Lovereading.co.uk
Helping you choose your next book

You loved your last book...but what are you going to read next?

Using our unique guidance tools, Love**reading** will help you find new books to keep you inspired and entertained.

Opening Extract from...

Ten Billion

Written by Stephen Emmott

Published by Penguin Books Ltd

All text is copyright © of the author

This Opening Extract is exclusive to Love**reading**.
Please print off and read at your leisure.

PENGUIN BOOKS

Published by the Penguin Group
Penguin Books Ltd, 80 Strand, London WC2R 0RL, England
Penguin Group (USA) Inc., 375 Hudson Street, New York, New York 10014, USA
Penguin Group (Canada), 90 Eglinton Avenue East, Suite 700, Toronto, Ontario,
Canada M4P 2Y3 (a division of Pearson Canada Inc.)
Penguin Ireland, 25 St Stephen's Green, Dublin 2, Ireland (a division of Penguin Books Ltd)
Penguin Group (Australia), 707 Collins Street, Melbourne, Victoria 3008,
Australia (a division of Pearson Australia Group Pty Ltd)
Penguin Books India Pvt Ltd, 11 Community Centre,
Panchsheel Park, New Delhi – 110 017, India
Penguin Group (NZ), 67 Apollo Drive, Rosedale, Auckland 0632, New Zealand
(a division of Pearson New Zealand Ltd)
Penguin Books (South Africa) (Pty) Ltd, Block D, Rosebank Office Park,
181 Jan Smuts Avenue, Parktown North, Gauteng 2193, South Africa

Penguin Books Ltd, Registered Offices: 80 Strand, London WC2R 0RL, England

www.penguin.com

First published 2013
001

Copyright © Stephen Emmott, 2013

The moral right of the author has been asserted

The views expressed in this book are those of the author, and do not necessarily
represent the views of Microsoft Research Limited or any of its affiliates.

Except in the United States of America, this book is sold subject
to the condition that it shall not, by way of trade or otherwise, be lent,
re-sold, hired out, or otherwise circulated without the publisher's
prior consent in any form of binding or cover other than that in
which it is published and without a similar condition including this
condition being imposed on the subsequent purchaser

Design: YES | www.yesstudio.co.uk
Typeset in Founders Grotesk | www.klim.co.nz

Printed in England by Clays Ltd, St Ives plc

ISBN: 978-0-141-97632-7

TEN BILLION

Stephen Emmott

Earth is home to millions of species. Just one dominates it. Us. Our cleverness, our inventiveness and our activities have modified almost every part of our planet. In fact, we are having a profound impact on it. Indeed, our cleverness, our inventiveness and our activities are now the drivers of every global problem we face. And every one of these problems is accelerating as we continue to grow towards a global population of 10 billion. In fact, I believe we can rightly call the situation we're in right now an emergency – an unprecedented planetary emergency.

We humans emerged as a species about 200,000 years ago. In geological time, that is really incredibly recent. Just 10,000 years ago, there were one million of us. By 1800, just over 200 years ago, there were 1 billion of us. By 1960, 50 years ago, there were 3 billion of us. There are now over 7 billion of us. By 2050, your children, or your children's children, will be living on a planet with at least 9 billion other people. Sometime towards the end of this century, there will be at least 10 billion of us. Possibly more.

We got to where we are now through a number of civilisation- and society-shaping "events", most notably the agricultural revolution, the scientific revolution, the industrial revolution and – in the West – the public-health revolution. By 1980, there were 4 billion of us on the planet. Just 10 years later, in 1990, there were 5 billion of us. By this point initial signs of the consequences of our growth were starting to show. Not the least of these was on water. Our demand for water was going through the roof. But something was starting to happen to water. Unusual drought, and unusual flooding, was increasing everywhere: Australia, Asia, the US, Europe. Water was now suddenly something that had the potential to be scarce.

By 2000 there were 6 billion of us. It was becoming clear to the world's scientific community that the accumulation of CO2, methane and other greenhouse gases in the atmosphere was changing the climate. And that, as a result, we had a serious problem on our hands.

There are now more than 7 billion of us on Earth. As our numbers continue to grow, we continue to increase our need for far more water, far more food, far more land, far more transport and far more energy. As a result, we are accelerating the rate at which we're changing our climate.

Let's take one important, yet little known, aspect of increasing water use: "hidden water". Hidden water is water used to produce things we consume but typically do not think of as containing water. Such things include chicken, beef, cotton, cars, chocolate and mobile phones. For example: it takes around 3,000 litres of water to produce a burger. In 2012 around five billion burgers were consumed in the UK alone. That's 15 trillion litres of water – on burgers. Just in the UK.

Last year, in the UK alone, we bought, drank and threw away nine billion plastic water bottles. That is 36 billion litres of water, used completely unnecessarily. Water

wasted to produce bottles – for water. In short, we're consuming water, like food, at a rate that is completely unsustainable.

Demand for land for food is going to double – at least – by 2050, and triple – at least – by the end of this century. This means that pressure to clear many of the world's remaining tropical rainforests for human use is going to intensify every decade, because this is predominantly the only available land that is left for expanding agriculture at scale. By 2050, 1bn hectares of land is likely to be cleared to meet rising food demands from a growing population. This is an area greater than the US. And accompanying this will be three gigatons per year extra CO2 emissions.

Meanwhile, another 3 billion people are going to need somewhere to live. By 2050, 70% of us are going to be living in cities. This century will see the rapid expansion of cities, as well as the emergence of entirely new cities that do not yet exist. All this is going to use yet more land.

We currently have no known means of being able to feed 10 billion of us at our current rate of consumption and with our current agricultural system. Indeed, simply to feed ourselves in the next 40 years, we will need to produce more food than the entire agricultural output of the past 10,000 years combined. Yet food productivity is set to decline over the coming decades due to: climate change; soil degradation and desertification and water stress. By the end of this century, large parts of the planet will not have any usable water.

At the same time, the global shipping and airline sectors are projected to continue to expand rapidly every year, transporting more of us, and more of the stuff we want to consume, around the planet year on year. That is going to cause enormous problems for us in terms of more CO2 emissions, more black carbon, and more pollution from mining and processing to make all this stuff.

We are going to have to triple – at least – energy production by the end of this century to meet expected demand. Our existing oil, coal and gas reserves alone are worth trillions of dollars. Are governments and the world's major oil, coal and gas companies really going to decide to leave the money in the ground, as demand for energy increases relentlessly? I doubt it.

Meanwhile the emerging climate problem is on an entirely different scale. The problem is that we may well be heading towards a number of critical "tipping points" in the global climate system. There is a politically agreed global target – driven by the Intergovernmental Panel on Climate Change (IPCC) – to limit the global average temperature rise to 2C. The rationale for this target is that a rise above 2C carries a significant risk of catastrophic climate change that would almost certainly lead to irreversible planetary "tipping points", caused by events such as the melting of the Greenland ice shelf, the release of frozen methane deposits from Arctic tundra, or dieback of the Amazon. In fact, the first two are happening now – at below the 2C threshold.

As for the third, we're not waiting for climate change to do this: we're doing it right now through deforestation. And recent research shows that we look certain to be heading for a larger rise in global average temperatures than 2C. It is now very likely that we are looking at a future global average rise of 4C – and we can't rule out a rise of 6C. This will be absolutely catastrophic. It will lead to runaway climate change, capable of tipping the planet into an entirely different state, rapidly. Earth will become a hellhole.

More "fortunate" countries, such as the UK, the US and most of Europe, may well look like something approaching militarised countries, with heavily defended border controls designed to prevent millions of people from entering, people who are on the move because their own country is no longer habitable, or has insufficient water or food, or is experiencing conflict over increasingly scarce resources. These people will be "climate migrants". Anyone who thinks that the emerging global state of affairs does not have great potential for civil and international conflict is deluding themselves. It is no coincidence that almost every scientific conference that I go to about climate change now has a new type of attendee: the military.

Every which way you look at it, a planet of 10 billion looks like a nightmare. What, then, are our options?

The only solution left to us is to change our behaviour, radically and globally, on every level. In short, we urgently need to consume less. And we need to conserve more. To accomplish such a radical change in behaviour would also need radical government action. But as far as this kind of change is concerned, politicians are currently part of the problem because the decisions that need to be taken to implement significant behaviour change inevitably make politicians very unpopular – as they are all too aware.

So what politicians have opted for instead is failed diplomacy. And the way governments justify this level of inaction is by exploiting public opinion and scientific uncertainty. What politicians and governments say about their commitment to tackling climate change is completely different from what they are doing about it.

What about business? In 2008 a group of highly respected economists and scientists led by Pavan Sukhdev, then a senior Deutsche Bank economist, conducted an authoritative economic analysis of the value of biodiversity. Their conclusion? The cost of the business activities of the world's 3,000 largest corporations in loss or damage to nature and the environment now stands at $2.2tn per year. And rising. These costs will have to be paid for in the future. By your children and your grandchildren.

I confess I used to find it amusing, but I am now sick of reading in the weekend papers about some celebrity saying, "I gave up my 4×4 and now I've bought a Prius. Aren't I doing my bit for the environment?" They are not doing their bit for the environment. But it's not their fault. The fact is that they – we – are not being well informed. And that's part of the problem. We're not getting the information we

need. The scale and the nature of the problem is simply not being communicated to us. And when we are advised to do something, it barely makes a dent in the problem.

The behavioural changes that are required of us are so fundamental that no one wants to make them. What are they? We need to consume less. Less food, less energy, less stuff. Fewer cars, electric cars, cotton T-shirts, laptops, mobile phone upgrades. And here it is worth pointing out that "we" refers to the people who live in the west and the north of the globe. There are currently almost 3 billion people in the world who urgently need to consume more: more water, more food, more energy. Saying "Don't have children" is utterly ridiculous. It contradicts every genetically coded piece of information we contain, and one of the most important (and fun) impulses we have. That said, the worst thing we can continue to do – globally – is have children at the current rate. If the current global rate of reproduction continues, by the end of this century there will not be 10 billion of us – there will be 28 billion of us.

The problem is us. Why are we not doing more about the situation we're in – given the scale of the problem and the urgency needed – I simply cannot understand. Only an idiot would deny that there is a limit to how many people our Earth can support. The question is, is it seven billion (our current population), 10 billion or 28 billion? I think we've already gone past it. Well past it.

Science is essentially organised scepticism. I spend my life trying to prove my work wrong or look for alternative explanations for my results. It's called the Popperian condition of falsifiability. I hope I'm wrong. But the science points to my not being wrong. We can rightly call the situation we're in an unprecedented emergency. We urgently need to do – and I mean actually do – something radical to avert a global catastrophe.