



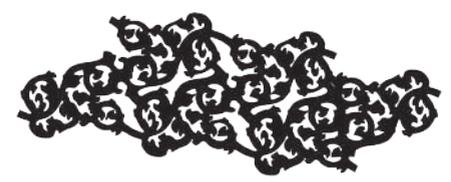
Eyecatchers
From design to art

IGUANA
1994-1999
DESIGN PLUS
Top 10
Design
Award
Winner
2000



AWAKE THE ARTIST

Eyecatchers
From design to art



OXYGEN



The **OXYGEN** radiator



TOP PERFORMERS

TWINE
reddot design award
winner 2009



WWW.
THE RADIATOR FACTORY
.COM

DREAM A FUTURE

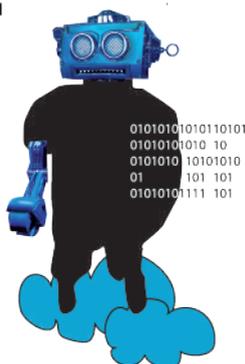


TOP PERFORMERS



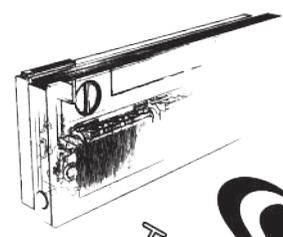
LIVING TOMORROW
Where visions meet

Eyecatchers
From design to art



jagaHybridHeating

The **OXYGEN**



TOP PERFORMERS



D/2013/45/285 - ISBN 978 94 014 1082 3 - NUR 801

Book design: Marco Cassano & Peer De Maeyer
Christof Verelst & Kris Thys
Editorship: Sara Reymen (Woord & Beeld)
SIM Belgium

© Jan Kriekels & Lannoo Publishers nv, Tielt, 2013.

LannooCampus Publishers is a subsidiary of Lannoo Publishers,
the book and multimedia division of Lannoo Publishers nv

All rights reserved.

No part of this publication may be reproduced and/or made public,
by means of printing, photocopying, microfilm or any other means,
without the prior written permission of the publisher.

LannooCampus Publishers
Erasme Ruelensvest 179, box 101
3001 Leuven
Belgium

www.lannoocampus.be

INNOVATE OR DIE

**THE UNIVERSAL SURVIVAL
PHILOSOPHY OF
JAN KRIEKELS**



LANNOO
CAMPUS



JAGA VALUE TOTEM

| | |
|--|-----|
| FOREWORD: ABOUT JAN KRIEKELS | 12 |
| INNOVATE OR DIE | 18 |
| VALUE 1: RESPECT NATURE | 23 |
| The beaten path | 26 |
| <i>Fire = evolution?</i> | 27 |
| <i>The myth of fire: Prometheus' stolen gift</i> | 27 |
| <i>From myth to reality: the earth is suffering</i> | 32 |
| <i>Conclusion: our use of fossil fuels is not efficient</i> | 60 |
| <i>Point of no return?</i> | 65 |
| <i>Putting the power of fire into perspective</i> | 74 |
| The path of innovation | 76 |
| <i>A different awareness: back to basics</i> | 77 |
| <i>Circular thinking: closing the material cycle</i> | 84 |
| <i>Self-sufficiency as an optimal green solution</i> | 98 |
| The archetype for Respect Nature: the Green Engineer | 101 |
| VALUE 2: AWAKE THE ARTIST | 103 |
| The beaten path | 106 |
| <i>The curse of mass consumption</i> | 107 |
| <i>Technology as a new god</i> | 110 |
| <i>The end of creativity?</i> | 111 |
| <i>Crisis as a trigger for creativity</i> | 115 |
| The path of innovation | 118 |
| <i>The new consumer</i> | 119 |
| <i>Creativity as a basis for business</i> | 124 |
| <i>A creative society</i> | 144 |
| The archetype for Awake the Artist: the Artist | 145 |
| VALUE 3: DREAM A FUTURE | 147 |
| The beaten path | 150 |
| <i>Man clings to what he knows</i> | 151 |
| <i>Banishing dreams and imagination</i> | 151 |
| <i>The ease of consumption</i> | 152 |
| The path of innovation | 154 |
| <i>Dare to dream bold dreams</i> | 155 |
| <i>Embracing visionaries</i> | 156 |
| <i>Walking the path to the future: sustainability and self-sufficiency</i> | 166 |
| The archetype for Dream a Future: the Visionary | 179 |

| | |
|--|-----|
| VALUE 4: CREATE EMOTION | 181 |
| The beaten path | 186 |
| Individualism | 187 |
| Excessive glorification of rationality | 188 |
| Closed system, closed innovation | 189 |
| The predominance of economic interests | 191 |
| The path of innovation | 192 |
| The strength of the group | 193 |
| Scope for emotions and experiences | 196 |
| Open system, open innovation | 216 |
| Industrial humanism in the world of business | 219 |
| The impetus for a universal survival model: Greenforce | 220 |
| The archetype for Create Emotion: the Motivator | 229 |
| | |
| VALUE 5: BUILD BRIDGES | 231 |
| Trust, not fear | 236 |
| Uchronia Community: the navigation network | 240 |
| Time for a different kind of awareness | 261 |
| The company in a creative economy | 265 |
| The goal: one empathetic super-brain | 266 |
| The archetype for Build Bridges: the Navigator | 267 |
| | |
| THE KEY TO INNOVATION | 269 |
| GLOSSARY | 272 |
| INTERESTING BOOKS AND WEBSITES | 283 |

BOXES

| | |
|--|-----|
| Our ecological footprint | 48 |
| Your personal ecological footprint | 50 |
| Our water footprint | 54 |
| A feverish planet: the effects of temperature increases on the earth | 56 |
| Easter Island: all used up and perished | 63 |
| New global economies | 64 |
| It can be done! The hole in the ozone layer is getting smaller | 68 |
| Climate Change Conference: Kyoto, Copenhagen, Durban and Doha | 70 |
| The Jaga method: increasingly more economical and efficient | 90 |
| Plastic soup | 112 |
| An inspiring example: Alvin Toffler's 'Third Wave' | 130 |
| The Jaga exhibition stands | 133 |
| Jaga Experience Lab | 137 |
| Unique designs at Jaga | 139 |
| Examples of visionary thinking | 160 |
| Visionary dreams at Jaga | 168 |
| Moby: modular oxygen bubble | 169 |
| Experience branding at Jaga | 198 |
| The company as a community: the birth of the Uchronia | |
| Community at Burning Man | 246 |
| The five values experienced during Burning Man | 258 |



INNOVATE OR DIE

INNOVATION. *The word of the twenty-first century.* There has never been as much innovation going on as there is now. And there has never been as much demand for it. A bizarre paradox. So are we innovating in the most effective way?

Life on our planet is changing dramatically. Sooner rather than later, we need to look for new ways to survive. Innovation today should serve just one goal: the quest for a universal survival model. This is the only way that our future can be guaranteed.

FIVE BASIC VALUES

For me, true innovation is contained in ancient principles. I created my survival philosophy based on five key values that I gleaned from my experiences, education and business philosophies. We all know these values, but we have to dig deep in our consciousness these days to discover their origins. And yet these basic principles contain the renewal that we – and our planet – so crave. By reactivating these basic values, we are laying down a new, more sustainable path to the future. These five values are our new foundation:

VALUE 1 RESPECT NATURE

VALUE 2 AWAKE THE ARTIST

VALUE 3 DREAM A FUTURE

VALUE 4 CREATE EMOTION

VALUE 5 BUILD BRIDGES

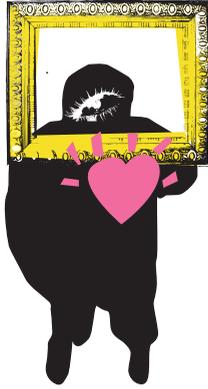
INTELLIGENCE, EMOTION AND SPIRITUALITY

The five values are based on three components, which are present in everyone: intelligence, emotion and spirituality. The first three values – *Respect Nature*, *Awake the Artist* and *Dream a Future* – are the simplest for Westerners to adopt. We mainly use the left-hand side of our brain for these – the same side as logic, reason, facts, and evidence. The other two are a throwback to the emotional and spiritual person within. To fully understand them and to realise their importance, we must appeal to the right-hand side of our brain. We have to open ourselves up to something that we may not be able to grasp immediately.

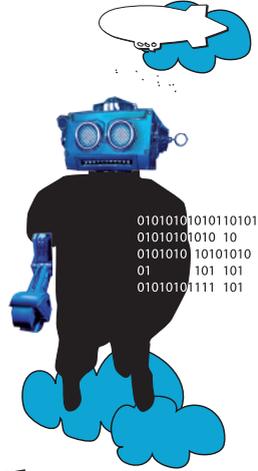
At this moment, man is being confronted with the terrible consequences of something he himself has caused. His negative impact on the planet is becoming more evident every day. Now he must prove his worth – and he can't do that just with the mathematical mind that has dominated thinking in modern times. We need more creativity, emotion and a collective dream. And above all, we need a sense of belonging that makes committed collaboration possible, so that we can realise our dream for the future.



**RESPECT
NATURE**



**AWAKE
THE ARTIST**



**DREAM
A FUTURE**



**CREATE
EMOTION**



**BUILD
BRIDGES**

FIVE ARCHETYPES

I link one archetype to each basic value, making five archetypes in total. These archetypes are present in every society and, to a certain extent, in every human being. My thinking has been inspired by the principles of the ancient tribes, because the combination of various characteristics enabled these tribes to survive. A monoculture died out. Even today, these five archetypes need to be represented in every layer of society. This means that every company needs to have them too, to really innovate. By allowing these different characters to work together openly and critically, we are laying the foundations for sustainable results and future-oriented decisions.

VALUE 1

Respect Nature – the Green Engineer
He respects nature and the circle of life.

VALUE 2

Awake the Artist – the Artist
He awakes the artist within us.

VALUE 3

Dream a Future – the Visionary
He dreams about our future and builds the sustainable path to achieving it.

VALUE 4

Create Emotion – the Motivator
He creates emotion and inspires us to cooperate.

VALUE 5

Build Bridges – the Navigator
He builds bridges between our spirits.

A SUSTAINABLE ALTERNATIVE

In this book, I present an alternative to every outmoded way of thinking and every tried and tested method. Right now, we have one foot in the old world and the other in the new. The transition is already in full flow. That's why there is both a hard and a soft copy of my book; it acts as a bridge between what we know and where we want to go.

I want to use this book to contribute to a better way of living and a more sustainable way of doing business. I want to use my alternative path for each value to show that innovation is feasible. I want to show that things can be done differently – no, *have* to be done differently. We are the last generation that can still make a difference. Innovation is no longer a choice but an absolute necessity. It is up to us: innovate or die ...

THE BEATEN PATH



RESPECT
NATURE



FIRE = EVOLUTION?

The source of human civilisation as we know it is fire. Fire determined the strength of the human being. Fire is the engine of everything; fire and burning have catapulted man from zero to hero. A life without fuel is unthinkable these days ...

Nevertheless, of the four basic elements, fire has also proven to be the most devastating. Our water, our air and our earth feel its impact every day.

The question of whether fire has enabled human evolution is therefore central in this first section, because my first value – *Respect Nature* – demands respect for all four natural elements: earth, water, air and fire, and it is technology that connects them all.

Going way back in time is part of my quest for answers: to the foundations of Western civilisation. According to Greek mythology, man was given fire by Prometheus, who stole it from the gods of Olympus. It soon emerged that his gift was not all that it seemed ...

THE MYTH OF FIRE: PROMETHEUS' STOLEN GIFT

Fire was invaluable to the Greek gods. When Prometheus stole a lighted torch from Olympus, the consequences were far-reaching. Prometheus gave fire from the gods to mankind because he saw that man was unhappy. This act meant he incurred the wrath of the almighty Zeus, who punished him by chaining him up on a mountain. An eagle came every day to feast on his liver, but as Zeus made it grow back each night, the eagle would simply return the following day.

The Olympic flame The Olympic flame originated from this myth: the Romans kept the flame in the temple of Zeus burning throughout the games to keep the memory of the theft alive. The tradition of carrying the flame is still an integral part of every Olympic Games.

Fire in human hands Thanks to his act of thievery, Prometheus played a key role in the history of mankind, because humans went on to make good use of that stolen gift. Fire was the basis of a true transformation: man evolved from a low, insignificant creature to an almost divine creation. The ability to deal with fire in a responsible way meant a drastic change in human ways of living. People were able to warm themselves. They were better equipped to keep wildlife at a distance, as animals appeared to have a primal fear of fire. They could also use flames to sharpen spears, which made hunting easier. They roasted meat and were able to eat a more varied diet, which allowed them to ingest nutrients more quickly. Human health and life expectancy thus

also improved significantly. Improved living conditions and more free time meant the human brain could develop.

Pandora's Box: all the sins of the world Zeus didn't just punish Prometheus for his betrayal; he also punished man. He sent Pandora to bring disaster on them. Pandora was given many good gifts by the gods: Athena gave her intelligence and talent and Aphrodite gave her the beauty of a goddess. Hermes, however, gave her the gift of speech, a deceitful nature and shameless thoughts. She also had a characteristic that was to have terrible consequences: curiosity. Zeus gave Pandora to Prometheus' brother along with a box that contained all the misfortune of the world. The curious Pandora opened the box and brought disease and disaster to the earth. She tried to close the lid quickly, but the only thing still left inside the box was hope.

Fire as a symbol Prometheus means *the forward-thinking one*. Fire could therefore be a symbol for inspiration and intelligence because, thanks to altered living conditions, humans suddenly had the ability to think about more than simply surviving. There was now room for deeper thoughts and ideas. Thanks to the advances brought about by fire, humans developed far more swiftly than other living beings on earth. In *The Secret Doctrine*, HP Blavatsky refers to the myth of Prometheus as 'the allegory of the pilgrimage of man, in which thought is the hero who overcomes evil forces and eventually regains a state of wisdom and freedom'.

Evolution? The crucial question is whether man has really used that wisdom to improve his lot. And whether he has seized his new freedom as an opportunity to create a better future ... I don't think the answer is a definite 'no' just yet – although I do think that moment is getting closer. It is clear that humans have not dealt with Prometheus' gift in the most efficient way. Yet we now need to carry on with the hope that remained in Pandora's Box, because that will be imperative to ensuring our ability to survive.





FROM MYTH TO REALITY: THE EARTH IS SUFFERING

I believe respecting nature starts with one crucial insight, which is that the earth did create a perfect equilibrium once upon a time. This was a balanced system that made millions of life forms possible. For a long time, man was just one of many small components. Then, one day, he disturbed that unique equilibrium and irreversibly affected all ecosystems designed so carefully by the earth. Man's decisions formed the basis of a profound change for nature: global warming and a drastic change in the habitat of all life forms. In short, this wasn't just climate change but a profound modification of our biotope.

Climate change and a system thrown off balance

AN AGE-OLD PHENOMENON Climate change has been an issue at various stages throughout the history of the earth. Average temperatures rise and fall, air currents and water cycles change... the climate and weather are constantly changing. During the ice ages, it was significantly colder on earth than it is today, but there have also been periods when the average temperature was a lot higher. Some changes in climate came about gradually, whereas others came about more quickly and had a major impact on the earth, although this was not as high everywhere.

Changing weather conditions has different causes. For example, a change in solar activity can temporarily affect temperatures. The 'Little Ice Age' in Europe – between 1600 and 1800 – was caused by this. Even volcanic eruptions affect the weather. The ash and sulphur released during an eruption block the sun's rays and cause a slightly lower temperature for a number of years. Changes in ocean currents and air currents also influence the weather. For example, the El Niño phenomenon, in which sea water along the equator in the eastern Pacific Ocean warms up, is directly related to local rainfall.

THE BALANCE: THE GREENHOUSE EFFECT AND PHOTOSYNTHESIS The temperature on earth – and therefore the weather – is closely related to two natural processes: global warming and photosynthesis. Our planet uses both to maintain a balance in nature.

GREENHOUSE EFFECT: THE EARTH UNDER A BELL JAR The interplay between the sun, atmosphere and earth determines the temperature on the planet. The sun gives off rays to the earth, which in turn sends the heat from the sun's rays back into the atmosphere. Some of these leave the atmosphere immediately; the others are absorbed by the earth, which re-radiates the energy in the form of infrared radiation or heat. It is this radiation that is partially absorbed by gases which occur naturally in the atmosphere. This creates the effect of a conservatory or greenhouse: the heat is retained, so the temperature rises. Carbon dioxide (CO₂) and methane (CH₄) – the most important of the so-called greenhouse gases – play an important role in this effect. Thanks

to the greenhouse effect, the average temperature on earth is about 15 degrees Celsius, rather than -18 . In other words, this process makes life possible.

PHOTOSYNTHESIS: CO₂ TURNS INTO OXYGEN Nature maintains its own balance by controlling the amount of carbon dioxide in the atmosphere by way of photosynthesis. Plants use light energy to absorb CO₂ and to turn it into oxygen. They also form carbohydrates from the CO₂ and water. This means that the flora on earth is crucial to life. Forests and seas are carbon dioxide warehouses and they act as the lungs of our earth. They reduce the amount of CO₂ in the air, which means the atmosphere does not warm up too much. In short, they keep the planet cool and ensure that the system remains stable.

The greenhouse effect and photosynthesis are, in other words, two natural processes which together keep temperatures on earth under control and optimise the composition of our air – or rather, that’s what happens if they are able to carry out their work as normal. Throughout the centuries, other natural processes have had an impact on this balanced cooperation, but nature has always managed to repair itself. Until now.

THE DIFFERENCE TODAY: ANTHROPOGENIC CHANGE

The current climate change is unlike any previous one. Scientists have thought long and hard about this for decades, as twentieth century climate change could not be fully explained by natural processes. The conclusion was rather obvious: human activity was the basis of the change. This conclusion launched a period of contention and discussion between scientists, industrialists and policymakers, given the enormity of its economic, ecological and political consequences.

.....

Man has unbalanced the system. Humans have caused climate change.

.....

The first step towards recognising the problem has been taken. No one would really dare to openly doubt its existence: climate change is a fact and man has caused it. However, although the period for discussions and expressing doubt may well be a thing of the past, effective measures to tackle the problem have still not been forthcoming from our world leaders and policymakers, despite the fact that the time for action is now! I can only hope that humanity and nature don’t have to wait too much longer for us to finally sit up and take note, and that we don’t have to wake up one day and realise that it’s too late to resolve the situation.

The turning point: the Industrial Revolution It didn’t take scientists long to establish the point at which the system of global warming and photosynthesis was disturbed: the end of the eighteenth century. The Industrial Revolution thus became not only a turning point in the history of man, but also in that of nature.



A DIFFERENT LIFE FOR MAN AND FOR NATURE The Industrial Revolution affected nearly every aspect of daily life in the Western World in particular. The transition from manual labour to production by machines running on fuel had an enormous impact on how things were done. The invention of the steam engine meant objects could suddenly be produced quickly and in large quantities; coal mining gave an additional boost to steel production; factories and cities started sprouting up everywhere and forests had to make room for more factories; and steam engines running on wood and coal worked at full speed, meaning production capacity increased significantly.

OPTING FOR MORE TIME OR MORE PRODUCTION

During the Industrial Revolution man made an important decision. The speed and efficiency of machine production gave him the opportunity to invest the time he had regained in other things, such as personal development and keeping in touch with friends and family. Instead he chose to produce more, and it was this mass production that would eventually put natural processes under pressure.

.....
*Man has changed the
 composition of the
 atmosphere: the balance
 has been disturbed.*

A BALANCED SYSTEM BECOMES OUT OF KILTER Since the Industrial Revolution, humans have been emitting increasing amounts of greenhouse gases into the air – in particular carbon dioxide (CO₂), which is primarily emitted by burning fossil fuels for energy, heat and transport. Massive deforestation in recent centuries means we have fewer green areas to fulfil the purifying function of photosynthesis. This is how more and more carbon dioxide is emitted into the air. Humans have changed the composition of the atmosphere dramatically over the past two centuries.

MORE AND MORE GREENHOUSE GASES It is this increase of the amount of greenhouse gases in the atmosphere that causes global warming. The gases work like a kind of braking system, which prevents the earth from getting rid of the sun's heat as easily as it used to. This means that our thin atmosphere becomes increasingly thicker and retains more infrared rays. This in turn warms up the lower atmospheric layers while the highest atmospheric layers get less heat.

The best known of the greenhouse gases is carbon dioxide. Discussions about addressing climate change are therefore usually about how to reduce CO₂ emissions. Yet carbon dioxide is not the only greenhouse gas that causes damage. The increased amount of methane (CH₄) – which holds twenty times more heat than carbon dioxide – is also problematic. Methane is mainly emitted by livestock. Population growth



means meat production has increased and the amount of methane in the air continues to rise. Other greenhouse gases with a heavy impact on nature's balance include black carbon, halogenated alkanes, nitrogen oxide, carbon monoxide and volatile organic hydrocarbons.

The production of electricity and heat is responsible for a quarter of greenhouse gas emissions. Deforestation ranks second at 18 per cent. Transport, industry and agriculture also contribute to pollution – each is responsible for about 14 per cent of emissions.

REDUCED LUNG CAPACITY OF THE EARTH The earth's surface consists of about four billion hectares of forest: that is about one third of the total land area. Deforestation has been going on for centuries, but it has been taking place ever more frequently in recent decades. This creates a twofold problem: more carbon dioxide and fewer purifying trees.

The destruction of forests is responsible for around one fifth of annual carbon dioxide emissions. Forests are burned for agricultural purposes, like establishing plantations and livestock farming. Brazil and Indonesia in particular are engaging in deforestation on a large scale. In Indonesia, this is done in order to establish palm oil plantations. More forest is felled and the land is drained by setting fire to the peat. The palm oil is used for the food industry and for the production of biodiesel, although this last usage is coming increasingly under fire. This is because a life cycle analysis spanning several years showed that the entire process for the production of this biofuel emits more carbon dioxide into the air than the plantations can extract from it.

Deforestation thus contributes to global warming in two ways. On the one hand, trees that are destroyed emit carbon dioxide and this goes into the atmosphere. On the other hand, there are fewer trees to extract carbon dioxide from the air and turn it into oxygen. In short, just when the earth needs a good set of lungs more than ever, it has to deal with a reduced lung capacity.

CONSTANTLY ON THE LOOKOUT FOR MORE ENERGY Where do we get the fossil fuels that pollute our earth? Well, paradoxically, from the earth itself. The earth's crust was formed during the Precambrian era, which began 4.56 billion years ago. There was a lot of volcanic activity and a lot of meteorites and comets hit the earth. At the beginning of this period, the atmosphere consisted mainly of carbon dioxide, methane and ammonia. At a later stage, the atmosphere cooled down rapidly since almost all of the methane had disappeared from it. In recent centuries, humans started to mine the oil and gas supplies, hidden in the depths of the earth, which originated during this period. They opened up Pandora's Box ...



The amount of fossil fuels that we need today to meet our basic needs is increasing all the time. We now need more energy to achieve the same effect, simply because our energy fields are further and further away. The result is entropy, a drastic depreciation. We used up the resources in our immediate vicinity – such as the wood of the forests we lived in – quite quickly. This meant we had to get energy out of the ground: lignite, coal, oil, gas. We had to look ever deeper to find these fossil fuels. We made it more and more difficult for ourselves and so we also needed more complex technology. The scarcer the resources became, the more risks we took, all for the sake of comfort and lifestyle and to be able to keep up with population growth. The result is an increasingly large ecological footprint and an ever-growing water footprint (*see box, page 48 & 54*).

Our climate: from stable to variable Greenhouse gas levels and global temperatures have fluctuated since the planet came into existence. Scientists established this by examining the isotope ratio of oxygen in sludge from the ocean floor. Their research produced data on evaporation and precipitation, and therefore on temperature. The fluctuation of the carbon dioxide concentration in the atmosphere was investigated by analysing air bubbles in ancient ice formations. The Belgian Princess Elisabeth polar station in Antarctica plays an important role in this type of research on glaciers and the climate.

The conclusions of these scientific studies are striking. Over the past 3,000 years, the level of greenhouse gases in the atmosphere has remained fairly stable, as has the average temperature. This biological balance has allowed human civilisation to make such a huge leap forwards. It is only since we began burning fossil fuels *en masse* and emitting greenhouse gases into the atmosphere in many other ways, that we started seeing significant changes.

INSEPARABLE: CO₂, TEMPERATURE AND SEA LEVELS The relationship between carbon dioxide levels, temperature and sea levels is unmistakable: they rise and fall together. It is common knowledge that CO₂ emissions started increasing dramatically from the Industrial Revolution onwards, yet current statistics are staggering. We emit around thirty billion tonnes of carbon dioxide into the atmosphere every year. Nature absorbs half of this and the other half is what causes the increased concentration of CO₂ in the atmosphere.

Our climate has remained fairly constant since the last ice age, which took place some 11,000 years ago. Carbon dioxide levels have never risen above 300 ppm during the past 650,000 years. [Ppm stands for ‘parts per million’, the number of particles of carbon dioxide in each million of other particles.] Almost two and a half centuries ago, things started to change: we went from 280 ppm in the middle of the eighteenth cen-

tury to 385 ppm, where we are now. This means that the amount of carbon dioxide in the atmosphere has risen by more than a third since the Industrial Revolution. As well as this, annual global greenhouse gas emissions have increased by up to six billion tonnes since the start of the nineties – a growth of more than 20 per cent!

The average temperature has already risen by about 0.8 degrees Celsius. A study by the UN Environment Programme shows that the period from 2000 to 2009 saw the highest ever greenhouse gas emissions, and this decade was also the warmest ever. The results of the Intergovernmental Panel on Climate Change (IPCC) show an average temperature rise of 0.15 to 0.20 degrees Celsius in each decade. The sea level also increased as rising temperatures melted the ice on glaciers and ice caps. The impact that humans have had on the planet in recent decades is bigger than ever. During the years to come this will not only affect nature and our biotope, but every living creature on this planet.

A temperature increase with serious consequences

It is already clear that global warming affects all parts of the world. We come across headlines about devastating hurricanes, severe floods, disastrous droughts and fires when reading our newspapers at breakfast. Climate change has serious consequences for the health of our ecosystems and the conservation of our flora and fauna. The impact grows with each degree that the temperature rises (*see box, page 57*).

.....

Humans and nature will feel the impact of global warming all over the world.

.....

RISING SEA LEVELS The rise in sea levels due to the melting of glaciers and ice caps will have consequences for the world of the future: coasts will become uninhabitable, large parts of the civilised world will be flooded. The effects of climate change are already a painful reality for the people of Kiribati, a volcanic island group in the Pacific Ocean. The islands are just a few centimetres above sea level, which makes increased rainfall, more frequent storms and rising sea levels a constant threat to their survival. Groundwater is salinated, causing difficulties in growing crops. The islanders have already had to move some of their villages.

MORE EXTREME WEATHER The weather is set to become even more extreme and unpredictable. This is because the temperature of the oceans is increasing. In the foreseeable future, strongly rising convection currents and higher wind speeds will start to form above warm water, causing severe storms, hurricanes and tornadoes. Increased evaporation also means more rainfall. In the last two decades of the twentieth century, we saw an increase of 230 per cent of the number of disasters caused by floods. Droughts follow periods of intense rainfall. This creates more forest fires,

which brings everything that is harmful to the earth's surface. The result is more carbon dioxide in the atmosphere.

SCARCITY OF DRINKING WATER Climate change has also had an impact on our drinking water supply. Humans only drink fresh water, which comes mainly from melting glaciers. Just 2.75 per cent of all water on earth is fresh and just over 2 per cent of that comes from glaciers. An ice cap acts like a mirror for the sun: it reflects 90 per cent of the rays; thus these are not converted into heat. The sea does, however, absorb a lot of heat. The consequences are obvious: the less ice there is, the faster the temperature rises and the faster the ice disappears. The glaciers are melting away at an alarming rate.

Our water supplies are dwindling. The depletion of water resources has tripled in the past fifty years. Nowadays, 80 per cent of the population lives in an area with a high risk of water shortage. It is becoming increasingly difficult to supply people all over the world with drinking water. By 2050, more than 600 million people will no longer have access to clean water. Water shortages are expected to be particularly acute in the Middle East and Australia.

ECOSYSTEMS ARE AT RISK, BIODIVERSITY IS DECREASING Climate zones are shifting and entire ecosystems are thus being undermined: the habitat of certain plants and animals is either disappearing or changing radically. Rivers are drying up, forests are withering away. Some life forms are threatened with extinction because they cannot adapt quickly enough. Increasing pollution exacerbates this precarious situation. The Living Planet Report 2012 by the WWF contains shocking figures. The Living Planet Index – which shows the health of our ecosystems and is based on 8,000 groups of 2,500 vertebrate species – shows that biodiversity in the tropics has decreased by 60 per cent since the seventies, and that the natural habitat of many species has also shrunk since the eighties. One fifth of vertebrate species is at risk of extinction. The rhinoceros, orang-utan, gorilla and tiger are among those on the list of endangered (or critically endangered) species.

The situation is no less disturbing in the oceans. Oceans absorb carbon dioxide, which affects biological systems as CO₂ uptake increases the acidity of the oceans. Some marine animals, such as shellfish and corals, suffer the painful consequences of this. The condition of coral reefs has declined by 38 per cent during the past thirty years. Extensive pollution means the cod and river dolphin are now also endangered species.

