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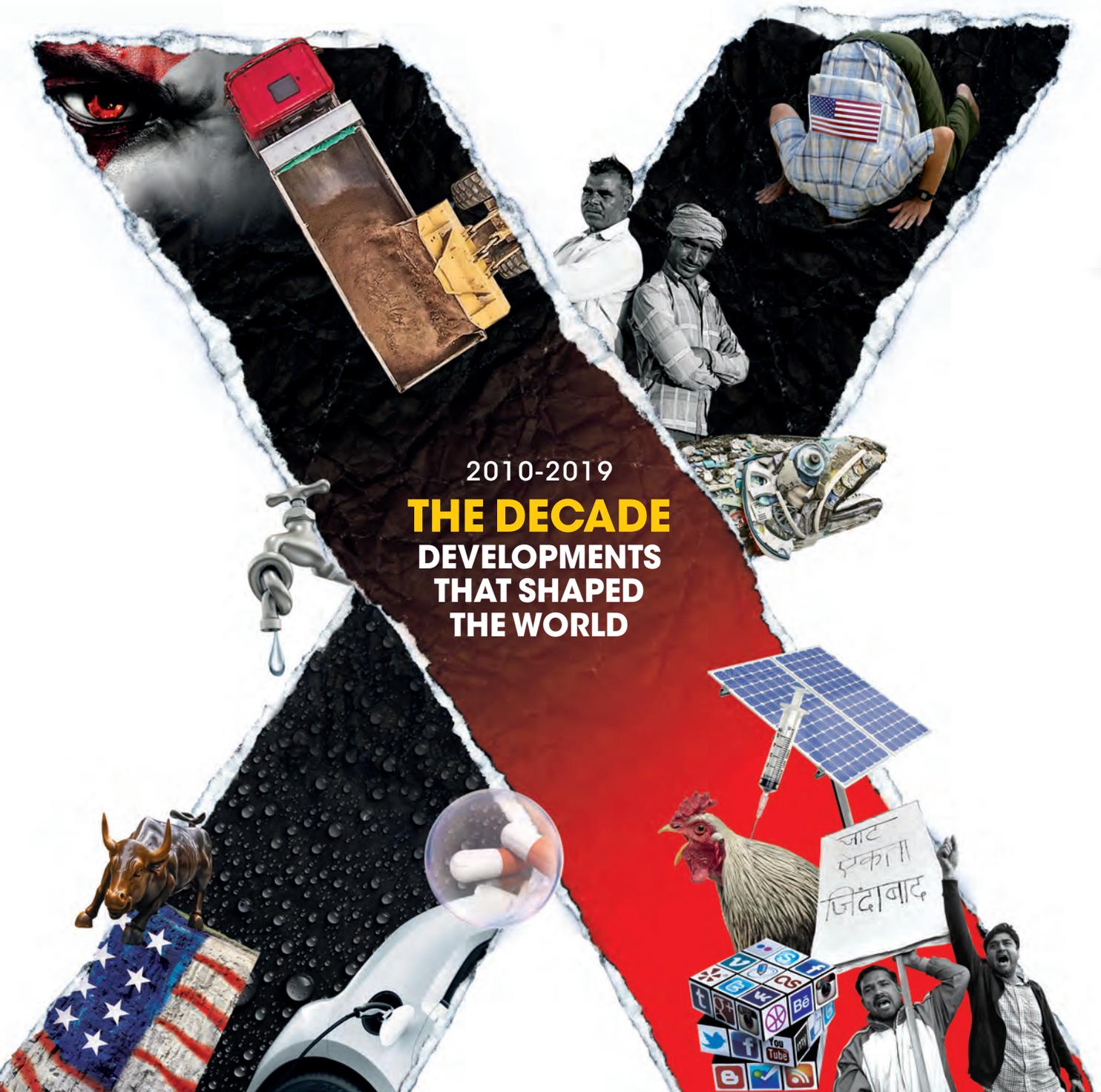
Down To Earth

FORTNIGHTLY ON POLITICS OF DEVELOPMENT, ENVIRONMENT AND HEALTH

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ON CoP: CLIMATE TALKIES



2010-2019

THE DECADE
DEVELOPMENTS
THAT SHAPED
THE WORLD

Down To Earth

Founded in 1992 to arm you with knowledge critical to shaping a better world

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THE DECADE: IT'S A TINDERBOX WORLD

Growth has stumped environment.
The decade of 2020 is the last chance we have
to walk the talk and make it right

SUNITA NARAIN

IT'S THE end of a decade and the start of a new dawn, we hope. In the decade we leave behind—2010-2019—the world, it would seem, has unravelled; come apart; our leaders are diminished; our economies are in trouble; and, there is conflict and strife everywhere we look. In this decade, we have realised that climate change is not in the distant future. It is happening and its impact will only grow. Every year in this decade has broken a new record—the highest heat and the most extreme weather. But it is not just about weather. It is about how people in the world view their present and think about their future.

We know that the young are restless—maybe more than in any past decade. In the richer world, young people are alarmed and insecure because they don't know how they will survive this increasingly warming world. But the young are also worried about their jobs—their rich economies are now even shedding skilled labour. Artificial Intelligence (AI) sounds good, but that's because it is still futuristic. It will take over the world, and the problem is that when it does, it will go viral so fast and out of control that nobody will be able to control or regulate it. It's like a mutant, with a life of its own. This generation is the creature of the internet and social media. But they know that however amazing this tool is, however much it defines them, it also has huge downsides—from fake news to weakening of democracy. Today, many young people in the mecca of internet business, the US, are joining the call to break up the influence of the companies of the new age—Amazon, Google and Facebook.

But I think what worries the young the most is that they feel powerless to make the difference—what is intrinsic and essential in their lives is what is indicted as the problem. How will they change this? The young worry about this. As they must.

In the poorer world, the young want opportunity. But the future prospects look bleak where they live. They want to move; from village to city; from city to another country. They are not satisfied with the plight of their parents. Even if they don't have enough formal education (because governments have let them down), they are in tune with the present through their mobile telephony. They know about the bright lights; they know that the world is awaiting



them. They want it, as they should. They will not be submissive and meek about their desires and aspirations. They also see the world around them crumbling—their farmer parents are not able to make two ends meet. The price and the weather risk of growing food increases each day; and each season increases the spiral of debt. They don't want this. Their generation is also different in another way. They are not meek or submissive. They are hungry for more but also impatient.

It is, therefore, no surprise that in almost every part of the world things can go out of hand very quickly. A simple hike in fuel or university fees can topple governments, with army on the road, shooting, burning and looting. It's a tinderbox world, on the boil.

It's also a divided world. Countries no longer work together anymore. Every country thinks only of its self-interest and nothing more. This is not to say that the situation was any different earlier. But the pretense has gone—and this, in an age of extraordinary inter-connectedness and inter-dependence, has huge consequences.

It was in the 1990s that globalisation became the norm—economies were stitched together in the promise for a better world. In that decade and later, there was rumbling and mumbling against this movement of industry to places where labour was cheap and the cost of



environmental management could be discounted. But it was covered up; quashed because this great trading business was working for some, if not all. In the decade of 2000, the first crucial blow came with the 2008 financial meltdown. But this was also shoved under the carpet. All was well as we went into the 2010 decade. But then the cracks started widening—Brexit was waiting to happen; Donald Trump is not an aberration.

These are consequences—intended and unintended of the economic order in the post-globalisation world. It is a fact that in this period of obsessive and competitive growth, there have been many losers—most of all, the poor and the environment. Let's be clear that in the last three decades—1990-2019—growth has stumped environment; even if local air has been cleaned, emissions have been externalised—leading to this existential threat of climate change. Our inheritors should remember this.

There is other decadal learning as well—in our world, we are seeing unprecedented rates of internal migration and rural distress. I say this with all caution because I know that data on migration, or population, is always delayed. But I say this, not only because of the massive and often vile discourse over immigrants, but also because we know that our cities are growing in the illegal and that this growth is massive and unmanageable. In my city of Delhi, the scale of the so-called unauthorised settlements and its inhabitants cannot be counted anymore. But what we fail to understand is that people are coming because there are jobs to be found in cities, as against the village—where farmers are crushed under double-triple burdens of poor infrastructure, debt and now freak weather events.

The jobs that are available to the migrant are at the bottom of the heap—if we go into these factories (as I have) you see the deplorable and hazardous conditions of work; people eat and sleep in closed hovel-type places; fumes and all. But why should we be shocked? The fact is that modern industrial growth is designed to shift the burden of the cost of labour, occupational health and safety and environment to places where it can be discounted.

This is also where the circles close. The fact is that Delhi cannot breathe today—our air is foul and toxic. Our health is compromised. What we must understand is that a large part of the problem of pollution—some 30 per cent—comes from industries that spew emissions into the air. This industry cannot afford to move to cleaner fuel, like natural gas, because of expense. It will use the dirtiest of fuel—pet coke and if it gets banned then coal or anything else that is cheap.

In this way, the industry of our world discounts health—of its workers and of the surrounding region—because of the need to compete. This is the rule of the game. If its cost goes up, it will lose business, and it will now move to even poorer regions and work even more in the “dark” so that enforcement is not possible. It is a race to the very bottom. But if we in Delhi want clean air, then we cannot export this industry to the next region. The airshed is the same. Air pollution is a great leveller, as I keep saying. We need to ensure that this industrial growth comes without discounting the cost of environment. We need growth so that it is inclusive—rural and urban; for the rich and the poor.

This should have also been the lesson for the rich in the rich world. Their governments have worked overtime in successive climate negotiations to erase the very idea of equity and justice. They believed they could shove the blame on the poor world as it works to develop—using the same energy sources that the rest of the world did and so emitting the same greenhouse gas emissions that the rest of the world did. But the fact is that we have one



planet and one atmospheric space—it is also a common airshed. If the rich emitted in the past, the poor will emit in the future. We also share a common future and it does not look so good anymore in terms of climate impacts.

Now, climate change negotiations have a new twist in this deadly tango—the word is net-zero or carbon neutral, which could mean another attempt at creative carbon accounting. A game to find cheap options to cut emissions at home and through purchases from desperately poor developing countries. We know and they know it will not work in our severely compromised and climate-risked world. It will lead to more poverty as climate impacts hit the poor, and they will have no options but to migrate and this will lead to more insecurity and more vile and nasty attempts to control immigrants. At this rate, the world will need another planet to build “detention” camps to hold the unwelcome outsider.

So, let’s please get real in this next decade. If not for our sakes, then for the sake of the young who will inherit this world—polarised; intensely unequal, and now greatly risked because of climate change. No more games. No more procrastination. The decade of 2020 is the last chance we have to walk the talk. To make it right. Let’s not lose it. Not again. ■

2010 X 2019

GLOBALISATION

The 2008 recession shattered the well crafted narrative of globalisation. A free economy did deliver the profits as expected. Wealth generation was at its peak. The first onslaught on globalisation was the widening inequality in wealth distribution, more in developed countries. **Developing countries were basking in the glory of high economic growth ignoring their long-standing problem of inequality.** The first ones to abandon this naturalised model of growth were its champions. Developed economies decided to go back to their earlier worlds: the economy of and for locals. For the new generation, the decade witnessed arrival of the new rage: deglobalisation.

FREE FALL FOR FREE MARKET

Ultra localism is replacing globalisation

DECEMBER 2016

The developed world's poorest country—the United States of America (USA)—voted for its new president Donald Trump. His victory was unexpected. But the anger that fuelled his victory was very much expected, and sent out a clear message. It questioned the free market model of economy that has been the only model in existence for more than half of the world's population. Championed by the developed world, the free market economy has been under scrutiny since 1990. But developments in the



aftermath of the recession of 2008 show that countries are increasingly losing interest in this model of economy. Britain's surprise vote to leave the European Union (Brexit) was the biggest reality check on the efficacy of globalisation, while high unemployment in Spain and severe economic crisis in Greece that led to adoption of austerity measures across the countries were wake-up calls.

Trump is just a rude reminder that there is some fundamental problem with the free market model. "Clearly, people are not feeling they profit from the benefits of globalisation and free trade," said Anthony L Gardner, the US ambassador to the EU. The victory of Trump also indicated that the developed world struggled with the third world problems. Its economies are in tatters; inequality is further widened, with a handful of people amassing the major chunk of profits generated out of a free market; and human development indices have declined sharply.

Trump's call for "Americanism, not globalism" struck a chord with the white working-class voters at a time when the US was still licking the wounds of the North American Free Trade Agreement (NAFTA), an agreement signed between the US, Mexico and Canada in 1994. Way back in 2011 when the Occupy Wall Street took roots, highlighting inequality and the failure of the economy to meet people's expectation, the International Labour Organization hinted that the growing unrest had an uncanny protagonist: the youth. Currently, the population in the age group of 15-24 is at a historic high. This group has not seen any economic model other than the free market.

A wto report, which analysed restrictive trade measures between mid-October 2015 and mid-May 2016, said the G20 economies introduced new protectionist trade measures at the fastest pace since 2008 economic recession. "G20 economies applied 145 new trade-restrictive measures—an average of almost 21 new measures per month, compared to 17 in the previous report." ■



1992>>

This year, the world moved several steps towards globalisation. It was also the year of market integration and GATT. Rich governments pushed harder for a powerful GATT to free world trade

2018>>

This history is a reminder that there is an old pattern to these shaky modern times. In the 21st century, counter-reactions to globalisation have also been taking radically different forms. Early in the century, Latin America's leftist governments challenged the neoliberal order, rejecting the Washington Consensus and building regional solidarity

NUMBer

28

trade restrictions
in 6 months

37%

higher than same
period last year

By G20 countries during
May-October, 2019

2010 2019

WATER SCARCITY

In 2010, the world achieved a milestone: five years ahead of schedule, the Millennium Development Goal of giving access to clean water was achieved. In 20 years some 2 billion people gained access to clean water. But the decade had another daunting challenge of providing clean water to additional 2.1 people. **“Day Zero” became a reality that hundreds of towns and cities across the world dread now.** The world had never before debated an abundant natural resource like this. More than oil, conflicts were being analysed from water perspective. India emerged as a global hot spot for being the largest user of water, more of groundwater, the nature’s provident fund of life-saving reserve.

DAYS ZERO

More than scarcity, water management became the debate point

MARCH 2018

While the world’s most dramatic urban crisis unfolds in Cape Town in South Africa, recent studies say at least 200 cities across the world are fast running out of water. An analysis by *Down To Earth* shows 10 of them are headed towards Day Zero—when the taps will run dry. This comes as a surprise because cities across the world have grown, thrived and expanded along rich, perennial sources of water, be it lakes, rivers, springs or even seas. So, where did all the water go? Robert McDonald, lead scientist at the US-based environmental group Nature Conservancy offers an explanation. “The main long-term driver of these shortages is the unprecedented urban growth occurring around the world,” he says. Rightly so.

The crisis at Cape Town has shown what unplanned urbanisation can do to water availability in the world’s urban centres. Not only are our metropolises headed to a dry future, the scarcity will increase as people are migrating to



urban areas at unprecedented rates.

About 54 per cent of the world, or 3.9 billion people, live in urban areas and they will grow between 60 and 92 per cent by the end of the century, says a study published in *Nature* this January. As a result, the urban water demand will increase by 80 per cent by 2050, it adds. It is worrying that "climate change will alter the timing and distribution of water," it says. About 400 million urban dwellers currently face water shortage, states a 2014 study published in *Global Environmental Change*. This when the average global temperature has not even risen by 1.5°C above pre-industrialisation levels. What will happen when it rises by 2°C? A study, published in *Earth System Dynamics* in November 2017, has made projections for those scenarios. A 1.5°C rise in the average global temperature will expose 357 million urban dwellers to extreme droughts while the figure for a 2°C rise will be 696 million, it says. The number of city dwellers facing water shortage by 2050 could be much higher, about 1 billion, says the *Nature* study. ■



2016>>

Increasing instances of use of water as a weapon of war in ongoing conflicts is now a new worry for the United Nations and other agencies which till now had been working to provide better water and sanitation facilities to these countries

2019>>

The Indus River and its tributaries, which flow through parts of China, India, Afghanistan and Pakistan, are among the most vulnerable "water towers" in the world, a study from Utrecht University in the Netherlands said. Besides the Indus, other highly vulnerable water towers in Asia include the Tarim, Amu Darya and Syr Darya in Central Asia and the Ganges-Brahmaputra in South Asia

NUMBer

1,000 kms

A year a rural household travels to fetch drinking water

2010 2019

YOUTH UNREST

The world was never so young, and also restless. More than 41 per cent of global population is below the age of 24 years. It is a generation that has grown up in the post-1990s tumultuous phase. **They have grown up with one model of economic growth—the globalised free market.** They are better off than their predecessors, economically and politically. But from Hong Kong to Chile to Lebanon to Barcelona to India, from rising food inflation to train tickets to curbing of freedom to climate change, from rich to poor, protests sweeping across the world have one common factor: the youth leading the charge. This decade the young world became angrier.

SCARRED GENERATION

What explains the restlessness

MAY 2018

The blight on the promise of youth today is probably far more pernicious. To get a sense of the scale of the betrayal, chew on this disturbing statistics: according to the Organization for Economic Co-operation and Development's Economic Survey of India, over 30 per cent of India's youth (about 120 million) is neither employed nor in school or in any kind of apprenticeship. Add to this a crumbling welfare state, rising inequality, a rapidly changing economy that constantly needs new skills, a consumer culture that feeds on ever-new material fantasies, a never-ceasing carousel of violence, and, not to mention, a traditional society struggling with what novelist V S Naipaul described as a million mutinies, and you have a potential tinderbox.

Well, blame it on corrupt and myopic politics, an outdated and financially-strained education system, an economic system skewed in favour of the rich, and, arguably, disruptive technologies—the usual suspects. But there is a fifth factor that's making life even more difficult and precarious for this century's young. Demographers call it the "youth bulge", a phrase first coined by the German social scientist Gunnar Heinsohn in the 1990s to describe a phase in a country's demographic transition when even as fewer kids die at birth, women continue to be as fertile as before. Over the next two to three decades, this translates into a youth bulge in the population curve.



India is not the sole witness to this phenomenon. In fact, the world as a whole has never been younger. According to the Population Action International, a Washington-based private advocacy group, at least 62 countries, mostly from West Asia, South Asia and Africa, have a “very young” populace, which means every two out of three people are under the age of thirty. As Africa’s population mushrooms, it is set to become the youngest continent in another 30 years. Many social scientists, economists and politicians theorise the youth bulge as a double-edged sword. Harness its potential, and you enjoy higher growth and peace—a double dividend. Squander it, and you incur diminishing growth

and social strife—a double jeopardy.

The Great Recession that gripped the world in the wake of the 2008 financial crisis shows no signs of letting up. If anything, automation is making it worse. But what’s clear is that young are bearing the brunt of it. About 74 million youth between the ages of 15 and 24 were unemployed in 2013. Although that figure has come down by 3 million since then, it is still about 35 per cent of the total unemployed.

As prolonged joblessness renders the young cynical and angry, the International Labour Organization has warned of a “scarred generation” that may become easy fodder for fascist, religious or political groups like the ISIS in West Asia, the

2010 X 2019

1995>>

Given the inefficiency of the governance system, India's democracy is asserting itself. The Supreme Court has stepped in to give Indian citizens the right to lodge complaints against the despoilers of the environment

2019>>

The impact of protests by the youth all around the world to demand greater climate action could be clearly seen at the United Nations Framework Convention on Climate Change (UNFCCC) conference in June held in Bonn, Germany. With many young people in attendance, Patricia Espinosa, the United Nations Climate Change executive secretary, praised the call to action by saying it's an "unmistakable message". She promised that their voices will be heard in the UNFCCC process

NUMBER

50%

Of young people showed confidence in free and fair elections

Taliban in Afghanistan, or the Bajrang Dal in India. Or it may take to a life of crime, like leaking question papers, peddling narcotics, rioting, stealing credit cards, or joining the ranks of the lynch mobs.

Extracting capital out of youth is part of the neoliberal project that views each individual decision or choice as a rational calculus of costs and benefits. As American political theorist Wendy Brown argues, "The rationally calculating individual bears full responsibility for the consequences of his or her action no matter how severe the constraints on this

action, for example, lack of skills, education and childcare in a period of high unemployment and limited welfare benefits."

The trouble is that with the neoliberal experiment is on the brink, its Franksteins now have to deal with the fury and frustration of millions of young men and women left to their own devices (including, ironically, the smartphone, the ultimate icon of liberalisation).

It hasn't escaped anyone's notice, least of all politicians, that the kettled youth, to borrow the title of a book on violence among British youth, is the future currency of power. The rise of Trump, Modi, and Erdogan, the Brexit campaign and growing traction of right-wing politics in Europe are all portents of what the future game of thrones might look like. Militant outfits like ISIS and spiritual ones like Dera Sacha Sauda too have milked this bottled-up anguish.

Perhaps it is high time the world junked the discredited neoliberal project and tried something more radical than capitalism in pastel shades. As economist Joseph Stiglitz contends, "If socialism means creating a society where shared concerns are not given short shrift—where people care about other people and the environment in which they live—so be it. Yes, there may have been failed experiments under that rubric a quarter or half-century ago; but today's experiments bear no resemblance to those of the past."

Radical words for a former chief economist of the World Bank, but the question is how many such voices will it take to bell the comatose cat. ■

CERTIFICATE COURSE ON

CIRCULAR ECONOMY & RESOURCE EFFICIENCY

for Sustainable Waste Management



Rapid urbanization and rising consumption of goods make waste management in India a massive challenge. Urban India produces 62 million metric tonnes (MMT) of municipal solid waste every year, 70 per cent of which is collected and only 25 per cent of this collected waste is processed. Figures for recycling are abysmal; for instance, out of 25,940 tonnes of plastic waste generated per day, only 15,564 tonnes gets processed; similarly 95 per cent of e-waste is managed by the informal sector, which is a huge concern.

The need of the hour is to shift the focus towards source segregation, recycle and reuse. This will further strengthen and foster 'Circular Economy' by creating and optimizing resource 'loops' along value chains and will ensure sustainable consumption and production patterns into waste management systems.

The Centre for Science and Environment (CSE) has been working on policy and implementation with regard to waste management at the national and global levels. The Anil Agarwal Environment Training Institute (AAETI), a CSE initiative, recognizes the need to adopt resource efficient waste management regimes, and offers an advanced five-day training programme on 'Circular Economy & Resource Efficiency for Sustainable Waste Management'. The objective of the programme is to provide a better understanding of the key aspects of management of solid, plastic, biomedical, construction and demolition (C&D) and e-waste; feasibility of technologies involved in their treatment; regulatory frameworks; best practices and stakeholders involved.

COURSE HIGHLIGHTS

- Status of waste management in India
- Major provisions of the Waste Management Rules, 2016 and its amendments
- Utilization of the concept of circularity and resource efficiency in different waste streams
- Extended Producer Responsibility (EPR)
- Developing decentralised waste management frameworks
- Using information, education and communication for behaviour change
- National and international best practices
- Site visits

WHO CAN APPLY

Waste management practitioners, officials from central and state urban departments and municipalities, urban and town planners, village panchayat officials and members, academicians, students, and NGO representatives.



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February 3-7, 2020

LAST DATE FOR APPLYING

20 January, 2020

COURSE VENUE

Anil Agarwal Environment Training Institute
(a Centre for Science and Environment initiative), Nimli (near Alwar), Tijara, Rajasthan

2010 X 2019

CLEAN VEHICLES

India does give subsidy for buying electric/hybrid vehicles. And by March 2019, it amounted to ₹360 crore for over 285,000 buyers. There is an official scheme called Faster Adoption and Manufacturing of Hybrid and Electric Vehicles in (FAME-INDIA) to encourage switch-over to cleaner fuels to drive the aspirations of the booming middle class in India. The decade that just passed by will be remembered for how electric/hybrid vehicles became a preferred choice for vehicle owners. **Some 11 states have now policies to encourage switch to electric vehicles.** The potential is huge: currently, electric vehicles account for just 1 per cent of total vehicle sales in India.



E DRIVEN

The arrival of electric and hybrid vehicle

FEBRUARY 2010

The glitz and glamour at the biggest auto show in Delhi drew the highest number of footfalls ever. The show unveiled dreams and many of them had a green wrap this time. Amid the slew of small cars at the expo, held on January 5-11, was a line-up of electric and hybrid vehicles. Suddenly, e-vehicles have trudged up the popularity chart and become part of the business model of major automakers—both local and global. Some of them have finally looked beyond the conventional internal combustion engines and to a completely new genre of technology.

In the late 1960s and early 1970s, concerns about



air pollution and more important, the OPEC oil embargo, kindled interest in e-cars. This got further impetus in California's Zero Emission Vehicle Mandate that demanded 2 per cent of California's vehicles to be zero emission by 1998 and 10 per cent by 2003. But the mandate waned due to technical and cost barriers. Sales plummeted and global carmakers such as Toyota rolled back their plans.

Concern over high oil prices and stringency in pollution and climate regulations have once again spurred new interest in e-vehicles. These are fuel efficient, as, technically the conversion of electrical energy into motive power is more efficient than burning fuel in an internal combustion engine. According to the California Air Resource Board, the estimated fuel efficiency of e-vehicles is three times higher than the conventional car. As electricity costs significantly less than oil, the operating cost per kilometre falls to a fraction of that in a petrol car.

Several international organisations including the International Energy Agency forecast modest growth of electrification of the vehicle market by 2020 in a conservative scenario. This could increase to a quarter of the new vehicle sales by 2050.

High prices, limited range, slow investment in technology improvement and lack of charging infrastructure have significantly slowed the

commercialisation of e-vehicles. The battery is a major chunk of the cost of e-vehicles. It costs nearly 30 per cent of an e-bike's price. And it

has to be replaced every two to three years. For an e-car, a battery costs ₹60,000 to ₹70,000. ■

1999>>

Tomorrow's cars and motorcycles may operate on hydrogen, instead of petrol. A Benares Hindu University team in Varanasi, led by physics professor O N Srivastava, has succeeded in operating a hydrogen-powered motorcycle on the street. And, H B Mathur, professor in the mechanical engineering department at the Indian Institute of Technology-Delhi, has developed an internal combustion engine that works entirely on hydrogen

2019>>

Electric cab services are garnering interest in Indian cities. Lithium Cabs, an all-electric cab service, originally from Bengaluru, has already started operations in the National Capital Region. Nagpur was the first city in India to have an electric cab fleet, introduced by Ola Cabs plying within the city limits

NUMBER

30%

Adoption of electric vehicles by 2030

2010 2019

EXTREME WEATHER

Across continents, extreme and contrasting weather became the new normal in the decade that just passed by. The period from 2011 to 2015 has been the warmest five-year on record globally.

The average temperature in 2015 had already risen by more than one degree since the pre-industrial period. While there's growing fear that 2015's record-breaking temperatures will be normal by 2030, 2019 had already seen record-breaking heat for nine consecutive months. The term "climate change" has been rechristened "climate emergency". According to the World Meteorological Organization, 22 million people were displaced in 2019 due to extreme weather events. Now, weather events displace more people than conflicts in the world.



WHICH WAY THE WIND BLOWS

Climate emergency set in

MAY 2018

The sight of wheat, mustard, gram and fenugreek crops spread over 10 hectares (ha) would fill Vidyadhar Olkha's heart with joy. It was end of February and the crops were almost ready to be harvested. A week later, all he had was a mat of leaves and stalks lying on the ground. The rain and hailstorm in the first week of March destroyed 70 per cent of his crops in Jhunjhunu district of Rajasthan. Olkha has no idea what brought so much rain this March. Neither do scientists nor weather forecasters, who attribute the rain to western disturbances and have different theories on what made the disturbances so severe this year.

Western disturbances are low-pressure areas embedded in the Westerlies, the planetary winds that flow from west to east between 30° and 60° latitude. They usually bring mild rain during January-February, which is beneficial to the rabi crop. But in the past few years western disturbances have been linked to disasters. The cloud burst in Leh in 2010, the floods and landslide in Uttarakhand in 2013 and the excessive rain in Jammu and Kashmir in 2014 were all linked to these disturbances. This year, as per the India Meteorological Department (IMD), the average rain received between March 1 and March 18 was 49.2 mm—197 per cent above normal. This caused severe damage to crops in several states of the country.

There is no unanimity among scientists on the reasons behind the changes in the phenomenon.



They offer a number of explanations. First, easterly wave, that according to IMD, the severe rain this year is the result of the confluence of western disturbance and easterly wave from the Bay of Bengal. Easterly wave, or Easterlies, blows throughout the year from east to west. The confluence of the two winds happens throughout the year, but the results vary. They generally bring rain only to the northern part of the country but this year states in central and south India also received rain, says B P Yadav, head of IMD's

National Weather Forecasting Centre. Western parts of Madhya Pradesh, for instance, received over 2,025 times more than usual rainfall during March 1-18, while the rainfall in central Maharashtra was 3,671 times above normal, says IMD data.

Second, according to another study which blames global warming is by Jennifer Francis of Rutgers University, New Jersey, and S J Vavrus of University of Wisconsin Madison, both in the US. The study, published in the January issue of



2010 2019



2012>>

The year set major records. A quick Google search reveals it was the hottest year in US history and second wettest in the UK. Data from 2011 and 2010 show similar extremes. A report by United Nations reveals 2012 is the third consecutive year to suffer economic losses of over \$100 billion due to extreme weather events

2019>>

Since the Internal Displacement Monitoring Centre for the first time started collating data on persons displaced by disasters in 2018, this set of population has been increasing. In 2019, 1.6 million people displaced by disasters were still in camps or places out of home. This was a "highly conservative estimate" as it didn't consider displacement by disasters before this year. At 2.678 million, India had the highest number of people displaced by disasters and extreme weather events in 2018

Environment Research Letters, suggests that heating up of the Arctic has weakened the jet streams in the northern hemisphere.

The west to east flow of jet streams in the northern hemisphere is maintained by the "gradient of heat" between the cool Arctic and warmer areas near the equator. But the Arctic has been warming since the past 20 years due to which the jet streams have become weaker. Rather than circling in a relatively straight path, jet streams now meander. This is making the South colder and the North warmer. Francis says western disturbances could definitely be affected by these jet streams.

A study by the Indian Institute of Tropical Meteorology, Pune, has directly linked western disturbances to global warming. In a paper published in *Climate Dynamics* in February 2015, the researchers say global warming is impacting air currents and causing freak weather events. Pronounced warming over the Tibetan plateau in recent decades has increased the instability of the Westerlies and this has increased the variability of the western disturbances.

According to the study, the western Himalayan region has seen a significant rise in surface temperatures since the 1950s. Observations from the area show a significant increase in precipitation in recent decades. The researchers looked at a variety of climate data to understand the increasing frequency of heavy precipitation. They say temperatures have risen in the middle- and upper-tropospheric levels over the subtropics (area between the Tropic of Cancer and the Tropic of Capricorn) and the middle latitudes. "Our study suggests that human induced climate change is the reason for the increased variability of western disturbance," says R Krishnan, one of the researchers. "The findings are based on direct observations and we are now using climate models to confirm if the impact is human-induced," says Krishnan. ■

NUMBER

144

Countries reported displacement due to natural disasters in 2019

2010 2019

CLIMATE COLLAPSE

In 2010, the developing countries wrote off the historical carbon debt of the developed countries.

With this, **despite being the worst victims of climate change, the developing countries made negotiations on global emission reduction an effectively voluntary effort, without any sense of urgency that the crisis demanded.**

Developed countries always wanted this to happen. Since the Cancun meeting of the Conference of Parties to United Nations Framework Convention on Climate Change in 2010, global emission reduction has been losing the steam. Climate negotiations have just become climate talkies. It is no more a multilateral effort.

HOW WE LET THE CULPRITS GO

In the beginning of the decade, the world took a step backward

DECEMBER 2010

The new deal in Cancun (the Conference of Parties (CoP 16) to the United Nations Framework Convention on Climate Change) erases the difference between developed and developing nations. Developed countries no more have to commit legally to cut emissions. And what they pledge to do voluntarily is too little. On the other hand, developing countries will now have to take on binding commitments. While developing countries share the burden of cleaning up, financial and technological help the rich promised them remains just a promise.

World leaders applauded the Cancun agreement even though it violated the right of developing countries to grow with an equal access to global carbon space. Bolivia was the only country that pointed out the inequity. When its ambassador to the UN, Pablo Solon, called the deal a step backward, others booed him. Industrialised countries, along with a few emerging economies, pulled the biggest coup in the history of climate change talks: science and the principle of equity were brushed aside.

The Cancun agreement ignored ambitious targets of greenhouse gas reduction to arrest average global temperature rise below 2°C—the guardrail fixed by the Intergovernmental Panel on Climate Change (IPCC) to avoid catastrophic impacts of the climate change. The agreement recognises



that increase in global temperature cannot exceed 2°C (and also recognises the need to review whether the world should try keep it below 1.5°C) but it provides no road map for reaching this goal. It fixes no emission reduction targets for the developed countries, collectively, and there is no mention of a year when the world emissions should peak before starting to decline. On the contrary, it gives additional space to developed countries, especially the US,

to increase emissions further.

What it does is legalise the voluntary “pledge and review” mentioned in the Copenhagen Accord. Now countries are allowed to set their own domestic targets in the form of pledges. The developed countries’ pledges will be measured, reported and verified (MRV) but will not invite penalties if they are not met.

The Cancun agreement has also changed the basic rules for combating climate change forever;

2010 X 2019

2017>>

UNFCCC reaches the milestone of 25th year. But a milestone indicates the distance travelled, not the pace at which it has been reached. The Convention is still struggling to find a way out of this century's biggest developmental challenge: climate change

2019>>

The first-ever Global Assessment Report on Biodiversity and Ecosystem Services by Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES) says one million animal and plant species are under extinction. And humans are to be blamed for it

it has shifted the burden of emissions reduction from developed to developing countries. Against weak pledges by developed countries, developing nations have pledged to reduce emissions intensity significantly. India has pledged to reduce by 20-25 per cent below 2005 levels by 2020.

The industrialised countries that should have led in the emissions reduction will get away by cutting comparatively less emissions than the

developing world. While they cut 0.8-1.8 Gt by 2020, developing countries pledge to cut their emissions by 2.8 Gt. The cost of meeting these targets could prove too expensive for poor countries. It might hinder the UN millennium development goals, which include eradication of hunger and poverty and environmental sustainability.

The US, which is yet to commit to how much emissions it will cut, has the most to gain from the agreement. With the highest historical emissions, it needs to reduce 40 per cent of its greenhouse gas emissions by 2020. But it will get away by reducing zero per cent over its 1990 levels.

World leaders, on paper, committed themselves to limiting global warming to 2°C, considered a safe level of warming. But the pledges, made by countries over the past year under the Copenhagen Accord, that is now part of the Cancun agreement, won't be enough. Going by the pledges, the temperature rise in this century

may be somewhere between 3°C and 3.9°C. Small island states and countries most vulnerable to climate change impact argue even 2°C temperature is too high and that global warming should be limited to 1.5°C.

What happened in Cancun? What made the poorest and most vulnerable countries, who had vehemently opposed the Accord in 2009, to agree to the Cancun agreement? To understand this one has to understand what happened in Copenhagen and in the period between Copenhagen and Cancun. It is important to understand that domestic politics of Kyoto-renegade US demanded a non-binding agreement with full and complete participation of countries like India and China. This meant that the US could not afford to continue with the two-track UNFCCC negotiations and needed a new agreement that had no legally binding emissions reduction obligations as well as brought India and China into the agreement. This was the genesis of the Copenhagen Accord. ■

NUMBER

\$37,808 million

India's economic losses due to extreme weather events in 2018; four-fold rise over 2017

2010 2019

THE VIRTUAL WORLD

In 2019, we celebrated 50 years of Internet since two computers made node-to-node communication in 1969.

As the Internet becomes the public square and the marketplace of our world, it is increasingly becoming a contested terrain.

Its potential for diffusing knowledge and subverting the traditional channels of information is tremendous. So it is not surprising that governments, corporations and even seemingly innocuous social networking sites all want to control and influence the way the Internet operates. It's easy to see why. More than half of humanity is linked to this system—and the dramatic growth in Internet usage over the past decade is set to explode in coming years.

BATTLE FOR THE INTERNET

The WikiLeaks exposé showed us the significance of the Internet in today's interconnected world

MARCH 2011

The problem with the use of technology in keeping the Internet safe cuts both ways. With increasing number of cyber attacks on both official and public websites from an array of hackers and malware, governments are reaching for ever more sophisticated high-tech surveillance systems. For instance, computer systems of the US Congress and the executive branches are under attack an average of 1.8 billion times per month. The result: more spyware. One such is deep packet inspection technology. It is a tool that protects customers from rampant spam and virus traffic. Experts say the Internet could not survive without this technology and yet, it helps authorities to keep a close watch on what people are doing on the Net. In the US, ISPs are required to have this technology.

China's most famous blogger, author of best-sellers and race car driver, Han Han, took a jab at his government in April, 2010 after he was named one of the 100 most influential people by Time magazine (for 2010). In his blog "twocold" he wrote, "Other Chinese nominees include sensitive word, sensitive word and sensitive word." His post, referring to China's web censors' habit of blocking even commonplace names from web searches and blog sites, struck a chord with his readers. Within days, more than 20,000 commented on his post, most echoing Han's exasperation with the Chinese censorship of the Internet.



2010 X 2019

2013>>

The right of countries and peoples to access the Net was highlighted in Dubai when some African countries raised the issue of US control of the global Internet

2017>>

Guided by the same instinct, the current craze to quantify almost everything stems from Big Data's supposed extraordinary power to extract new truths about the world

China has one of the most advanced web monitoring and blocking systems. The system can be likened to a check at the airport. Every piece of luggage, coming in or going out, is put through a scanner. If any one of them contains weapons or narcotics, the scanner detects it immediately and the articles are impounded. Web filters work in a similar way. They scrutinise and block websites which could range from websites on free speech and democracy to ones on pornography, depending on the country using the system.

The Assange case more than anything else has exposed how vulnerable the Net is to political meddling and control. So while governments in many parts of the world block sites, jail or kill dissidents for expressing their views on the Net, threats to the freedom of the Internet come primarily from the paranoia that governments suffer and from badly crafted policies they implement to protect business and other interests.

The US, the ultimate symbol of liberal democracy, is no less uneasy about the power of the Internet. A slew of laws are making their way through the Senate, laws that will give the administration sweeping powers to seize domain names and shut down websites, even those outside its territory, and laws that strengthen the powers of the president in the time of a cyber emergency, including the use of a kill switch. In September, 2010 the US Senate introduced the Combating Online Infringement and Counterfeits Act, which would allow the government

to create a blacklist of websites that are suspected to be infringing IP rights and to pressure or require all ISPs to block access to those sites. In these cases, no due process of law protects people before they are disconnected or their sites are blocked.

In India, in the wake of the terrorist attacks in Mumbai in November 2008, Parliament hastily passed amendments to the Information Technology Act, 2000, without any discussion in either

House. The December 2008 amendments have some good points but they also allow increased online surveillance.

Section 69A permits the Centre to "issue directions for blocking of public access to any information through any computer resource", which means that the government can block any website. Pranesh Prakash of the Bengaluru-based Centre for Internet and Society notes that while necessity or expediency in terms of certain restricted interests is specified, no guidelines have been specified. "It has to be ensured that they are prescribed first, before any powers of censorship are granted to anybody," said Prakash in an analysis of the amendments. "In India, it is clear that any law that gives unguided discretion to an administrative authority to exercise censorship is unreasonable."

Civil rights activists say the section has broadened the scope of surveillance and that there are no legal or procedural safeguards to prevent violation of civil liberties. As the battle for keeping the Internet is joined by netizens who are aware of the power of connection, governments, too, are ramping up command and control measures. ■

NUMBER

1 million

People every day come online for the first time

2010 2019

ANTIBIOTIC RESISTANCE

It is a resistance that is difficult to control. Think of it like the revenge of the microbe—the bug that we thought we had conquered and squashed. **The miracle of modern medicine, antibiotics, which has saved millions of lives over generations, could be compromised.** Why? Because the bugs against which these medicines work have developed resistance. This is a global pandemic and will jeopardise our health and well-being. It will be impossible to treat simple infections, forget life-threatening diseases. This is a problem of huge proportion—it's the climate change proportionate crisis of the health world.

FATAL RESISTANCE

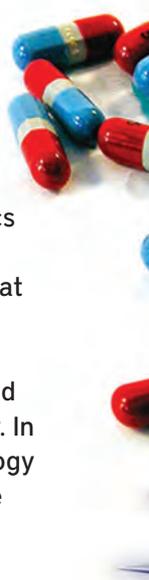
Can we fight antibiotic overuse?

OCTOBER 2011

Between October 3 and 5, researchers and policy makers from 40 countries met in New Delhi as part of the first global forum on bacterial infections. Worried about the high mortality rate due to antibiotic resistance, they looked into ways to delay resistance to the remaining few antibiotics. Experts at the Global Antibiotic Resistance Partnership (GARP) meet said studies show a steady growth in use of antibiotics in India. Of all the antibiotics, the beta-lactams, like penicillin, were sold the most followed by quinolone antibacterials, like ciprofloxacin. Penicillin is used to treat, among others, wound infections. Ciprofloxacin is given to patients with urinary tract infections.

Independent studies demonstrate the immensity of the problem in India, be it due to infection acquired in hospitals or in the community. A study released by GARP in March this year shows that chances of contracting vancomycin-resistant enterococcus, which cause a dangerous skin infection, are five times higher in Indian ICUs than in the rest of the world. Antibiotics have made their way to the environment as well. Cattle, for instance, harbour resistant bacteria that could pose a problem to humans who come in contact with them.

Resistant bacteria are also lurking in rivers and sewage, risking lives of those living in the vicinity. In 2009, scientists at the Indian Institute of Toxicology Research (IITR) studied several locations along the banks of the Ganga at Kanpur. They found four species of the genus *Enterococcus* resistant to many antibiotics, including that which treats tuberculosis. The authors contended that enterococci makes its way to the river through sewage from hospitals, industries and households.



“The Ganga is a source of drinking water,” says Rishi Shanker, senior scientist at IITR. “People depend on it for bathing and washing. Pilgrims bathe in it. Travel and tourism leads to spread of resistant bacteria,” he says.

In the battle between antibiotics and bacteria, it is the disease-causing microbe that has the winning edge. But it must lose. To ensure this, many countries have started formulating policies to maintain the effectiveness of antibiotics. In March 2011, the Union Ministry of Health and Family Welfare formulated the National Policy for Containment of Antimicrobial Resistance. It woke up to the threat of antibiotic resistance after a study, published in *The Lancet Infectious Diseases* in September 2010, showed that patients in Tamil Nadu and Haryana had bacteria with the New Delhi metallo-beta-lactamase-1 (NDM1) gene. This makes bacteria resistant to many antibiotics. Spread across Pakistan and Bangladesh, the gene is common in the subcontinent. ■



2014>>

At a time when chicken consumption is at an all time high in India, a study by Delhi non-profit Centre for Science and Environment shows poultry meat could be churning out robust microbes that can render all antibiotics ineffective

2019>>

Chemical residues released from pharmaceutical and personal care products are not only becoming a major contaminant of water bodies in urban areas but are also becoming a source of drug resistance in the environment

NUMBER

10 million

people will die of antimicrobial resistance every year by 2050

2010 2019

SAND

This decade the world woke up to another scarcity: sand. **The second most consumed natural resource after water, excessive use of sand has driven rivers to dry; local ecosystems being ravaged.** Such has been the impact that the UN Environment came out with scary report on its impacts on the planet's health. India has been reporting widespread cases of violent conflicts over illegal trade of sand. We are in fact now importing sand for construction. Now there is a scramble to evolve alternatives to sand.

NUMBER

18 kg

Sand extracted per each inhabitant in the planet

A LINE DRAWN IN SAND

India faces sand scarcity leading to conflicts and illegal trade

APRIL 2012

India has the world's third largest construction business after China and the US. Malls, houses, offices and flyovers have sprung all over. The 12th Five Year Plan projects an investment of 10 per cent of the national GDP, or ₹45 trillion, in infrastructure. Is the massive scale of sand mining that India has seen in the past few years a direct consequence of its growth?

Mumbai-based construction industry expert Amit Rampure explains: in 2010, investment in the construction sector contributed eight per cent to the GDP. Every one rupee investment in the construction industry for manufacturing cement or for mining sand causes ₹0.80 increment in the GDP as against ₹0.20 and ₹0.14 investment in the agriculture or the manufacturing industry. Economic activity in this sector generally creates 4.7 times increase in income and 7.76 times increase in employment, Rampure says in his independent report on investment in the construction industry in 2011.

Legal or illegal, sand continues to be a scarce commodity. The construction sector, mostly real estate, constantly complains of acute shortage of this minor mineral. The realty sector was unable to build houses planned in the 10th Five Year Plan. When the 11th Five Year Plan began in 2007, there was a backlog of 24.7 million houses. By the 12th Five Year Plan, the backlog increased to 42 million units. The Union Ministry of Urban Development

**2012>>**

This war over sand has changed the map of Indonesia significantly as two dozen small islands are estimated to have disappeared since 2005. Eight of these islands used to be part of the Seribu Islands archipelago in Jakarta Bay

2018>>

India is importing river sand to satiate the growing demand of its construction industry and to keep soaring sand prices in check. But imports alone will not suffice without effective implementation of regulations and promotion of alternative construction materials

projected a sand shortage of 91,666.7 million tonnes by 2011-end.

To put the brakes on illegal sand extraction, the Supreme Court, on February 27, 2012 made environmental clearance mandatory for all mining sites. Minor mineral mines will now have to undergo the Environmental Impact Assessment (EIA) process under the Environment Protection Act of 1986, the court said. Till then, EIA was conducted only for mining major minerals like bauxite, coal and iron ore and for minor minerals mined in more than 5 hectare. The order came after the Central Empowered Committee, appointed by the Supreme Court, found large-scale illegal mining in five districts of Rajasthan, Haryana and Uttar Pradesh. Even the mines with legal status had not applied for an environmental clearance. ■

2010 2019

SOLAR ENERGY

In 2010, India made the leap to harness solar power to meet its ever increasing energy demand. The decade has been a story of more successes than failures. The world also made significant progress in adopting solar energy. **The International Energy Agency has projected a rapid increase in installed capacity of solar power by 2040, from 495 GW now to 3,142 GW, in its latest World Energy Outlook.** Solar has the potential to surge ahead of coal and gas to become the largest source of installed power by 2035. As for generation, the share of renewable generation could nearly double, from 26 per cent today to 44 per cent in 2040, surpassing coal-based generation in 2026.

NEW GOLD RUSH

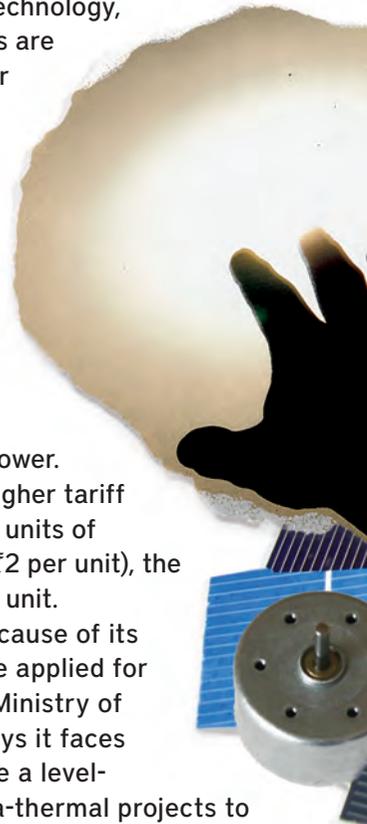
Everyone wants a piece of the pie in the sky

JUNE 2010

The three-phase Jawaharlal Nehru National Solar Mission has set up an ambitious roadmap: 22,000 MW of solar power by 2022. The clock is ticking fast for the first phase. By 2012-13, grid connected plants supplying 1,000 MW, rooftop and small plants producing 100 MW and off-grid applications generating 200 MW have to be up and running.

The mission requires drastically ramping up solar energy production in India from the current 8-12 MW of installed capacity. But technology, cost and operational challenges are not easy to overcome. The solar mission has evolved an innovative mechanism to fund this expensive power. The government directed the National Thermal Power Corporation's trading subsidiary, the National Vidyut Vyapar Nigam, to bundle the expensive solar power with the cheaper unallocated quota of thermal power. So with one unit of solar at a higher tariff (roughly ₹18) bundled with four units of cheaper conventional energy (₹2 per unit), the power utility pays about ₹5 per unit.

The programme is stuck because of its success. Too many people have applied for setting up solar projects. The Ministry of New and Renewable Energy says it faces two challenges. One, to provide a level-playing field for the newer solar-thermal projects to compete with the more established photovoltaic technology. After much deliberation it agreed on



dividing power targets equally between the two technologies. Two, it wants to avoid too many projects queuing up before financial institutions. The ministry has proposed selecting projects in three steps. In the first step it will 'migrate' a portfolio of existing projects to this scheme. In the next step it will target only 150 MW by 2010-11. The ministry says migrating the existing solar projects will quicken the pace. Officials say they received proposals for over 700 MW for migration, and have narrowed down the list to eight to 10 projects, adding up to 100 MW.

The government is swamped by applications and says it has little to allocate. It is now considering reverse auction, where project proponents shortlisted based on their net worth will be asked to state the cheapest rate at which they can supply solar energy. Proponents fear this approach could see big players underbid, which would lead to unfeasible projects. ■

2012>>

Going solar is no longer a bright idea for the four decade-old photovoltaic manufacturing industry. This high-potential renewable energy sector has suffered a serious setback in India as much as across the globe. And the alarm bells are ringing loud

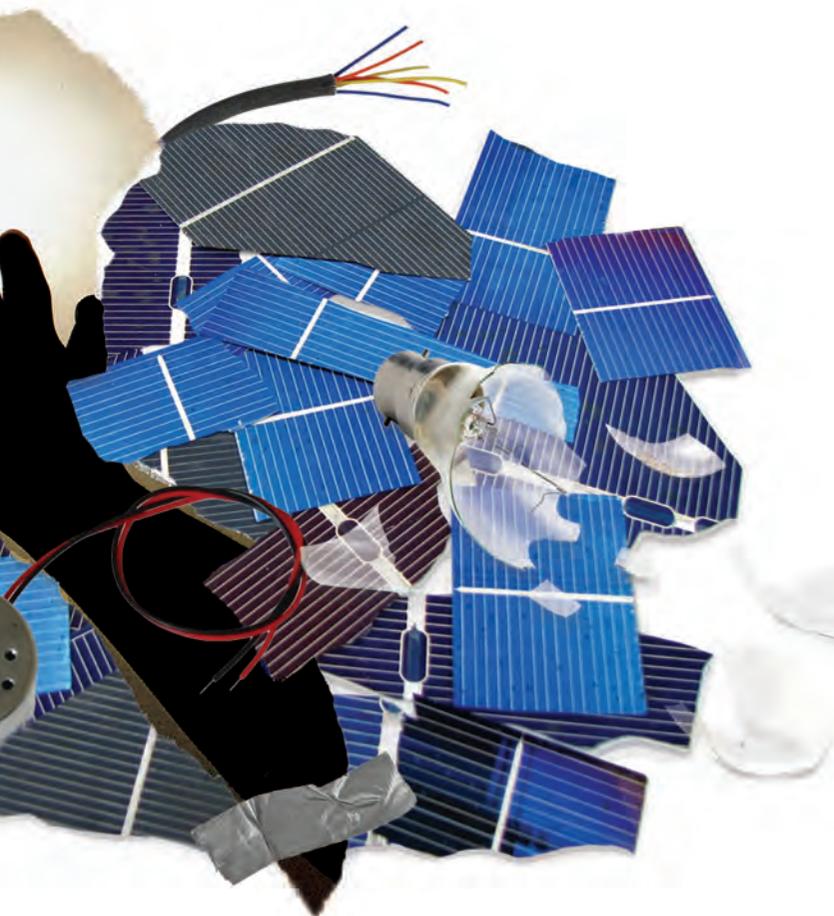
2019>>

Coal power station capacity addition is seeing a declining trend in India. Between financial years 2012 and 2016, 10-20 gigawatt (GW) new coal-power station capacity was added every year to the grid. But, in the last three years, this dropped to 5 GW and is further declining

NUMBER

70%

Of new generation capacities added to grid in India in last three years are renewable



2010 2019

AGRARIAN DISTRESS

By 2010, India was feted globally to tide over the economic recession of 2008 smoothly. At the core of this achievement was retaining demands for consumption that sustained economic growth. **Majority of these consumers are in rural India and most of them also depend on agriculture. This showed the criticality of rural India to the national economy.** But, from the middle of the decade a deep agrarian crisis set in. It pushed some 440 million Indians into an economic abyss. This decade would be remembered for the meltdown of the rural economy while the formal economy as well floundered. India is about to enter into a critical phase.

WHAT IS FAILING FARMERS

Near zero income for farmers threatens the national economy

JUNE 2015

Let's pray to God that the revised forecast doesn't come true," said Harsh Vardhan, Union Minister for Science and Technology and Earth Sciences, as the India Meteorological Department on June 2, 2015 further downgraded monsoon rain forecast in the wake of strengthening El Niño conditions over the Pacific Ocean.

A failed monsoon this year could mean sixth consecutive crop failure in most parts of the country. Weak summer monsoons and untimely winter rains and hailstorms in the past three years have already pulled down the overall agricultural growth rate to near zero per cent. The pattern is uncomfortably similar to the most severe droughts in recent Indian history. Fears of foodgrain shortage and food price inflation loom over the country. But the worst affected will be the farmers. Decades of decline in agricultural productivity has left them cash-strapped, distressed and without resilience to cope with anymore adversities. The agricultural economy is primarily made of loans now. At this point, a collapse of the agricultural sector seems imminent. This will hit 60 per cent of the country's population that relies on farming and affect the national economy that's struggling to revive.

The consecutive crop failures, due to too much and too little rain, have already pulled down the agricultural growth rate to 0.2 per cent, from 3.7 per cent in 2013-14. Food prices have started to

2010 X 2019



2010>>

Fifty-four suicides in Andhra Pradesh have blown the lid off the social posturing by microfinance companies. Regulations are fleeting and they don't touch where it hurts most: the high interest rates

2018>>

Between 2004 and 2014, the average earning of an agricultural household per month was ₹214 and expenditure ₹207

NUMBER

**₹ 45
lakh crore**

Farmers' cumulative loss in 2000-2016 for not getting rightful price for produce



creep up. The Economic Survey 2014 celebrated the fact that the rural wage growth had declined to 3.6 per cent in 2014 from 20 per cent in 2011. But it was oblivious of the fact that the decline indicated a major dip in income for 400 million daily wagers.

The 70th round of NSSO released in February shows that agricultural lending grew by 24 per cent during 2003-13. The agricultural GDP grew by just 13 per cent during the period. This is worrying as it indicates that while other growth factors like production and consumption remain stagnant or are declining, agricultural GDP is growing due to credit growth. If agricultural lending from all institutional sources like the public sector and cooperative banks is considered, farm credit is around 60 per cent of the agricultural GDP, according to Emkay's assessment. In a way, it is a credit bubble waiting to burst. ■

2010 2019

GENERIC DRUGS

In 2010, an unusual protest erupted over a still negotiated and secret free trade agreement between India and the European Union. Protesters were people living with HIV/AIDS and cancer. They saw a threat to manufacture of generic medicines in the country that have made their treatment affordable. Generic medicines are the cheaper equivalent of innovator products, usually manufactured after the expiry of the patent on the branded drug. **India is the pharmacy of the world because generics made here are used globally.** Since then, the world has woken up to the rise of generic drugs that emerge as a counter to the patent and profit driven multinational corporations.



BULLISH ON BIOSIMILARS

Fifteen years after it rose and went limp, the biotech sector has seen a bull run of sorts

MARCH 2015

The biotech economy boom is definitely not a “gold-rush” kind of phenomenon where desperate investors chase a success story. Since the crash in 2000, many developments have happened in drug science and policy that are fuelling the biotechnology industry’s growth. It is not just a demand supply phenomenon. There is an overarching change in drug policy in various countries and a push for freeing drugs from the patent regime. This is leading to a major realignment in the biotech industry in terms of investment.

The next big push for the industry comes from the unprecedented increase in the market for generic drugs, particularly in the US that controls the global market. Similarly, middle-income countries like India and Brazil are reporting increased demand and local manufacturing capabilities. US President Barack Obama’s healthcare reform is centred on low-priced drugs that can be made possible by generics. The US is already pressuring drug firms to lower prices to reduce cost of government programmes and to lower insurance rates, which will benefit people. Though at present, generics account for 70 per cent of America’s total prescription sales, market analysts estimate that it would grow further.

But what is fuelling the surge in generic drugs growth? The definition of generics covers a group of medicines called biosimilars. These are termed as the “generic equivalent” of branded biological





2010>>

The biggest barrier to access to medicines is that less than 10 per cent of the medicines are absorbed by the public health system and close to 80 per cent of the out-of-pocket expenses incurred by the poor, are on medicines

2019>>

Generic drug companies routinely make drugs of differing quality. They often make their worst drugs—with the lowest-quality ingredients and the most manufacturing shortcuts—for the least regulated markets, including India

products or biologics that are created through biological processes instead of chemical synthesis.

The world is witnessing an unheard of boom in these medicines. Research and market analysis group Datamonitor estimates the global biosimilar market will grow from \$243 million in 2011 to \$3.7 billion this year. That is a 1,422 per cent growth in just four years. Sandoz, the global leader in biosimilars, has estimated that the market could reach up to \$30 billion by 2020.

These medicines are popular for treating various cancers, rheumatoid arthritis and adverse cardiovascular conditions. Patented and brand biologics are expensive and turn out to be prohibitive in case of diseases like cancer and hepatitis. The biosimilars are relatively dirt-cheap and are now being supported by governments of developed countries precisely for this reason. ■

NUMBER

\$309 billion

The global generic drugs market in 2022

2010 2019



GEOPOLITICS

Rising temperature and melting Arctic ice are changing global geopolitics. Oil, natural gas, minerals and fish—there is enough of these trapped under the melting sea ice to satiate the world's growing hunger. Receding ice caps are opening up new sea lanes, making the exploitation easier. **The eight nations surrounding the Arctic Ocean are in a frenzy not to let go of even an inch of their territory.** The new-found resource is also attracting distant players like India and China. Countries are delving deeper into the ocean—least explored part of the planet—to explore its mineral wealth. Here as well a new regime is emerging.



THE ARCTIC RUSH

No one knows how human activity will affect its pristine ecology

MAY 2012

Recent scientific studies confirm that the Arctic is warming twice as fast as the rest of the globe. The period between 2005 and 2010 was the warmest since record keeping began in 1840. In September 2011, at the height of its summertime shrinkage, ice caps covered 4.33 million square kilometres of the Arctic Ocean. This, according to the US National Snow and Ice Data Center (NSIDC), was a 50 per cent drop from the average sea ice cover between 1979 and 2000.

The Arctic is also getting thinner and younger. Its thicker, older ice caps that have formed over several years and were able to survive through the summer melt season are increasingly being replaced with ice that accrues over the winter every year and then melts away. This makes the Arctic more vulnerable to global warming. By the reckoning of NSIDC, only five per cent of the Arctic ice caps were over five years old last summer. In the early 1980s as much as 40 per cent of the Arctic sea ice was over five years old.

The Arctic's vast reservoirs of fossil fuel, fish and minerals, including rare earth materials, are now accessible for a longer period. But unlike

NUMBER

70% Fall in the breeding population of ivory gull in the Canadian Arctic

2010 X 2019

Antarctica, which is protected from exploitation by the Antarctic Treaty framed during the Cold War and is not subject to territorial claims by any country, there is no legal regime protecting the Arctic from industrialisation, especially at a time when the world craves for more and more resources. The distinct possibility of ice-free summer has prompted countries with Arctic coastline to scramble for great chunks of the melting ocean.

Of the eight Arctic nations—Russia, Sweden, Norway, Iceland, Denmark (Greenland), Finland, Canada and the US—several have explored the Arctic waters and found over 400 oilfields with proven reserves of around 240 billion barrels of crude oil and natural gas. This is about 10 per cent of the world's known hydrocarbon reserves. They have also discovered significant deposits of various minerals on the seabed. ■

2011>>

This year, the extent of the Arctic Sea ice was the second lowest on record, and its volume was the lowest, revealed a provisional statement by the World Meteorological Organization

2017>>

The International Maritime Organization's Maritime Safety Committee signed the Polar Code and other amendments to the Safety of Life at Sea Convention as a precaution to protect people and the environment as shipping has been predicted to increase in the Arctic



2010 2019



EXTINCTION

“Nature is declining globally at rates unprecedented in human history—and the rate of species extinctions is accelerating with grave impacts on people around the world now likely,” says the first-ever Global Assessment Report on Biodiversity and Ecosystem Services by Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services.

According to the assessment, one million animal and plant species are under extinction. Thousands of these would get extinct within decades.

Three-quarters of the land-based environment and two-thirds of the marine environment have been significantly altered by human actions. The decade also marked the formal declaration of the Anthropocene, or the age of the humans.



ALL IS NOT WELL

Future loss of species to reduce plant production

OCTOBER 2012

Persistent pollution from chemicals, overfishing—80 per cent of fish stocks are said to be fully or overexploited—and higher levels of carbon dioxide in the atmosphere have degraded coastal and marine biodiversity to unprecedented levels, threatening the livelihoods of 500 million people who depend on the seas and the health of over a billion people who get their main source of protein from the oceans and seas. This vast expanse of blue also harbours ecosystems such as coral reefs that nourish as much life as our richest rainforests.

But it's not as if the world does not understand the importance of biodiversity for human well-being. The Convention on Biological Diversity (CBD), which grew out of the epochal Rio Earth Summit of 1992, was established as a legally binding pact to arrest a precipitous decline in biodiversity. CBD brings together 193 signatories or Parties as they are called (192 nations and the European Union) and in 2002 it undertook to “significantly reduce” biodiversity loss in a decade. However, a 2010 review tracking progress on this target showed the deterioration was accelerating. The study published in Science in May 2010 reported that most indicators of the state of biodiversity (covering trends in species population, extinction risk, habitat extent and condition) showed decline while indicators of pressures on biodiversity (resource consumption, invasive alien species, nitrogen pollution,



overexploitation) had risen.

A flurry of recent reports has revealed that biodiversity—across ecosystems, across species and in their genetic variety—is not faring well at all. In a study titled 'Biodiversity loss and its impact on humanity' published in *Nature*, a group of 14 academics said that future loss of species has the potential to reduce plant production just as much as global warming and pollution.

In the first study to directly compare biodiversity loss to other environmental stresses, the results underscored the need for better strategies to protect biodiversity. Loss of biological diversity will rank as one of the top five drivers of global change, they warned. In ecosystems where 21 to 40 per cent of the species go extinct, plant growth is expected to decrease by 5-10 per cent, an effect comparable to climate warming, or increased UV radiation from stratospheric ozone loss. But at higher levels of extinction, the impact would be similar to acid deposition on forests, ozone pollution and nutrient pollution. ■

2001>>

India's many varieties of fruits have already vanished and some are on their way to extinction. Indeed, it is the commercially viable ones that survive well

2018>>

Fossil records show that current extinction levels are around 1,000 times the natural background rate. They are exacerbated by habitat loss, hunting, climate change and the introduction of invasive species and diseases



NUMBER

2,000

Up to this number of species extinct every year

2010 2019



JOBLESS

100 million. That was the number of jobs the country had to create in a decade to meet its employment demands. That was also the toughest challenge of the decade that passed by. The decade saw jobless growth deepening roots. **Every year more and more youth joined the workforce but hardly a fraction of them got the suitable employment.** As many official data point out, India is having the worst unemployment rate in over four decades. This will definitely be the biggest challenge of the coming decade as well.



JOBLESS AND UNSKILLED

India desperately needs to avail jobs for its ever increasing youth population

APRIL 2014

An estimated five million graduates are churned out every year by the hundreds of thousands of teaching shops across the country that provide neither a solid education nor any special skills to these young people. Graduates working as peons in offices and postgraduates carrying head loads as construction labour are not exactly new. What is new and unnerving now is the overwhelming numbers of young people looking for employment on account of the changing demographics of the country.

A couple of significant statistics stand out in this new demographic profile. Nearly half the population, 48.6 per cent to be precise, of the total 1.21 billion is below 24 years, according to the 2011 census. What India is experiencing is a pronounced youth bulge with around 232 million people in the 15-24 age bracket, up from 190 million in 2001. The median age is 25 compared with 40 for most of the developed economies. Constituting a fifth of the total population, the 15-24 years cohort is the youngest slab in the working age population (WAP) which includes people between 15 and 59 years. It

is the WAP segment that has been exciting discussion at home and abroad because with as much as 62.5 per cent of the population in the working age, there is the possibility of India reaping a huge demographic dividend.

NUMBer

11 million

Indians join the labour market every year

2010 X 2019

2016>>

Today the country faces a new challenge: even the traditionally well-off farming communities are demanding reservations in government jobs. Their demand is an offshoot of deepening agrarian crisis that if ignored can snowball into an explosive situation

2019>>

India is one of the worst countries for working women. The OECD Economic Survey of India found the country has the largest difference between employment rates of women and men among OECD nations at 52 percentage points



But a caveat is in order here. Not everyone of WAP will be in the job market. According to the Institute of Human Development in Delhi, the overall labour force participation is just 56 per cent of WAP, a low figure compared to nearly 64 per cent for the rest of the world. This is largely because women participation is a dismal 31 per cent, among the lowest in the world and the second lowest in South Asia after Pakistan.

More people aged 15-24 years are likely to continue education, much more than the 26 per cent who do now, according to one analysis, while others think that more women in the same cohort are likely to join the workforce after their numbers dropped to an all-time low in the recent past. Whatever the calculations, India will need to create at least 100 million new jobs in less than a decade. ■

2010 X 2019

FOOD

Over 30,000 edible plant species are known to humanity, out of which, only 200 are cultivated at the farm level. **At the end of the day, 50 per cent of humans' calorie intake comes from just eight major crops namely wheat, maize, rice, barley, beans, groundnut, maize, potatoes, and sorghum. India is no more eating good food.** For a significant percentage of population there is even not adequate food. Malnutrition is a concern for both rural and urban population. But in this decade, there was a surge in people taking up local farming of indigenous varieties. Millet has reclaimed back its original place in our plates.



NEW PRIMITIVE WISDOM

Permaculture spreads
in India

NOVEMBER 2017

At the heart of permaculture lies the idea that a plantation should offer multiple benefits, right from food and fodder to timber and fertiliser. The concept is not new. It was first propagated in the 1970s by Australian biologist Bill Mollison. It gained acceptance in India after several enthusiasts were influenced by Mollison during his visit to the country in 1987.

By 2016, permaculture had grown into a movement and spread to 140 countries. Today, more than 3 million people across the globe practise permaculture, and claim that the novel farming system is the only way to make agriculture sustainable in the face of extreme weather events like recurrent droughts and unprecedented floods, land and soil degradation due to excessive use of synthetic fertilisers and manure, and a growing population.

In 2009, the UN gave a call to scale up food production to feed the global population, which is estimated to reach 9.1 billion by 2050, with 70 per cent of them living in urban areas. In such a scenario, it is imperative to produce more with less resource, build resilience among small farmers, improve soil health and encourage people to grow their own food. And all these can be achieved through permaculture.

Uma Maheswar Rao, principal scientist (agriculture division) with the Indian Agricultural Research Institute in New Delhi,



says permaculture is meant for small or slightly bigger ecosystems and is thus not enough for food security. In fact, all alternative farming systems, including permaculture, organic farming and non-pesticide management methods, emphasise on using local resources and not disturbing the local environment.

The profit potential under permaculture can be estimated from the fact that another older technique, which also relies on local inputs, is giving farmers good dividends. Permaculture follows several principles that are a part of India's traditional methods of farming. Similarly Zero Budget Natural Farming that won Maharashtra farmer Subash Palekar a Padma Shri in 2016 rests on the principle that farming should not be investment intensive.

Instead, it should rely on local crop varieties and natural pesticides. The native cattle breed is a major component in this farming system which consumes the local weed varieties of grass. Its dung and urine are used as pesticide and fertiliser. This technique also uses mulching, mixed cropping patterns and crop rotations to maintain the soil nutrients. ■

2017>>

Although permaculture is growing rapidly in India, the average villager's reluctance to try different foods and habits slows down the movement. For example, only a few varieties of vegetables are consumed in areas even when a huge diversity is feasible

2019>>

Shifting to a healthier diet by eating more seasonal fruits and vegetables and reducing the consumption of junk food could help in meeting the 'zero hunger' goal of the UN-mandated Sustainable Development Goals



NUMBER

1,900

Types of insects eaten across the world

2010 X 2019

PLASTICS

Our plastic addiction emerged as the latest human-induced unnatural to the nature to be fought in an emergency level. It is so entrenched that it could be considered as a geological indicator for the Anthropocene era.

In the decade of 2000-2009, we produced plastic waste that was more than the total of four decades before this. In the decade that just passed by, we produced 300 million tonnes of plastic waste every day. This is close to the total weight of all humans. Curbing plastic use is going to be the next big environmental challenge

NUMBER

8.3 billion tonnes

Plastics produced in the world since 1950s

OCEANS OF PLASTICS

Anti-plastic campaign starts from the seas

JUNE 2017

The First Global Integrated Marine Assessment says the oceans have reached their carrying capacity. Though it does not provide information on which ocean is the cleanest or which country is the most polluting, it says urgent action on a global scale is needed to protect the oceans from the many pressures they face. But unfortunately, we know very little about oceans around us. Indian Ocean, which unlike any other oceans is landlocked on the northern side, is not studied much. One of the reasons it is so poorly understood could be the fact that countries that share the Indian Ocean are too poor to invest in research. So far, two international expeditions have been undertaken to explore it; the second expedition was sent off in 2015. But their objectives are largely limited to





looking for new fishing grounds.

But what we do know is that over 8 million tonnes of plastic enter the oceans every year. A figure quoted widely suggests that by 2050, the number of plastic entities would be equal to the number of fish in the sea. At present as much as 80 per cent of all the litter in the oceans is made of plastic. More than 800 species have been

affected by the debris. Plastic waste alone is estimated to kill up to 1 million birds, 100,000 sea mammals and countless fish each year.

Microplastics, or small plastic particles from cosmetics, tyres, artificial grass, paints and clothes, are emerging as another threat to marine ecosystems. Ingested by phytoplanktons (microscopic plant-like organisms), microplastics

2010 X 2019

2014>>

This year, 311 million tonnes of plastic were produced around the world, and in the same year, scientists had devised a mathematical model to determine the countries contributing to the garbage patch in oceans

2019>>

The Coca-Cola Co has emerged as the No 1 global plastic polluter for the second consecutive year, according to a report on the top 10 plastic polluting companies in the world. The beverages brand was followed by Nestlé SA and PepsiCo In

pass through the food chain and find their way to our plates.

It is estimated that some 51 trillion microplastic particles—500 times more than the stars in our galaxy—are out there in the ocean. But we are yet to assess their impact on human health.

At the very first Ocean Conference convened by the UN at its headquarters in New York City, businesses also showcased their initiatives of going green. These include Adidas and Parley for the Oceans that are using ocean plastics to make sports shoes. The upper part of the shoe is made of yarns and the filaments from reclaimed ocean

wastes. The green wave pattern across the shoe uppers is made from reclaimed and often illegal gillnets, while the rest of the upper portion is made from plastics collected from beaches on the Maldives. After collection and processing of the plastics, the shoes are brought to life using a 3D-printing technology. They plan to manufacture a million shoes by the end of 2017.

However, nearly half of the 1,328 voluntary commitments were made by governments and government bodies in the UN conference. Norway committed to reduce the amount of microplastics ending up in the ocean. Indonesia committed to reduce 70 per cent of its plastic debris by 2025, Germany provided money for mangrove protection, whereas China committed to comprehensively control marine environmental pollution, gradually improve water quality in offshore areas and eliminate illegal sewage outlets. Palau, an island country in the western Pacific Ocean, announced the Palau National Marine Sanctuary Act at the conference. The Act aims to protect marine resources, particularly tuna stocks, of ocean. The Cook Islands, another island country in the South Pacific Ocean, dedicated its entire Exclusive Economic Zone Marae Moana, spanning 1.9 million sq km, for integrated management.

The five-day conference was unlike any other at the UN. To ensure that action is taken quickly, the organisers have focused on voluntary commitments. The Call of Action is also not mandatory. Some experts were happy with this non-binding arrangement, saying the time taken over the negotiations is not worth the outcome. Carl Gustaf Lundin, director of Global Marine and Polar Programme at iucn, said that negotiations generally lead to mediocre agreements as countries do not like to be told what to do. For example, UN Convention on the Law of the Sea which was ratified in 1994 has still not been signed by countries like the US. International Convention for the Control and Management of Ships' Ballast Water and Sediments took 10 years to be negotiated upon and just got ratified. During this time, invasive species continued to be dispersed across the world. These were the 20 years when action would have helped, said Lundin. ■