.

**14:56** But that's very much documenting the past.

**14:59** Talking about statistics, talking about what people have done in the past...

**15:02** ...it's important, it's about holding governments to account...

**15:06** ...but, as I said at the very beginning, the world is changing very, very quickly.

**15:11** And so we're having to introduce, almost overnight, a completely different way of viewing the environment...

**15:16** ...one which is actually going to be about early warning systems, about how quickly is the ice cap melting.

**15:23** And so we have proposals that look at having a maintained platform out in the Arctic...

**15:30** ...that will be one of the most sophisticated drilling and positional ships...

**15:35** ...that will tell us how thick the ice sheet is throughout the year.

**15:39** We'll link this to a program of global monitoring for environment and security.

**15:44** This is Europe's contribution to the global environment observing systems.

**15:48** And that's important because we need to connect our space observations...

**15:52** ...with what's actually happening on the skin of the earth.

**15:56** And to do that, we're also involving ourselves in sensors.

**16:01** Now here I have a little sensor, and it's sort of quite interesting.

**16:05** I think somebody's supposed to come and look at it.

**16:07** Oh yeah, there you are, you can see.

**16:08** So, the problem with most things in the environment is they're very expensive.

**16:12** That ship, I can tell you, will cost eight zero, maybe zero million Euros.

**16:19** This costs about eight Euros. No, maybe a little bit more, but not much more.

**16:24** But what it does is transform our view of how people...

**16:29** ...ourselves, can really monitor the environment very cheaply.

**16:33** We have already put some of these in place to calibrate against the very expensive

instruments.

**16:38** And I guess that's the challenge before us...

**16:41** ...so that we can look at carbon monoxide, which is important for detection of fires.

**16:46** We can look at carbon dioxide and greenhouse gases, really important in our fight against climate change.

**16:53** And these, I think, are the future...connecting these in remote places, but even in our cities, in our homes...

**16:59** ...to enable people to participate in the monitoring of the environment.

**17:04** What we've done is put them next to our beehives.

**17:06** We've become honey producers in the middle of the city of Copenhagen.

**17:11** I could always tell you a little story about honey produced in cities...

**17:13** ...which is much cleaner than honey produced in the countryside, because there are no pesticides.

**17:18** Anyway, our little bees go backwards and forwards, and occasionally they go near to the instruments.

**17:22** So we also want to see what that means.

**17:24** But these are fascinating things.

**17:26** And people in urban settings are intrigued at the fact that they can tell us a lot more...

**17:31** ...than currently they are receiving from the official data.

**17:35** So we see a future which is completely embedded with sensors...

**17:40** ...with instruments that are telling us from the depths of the ocean using the Argo buoys...

**17:45** ...which go down and come up to the surface and then transmit to our satellite tracking...

**17:49** ...to very sophisticated additional monitoring that we put on the fleet of airplanes...

**17:55** ...that go through the troposphere and upwards...

**17:57** ...together with many other platforms that we're launching with our colleagues in the US...

**18:03** ...but also with Russia with Roscosmos.

**18:06** We will see an enormous step up, terabytes of data that will be available to us to use...

**18:13** ...to be able to not only locate changes but to translate them into meaningful policies...

**18:18** ...for citizens and also for decision makers.

**18:22** We'll also go literally from outer space right down to the bottom of the ocean.

**18:26** And these are live networks of stations which are down...

**18:31** ...which are around the oil and gas fields, but also have many, many other reasons.

**18:34** We want to understand the deep, bathymetric currents because they do affect climate change.

**18:40** And finally, up in the mountains where we can actually see the most rapid climate change...

**18:47** ...we also want to understand what's happening.

**18:50** So the role of the agency in this particular setting is to connect the in situ monitoring...

**18:56** ...with the space-based observation, connect it in a way to the past reporting...

**19:02** ...and then tell people, Why does it matter? What's actually going to happen?

**19:07** So I'm going to take us now into a new regime, a new world of working.

**19:12** One where it's not always the official data that would hold sway when it comes to changing people's minds.

**19:18** And for that, I'm going to ask my colleague Jan Bilki to join me.

**19:23** Jan, some of you might know, has been with the agency for a very long time...

**19:27** ...much longer than me, and is in charge of our mapping and spatial dynamics.

**19:32** So, Jan. What he's got for us here...

**19:37** Well, he's got a fan club, I know.

**19:41** I'm going to come back to the first one, Eye on Earth, because that's another platform we're going to talk about.

**19:45** But let's go across to the next one.

**19:48** So what you see here is a display of our map services and our data service.

**19:51** We really are trying to make it very easy for people to lock in to different applications and maps and so on.

**19:59** So we cover biodiversity, air quality, water quality, and so on.

**20:04** Many, many different subjects.

**20:06** But I'm going to take us into the ozone.

**20:09** So for each one of these, there's an introductory video...

**20:12** ...tells you what's there and explains very much why you should be interested in what's there.

**20:17** And our sort of 50-odd applications cover many, many different aspects.

**20:21** Why are you interested in ozone, you might ask?

**20:23** Well, if you have a breathing disorder, you definitely want to know about ozone.

**20:27** It's one of the most lethal things around...

**20:29** ...and certainly near-ground ozone is something which comes along with heat waves.

**20:34** So we have already seen a very, very strong user community...

**20:38** ...within the medical world asking us for early warnings of ozone.

**20:43** What you see here, then, are the outcome of approximately 100,000 measurements a day.

**20:49** Now these are not required through legislation.

**20:52** Countries in Europe are only requested to report on exceedances in the summer.

**20:57** But through a process of about three years, we've been able to persuade countries...

**21:01** ...this is a very, very good thing if they actually inform citizens...

**21:05** ...about what's happening on the day regarding ozone.

**21:09** And this is coming from cities, it's coming from local authorities...

**21:12** ...it's coming from many people.

**21:14** And in fact, these sensors could also tell us about ozone as well.

**21:19** What you can see, of course, are the little stations, those little squares.

**21:23** And then, the kind of purple cover above it are the outcomes from the model.

**21:27** But now, if we were running it, you could actually see, in the sort of time sequence...

**21:33** ...how that model changes over a period of time of one day.

**21:39** What you can see on the right-hand side is that there are layers from the model and also from the stations.

**21:46** And if we go into a station, this is probably one of the most important things...

**21:50** ...that we really adhere to, and that's the idea of authentication.

**21:54** Authoritative data. We fundamentally believe that the role of the agency...

**21:58** ...is to make sure that people can trust the data that they find with the agency's logo or on our website.

**22:05** So for example, there's an identifier, who's produced it, where the station is...

**22:10** ...and here's a time series for that particular station itself.

**22:14** So data tagging, data sourcing, is extremely important for us.

**22:20** Now, there's been an awful lot of talk about different devices, and we're one of the group...

**22:25** ...also that believe in switching across to...away from desktops onto mobile devices.

**22:30** And for that we've spent some time developing applications on iPhones, iPads, Androids, and so on.

**22:38** What we're going to show you here are the possibilities that come with that particular approach.

**22:43** And I'm going to select one first of all, it's called LIFE, for those of you who don't know it...

**22:48** ...and if you're not European, you may not.

**22:49** But it's one of the major funding streams that we've had, particularly for the environment.

**22:55** So we have a lot of bureaucrats.

**22:57** They sit sometimes in Brussels and they want to know where they've spent their money.

**23:01** So we've been very, very clear that one of their demands on us is to give them...

**23:06** ...a very easy and accessible way that they can find out where money has been spent in the past...

**23:12** ...and if they're going to put some more money into the region...

**23:14** ...is it going to have additional benefits to their previous investments.

**23:19** So you can go to the Life program, you can see the detail.

**23:22** But they can also overlay that with, perhaps, a specialist layer about biodiversity.

**23:28** So we have some legislation called Natura 2000.

**23:31** And this is a very, very important piece of legislation to protect biodiversity...

**23:36** ...habitats, endangered species, and so on.

**23:40** So countries have set out across their territories...

**23:43** ...large areas which are to be protected and monitored under Article 17.

**23:48** And this, again, helps the people who are doing funding...

**23:51** ...together with countries to see where those investments are going...

**23:54** ...in relation to other areas that they have actually put under protection.

**24:00** The final one is a very interesting activity. It's producing an urban atlas.

**24:04** It comes from our [Unintelligible] cover work...

**24:07** ...and it is probably one of the most dynamic atlases that we have. It's used by everybody.

**24:13** It's used by planners, it's used by geographers, it's used by farmers.

**24:18** Because what we have seen in Europe is this enormous urbanization...

**24:24** ...where over a 10-year period, the same size of Belgium has been laid under concrete.

**24:29** And it continues year upon year.

**24:32** And this has very serious consequences for us in climate change terms.

**24:36** So knowing where and how different parts of the urban setting are being affected is extremely important.

**24:43** So we have a lot of availability.

**24:45** And one of the things that we're intrigued about is, what do people do?

**24:49** What are they using it for, and who is using it?

**24:52** So we have a service provider mentality in the agency...

**24:57** ...and we would very much like you to become familiar with our data service.

**25:03** We have, of course, built it around ArcGIS Online. It provides maps and apps.

**25:09** We think we've got about 80-plus different map services available...

**25:14** ...and each one of them, then, in this kind of book process, is available not only for your use but for many others.

**25:20** We use them ourselves for our own work, but we make these really available for others.

**25:25** So in a very simple way, people can come in and out of these services and download all the datasets...

**25:31** ...and make up their own kinds of data and services for their own uses.

**25:38** What we then found was that it was possible for us, using a kind of a heat map...

**25:44** ...to really look at ArcGIS Server activity. And here you can see a heat map.

**25:49** The dates were actually on the 16th of June for three hours. And what you get are 10-minute slots.

**25:57** And in that 10-minute slot, you see all the different datasets that are being downloaded.

**26:03** It's a phenomenal number of downloads.

**26:05** We are absolutely blown away by how many people are downloading maps.

**26:11** You can see on the right-hand side a little graph about, you know, which topics and which areas.

**26:15** And usually if we launch a report then you see, you know, a big upsurge in interest.

**26:19** But we can usually anticipate what's coming out in today's newspapers...

**26:25** ...because people are already downloading information just to check up what's in the newspapers.

**26:30** So it's a very, very good early warning device for policy makers and for politicians.

**26:35** But it is fascinating, because you can see what's interesting the public of Europe on any one day at any one time.

**26:42** So I think that, you know, when you're up in the order of millions of people...

**26:46** ...490 million people who we're trying to serve, this is a very encouraging sign...

**26:51** ...that people are genuinely interested in having information at their fingertips.

**26:56** So thank you very much, Jan.

**26:59** That's always the nerve-racking bit on the live...

**27:07** So now I'd like to come to really the last part, and perhaps the most exciting.

**27:12** It's all very well producing maps. We have a duty of care on content.

**27:18** But it's pretty obvious to, I think, everybody in this room that we just don't have enough money...

**27:23** ...and neither do we want the legislation to force this, to really get people engaged...

**27:28** ...and talking about what is happening in the environment worldwide.

**27:32** And so, as with many others, we have gone into the business of looking at citizen science...

**27:38** ...looking at lay, local knowledge, traditional knowledge, and seeing how we can bridge the gap...

**27:43** ...between traditional knowledge, for example, on the one hand, western science...

**27:48** ...and what citizens really feel they can contribute through a professional way or through a semi or an amateur way.

**27:54** And so we really have now embraced the idea of bringing citizen science into mainstream reporting on the environment.

**28:03** We have in Europe something called the shared environment information system. It is truly innovative.

**28:08** It forces countries to recognize that they have a duty of care. It feeds into e-government, but it needs to be supported.

**28:16** And we see that the support comes not only in IT and applications, and so on, and software...

**28:22** ...but it also comes by engaging the population and training the population...

**28:27** ...to become a large group of people who know what's going on around them.

**28:32** And this will be imperative when we think about climate change in the future.

**28:36** So, I always believe in walking the talk...

**28:39** ...and so we sent our staff off into the field to find out what it's like to be a citizen scientist.

**28:46** And they went out and participated in many different projects through Earthwatch, a fantastic organization.

**28:52** But there are many others that take ordinary people and, over a space of a week or two...

**28:58** ...literally convert them into scientists, gathering data, monitoring data...

**29:03** ...and bringing that back in a very considered and structured way.

**29:07** And now we're using those data to inform ourselves about many things to do with biodiversity...

**29:12** ...to do with water, to do with forestry, and so on.

**29:15** So these are really important life skills, and it's a kind of thing which many of us, I think, should do more of...

**29:21** ...just to simply experience what it's like to be in nature and to realize the changes that are going on around us.

**29:29** So citizen science needs a home.

**29:32** I've offered that home, I think, to many groups who are out there monitoring...

**29:36** ...invasive alien species all the way through.

**29:40** But of course, there'll be people who are not particularly interested in...

**29:43** ...you know, literally doing a sort of two-week holiday.

**29:47** But they do really see that they want to participate in a meaningful way.

**29:53** And so to legitimize and, in fact, to democratize information, we've created the Eye on Earth platform.

**30:00** We've done this with Microsoft, now with Esri we'll be doing more.

**30:04** And it really is, I think, for me, one of the big steps forward.

**30:09** We used the cloud because we could see already three years ago...

**30:12** ...that we needed to move that whole way of thinking into a very different mode of interaction.

**30:18** And we anticipated the traffic would be very high.

**30:22** What you see, then, is effectively a way where on the one hand we have in the little histograms...

**30:29** ...the official data, the data that we talked about earlier, that is mandated by countries on

ozone...

**30:34** ...for example, LOX, SOX, and so on.

**30:37** And on the right-hand side, in a semantic or restricted set of language...

**30:42** ...we have the possibility for citizens to tell us what they think.

**30:46** Now, it does two things. First of all, it tells us that people are interested. We get a lot of responses back.

**30:53** People can do it in their local neighborhood.

**30:55** They can use social media to then translate that into what their friends are going to do for the day.

**30:59** They're going to go to the beach. What are we going to do?

**31:02** But it also tells us that crowdsourcing is a very effective way of validating...

**31:08** ...some of the "authoritative" data from countries.

**31:12** And this is really important, because I'm often asked, How can you possibly use crowdsourcing?

**31:19** Well, with enough observations and without using, I might say, a cynical view...

**31:24** ...the power of the crowd, it is possible to see that we can detect...

**31:29** ...when stations are not monitoring things correctly.

**31:32** So we see that there are three kind of communities here.

**31:35** There is the authoritative quality assurance that comes through the reporting of countries.

**31:40** There is the semiprofessional citizen scientist...

**31:43** ...who is engaged in monitoring invasive alien species, maybe air quality, maybe water quality, and so on.

**31:49** And then there are basically citizens...490 million people who just want to tell us what they think.

**31:56** And so they actually interact in a very interesting way, because we do this in 32 languages.

**32:02** It means that people can, on the fly, see what people are saying...

**32:06** ...in the same place and really have an engagement as to the quality of their neighborhood.

**32:11** These are all watches...air watch, water watch, nature watch, noise watch.

**32:17** And these are really the things that people are bothered by.

**32:20** We'll probably even have a waste watch soon, I think.

**32:24** So, if you have a gripe, you want to tell us about it, you can do it.

**32:28** And that's very important that people see that there's a way to tell us and for us to communicate back.

**32:34** And this is the engagement that we're looking for now...

**32:37** ...with our local authorities and with governments across the world...

**32:40** ...not just simply in that kind of nice, cozy circle of the European Union.

**32:47** So let me finish, then, by really taking us to perhaps an even more extreme setting.

**32:55** Many of the things that we want to know about in the world are in remote regions.

**33:00** And we need to know about them very quickly. We can't afford to wait.

**33:04** If you go to the Arctic, if you have the opportunity to go to Greenland...

**33:08** ...you will realize that the world is changing at an incredibly fast rate.

**33:13** So one of the things that we're very keen to do, putting together all of these pictures...

**33:20** ...is to recognize the power of people who, working together, can actually create a possible, sustainable future...

**33:29** ...can avert disasters, can create the right sort of hazard maps, can inform their businesses...

**33:35** ...so they're not left somewhat without insurance or exposed, and actually have in their hands...

**33:43** ...whether it's on a mobile platform or on their desktop, the way to make the right decision in the future...

**33:48** ...whether it's by copying somebody else, getting their own sensor...

**33:52** ...having the right digital terrain map, whatever it is.

**33:55** Because we need to empower people to do that.

**33:59** We also need to recognize that in the remote regions, much of this is not available.

**34:04** And so we need...actually, we need people.

**34:06** We need communities to tell us about what is going to happen.

**34:11** So we have started a program of eyewitness citizen scientists and citizens and communities.

**34:18** And here are two of our wonderful people.

**34:21** On the left, we have [Unintelligible]. He is a Penan tribesman...

**34:24** ...he's a nomadic hunter, lives in the highlands and uplands in Borneo.

**34:32** And what he has observed over the last 10 years...

**34:34** ...is that every animal that he hunts now requires twice the territory because the land is so dry.

**34:42** So he has to hunt for much longer to get food.

**34:45** And, more importantly, the animals now are straying into the areas of where the palm oil plantations are.

**34:52** So his life has become actually quite dangerous on a regular basis.

**34:55** Not because of the animals but because of where he has to go to gather the food to survive.

**35:01** And at the other extreme, up in Greenland, we have Adam, who is a marvelous observer.

**35:07** In fact, it's down to him that we know how much ice is being lost...

**35:10** ...from the Greenland Ice Sheet, because he goes out every single day.

**35:15** So it's people like these, authenticated, in continuous contact with us...

**35:22** ...what is happening and how quickly we will have to react in the future to avoid catastrophic climate change.

**35:28** And we can, and many of the solutions lie within the stories that I've been telling today.

**35:34** But let me introduce Adam.

**35:36** He has a short story to tell you, and I'd like you just to listen for a few moments to that.

**35:43** Each time I come back to the big ice, that for me is the big things of my mind...

**35:50** ...because constant water running from the face down to the bottom.

**35:55** This is very scary for me. It's like to see melting of the heart of the man.

**36:02** We have a big, big surprise when we come back last year.

**36:07** Like the smell of the gases come to the surface. It's like methane gas.

**36:12** This is like organic material coming from the bottom of the ice and the smell of like a pig farmer.

**36:22** Each day when I come back to the glacier, I make my small exploration and like a small scientist.

**36:31** So I take some documentation to take picture and take some measure so I can see.

**36:36** I have a lot of data I can give for more information like my...from my own experience.

**36:47** So I'd like to leave you with that thought from Adam...

**36:50** ...and all the other eyewitness accounts that are coming in from across the planet...

**36:54** ...to tell us what's actually happening in those people's daily lives.

**36:57** What's important is that they know where they are.

**37:00** They know their position on Planet Earth, they know where they are on the surface.

**37:03** And I hope that our agency in Copenhagen can serve them well...

**37:07** ...by giving the information that they need to talk about the changes that they will encounter...

**37:12** ...as well as using their wise...and their wisdom, I would say, to help us all learn how we're going to adapt in the future.

**37:19** Thank you, and thank you for your time. Thank you.

**37:29** That's great. One moment.

**37:33** Do you have any special messages that you'd like these people to do?

**37:36** Build me apps wherever you can.

**37:41** It would be just wonderful to get as many people engaged in telling their stories...

**37:46** ...and actually being able to position them somewhere on the planet.

**37:49** That would be really fantastic. And if you've got an idea, we can probably send a film crew out.

**37:54** Good. Thank you, Jack.

**37:55** You're really a great leader.

**37:57** Thank you. You inspire me.

**37:58** Thank you. Thank you.

**37:59** I want to step aside and let you take over.

**38:02** Thank you very much, Jack.