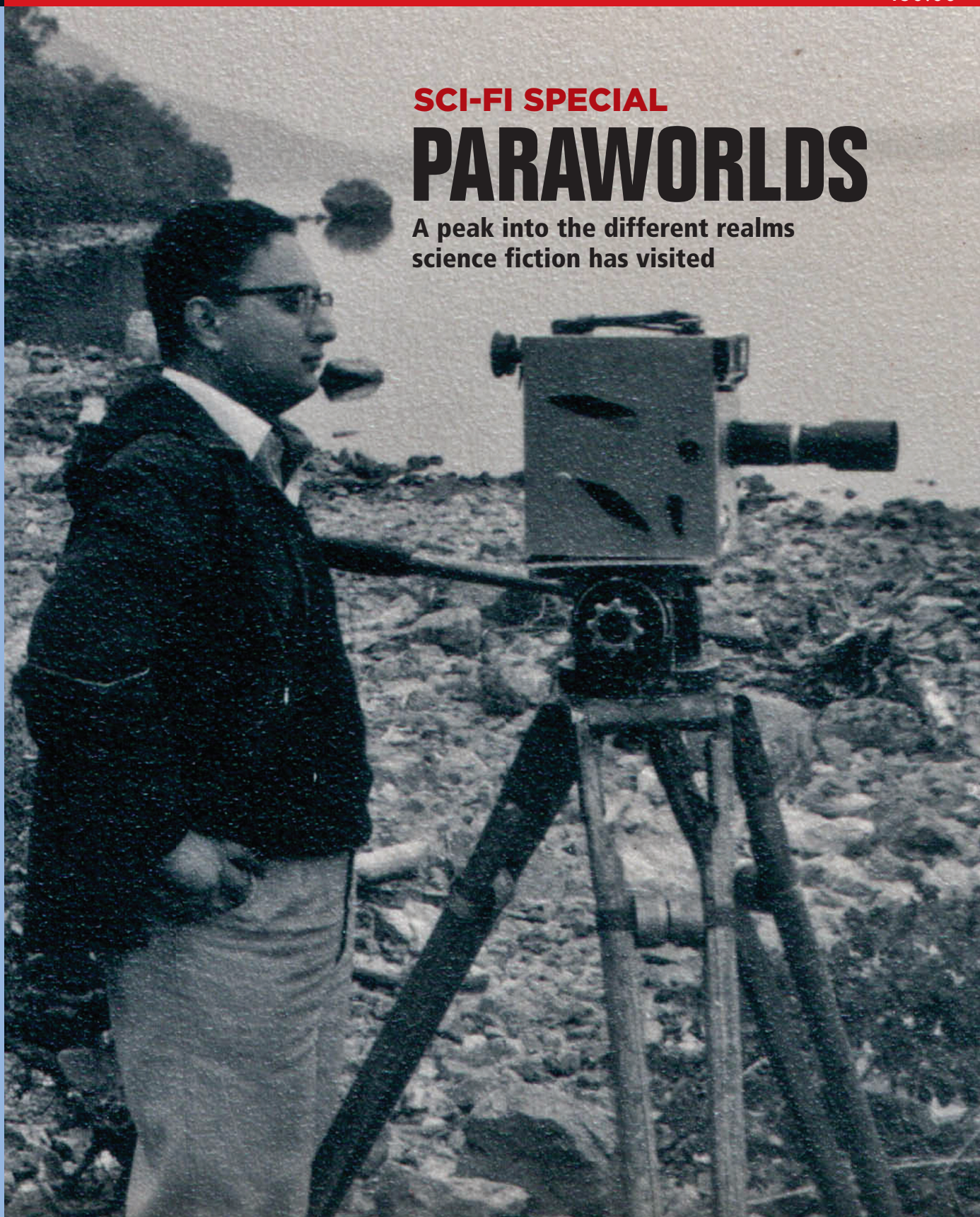
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JANUARY 1-15, 2012

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The minerals sector is a key driver for the country's industrial growth. However, it has brought in its wake severe environmental repercussions and social unrest. One of the greatest challenges, therefore, is how to make mining environmentally and socially acceptable.

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From protests to where in 2012?

2011's person of the year, according to *Time* magazine, is "the protester". Clearly, this is the image that has captured the world—from dissent against the lack of democracy and repression in large parts of West Asia to anger against economic policies in vast and disparate parts of the world. People, all over, are saying enough is enough. But what will happen to these voices in the coming years? Will the movements of protesters be enough to change the way the world runs its business? Do these movements even know what they want?

It is important to understand that there are similarities and yet huge differences in protest movements against economic policies in the rich and the getting-rich world. The US-born Occupy Wall Street movement's slogan is "we are the 99 per cent who will no longer tolerate the greed and corruption of the 1 per cent". The movement, which began in New York and then spread across many states, has been squelched in many places by aggressive city governments. But protesters say they will be back. They will overcome.



It is difficult to gauge how this will pan out in the coming year. The movement prides itself in being leaderless and people-powered. It has no manifesto and no actionable agenda on how Wall Street must be reformed or how the global economy must be restructured so that it can meet the needs of all. In this way, it is easy to dismiss this movement as just one more protest that will go nowhere. It is not the Arab Spring, but the American Winter that will prevail.

But there is another possibility. The fact is that this movement—as with many similar movements in the rich-but-economically-troubled world—has struck a chord. Today, the same rich world, which was secure in its consumption and comfort, is finding the going tough. Things it took for granted are no longer easily available—from homes and medical facilities to education and jobs. Ordinary people are being hit by what governments call necessary austerity measures. They are hitting back in every way they can.

In Atlanta, the occupy-our-home movement wants to take over houses of people who will be thrown out by banks because of default in mortgage payments. It says the current assessment of property values is too high and banks have too much power to throw out people, even if they default on one payment. In Washington, the occupy-the-vote-DC movement is demanding electoral representation for the federal city. The list goes on.

These movements represent many uncomfortable and inconvenient issues that are refusing to go away. The rumbling that began in mid-2008 with the bankruptcy of the Lehman Brothers has become a roar as more banks and national economies collapse. This is in spite of governments doing all they can to portray that they have arrested the financial collapse. The problem is that the world's economic managers do not believe there is any real option to restructure economies so that they consume less, pollute less and still grow in wellbeing if not in wealth. The problem is that we are wedded to this one ideology of growth. It is for this reason that in spite of all the perturbations and upheavals, the same people who have put us in this place continue to be in charge of fixing the problems of growth. It is no wonder that the protest movements are also on the rise. And even if they do not have the answers to the problems, they know that the current policies are not working. Their anguish reminds us that real change must happen, tomorrow or the day after.

The movements of protests in the emerging world are of many kinds and by many kinds of people. On the one hand, we have protests happening on the streets of urban India against corruption. This has certainly captured popular imagination and media attention. But there are many more protests—mutinies against displacement and pollution across the country—we rarely hear about and forget too soon.

These movements of small groups of people fighting for survival are real and intensifying. In a democracy there will be some hearing. Many of these protests—against land acquisition, water takeover, mining, dams, power projects or pollution—are getting some measure of official response. This is not to say that every protest will be successful. Far from it. But it is also a fact that these movements represent voices that are asking for different ways of development. These movements stand for rights to land, water, forest and mineral resources. And, as I have written before, these movements are collectively teaching us that we will have to build different pathways for economic growth that is inclusive and sustainable.

Therefore, even if these protest movements do not have a ready blueprint for future economic model, they have enough practice of prompting us to think of different ways. Most importantly, these movements are a response to real survival threats. They are here to stay until we find big answers to the big questions they raise.

This is then the challenge of 2012 and beyond. The world is on the boil and the steam of anger will not dissipate. The question is whether these protests can be channeled to etch new, better pathways of growth. ■

—Sunita Narain

SCIENCE AND ENVIRONMENT FORTNIGHTLY

Down To Earth

JANUARY 1-15, 2012

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CONTENTS



25
COVER STORY
Reason meets imagination
Down To Earth *invites sci-fi buffs and writers to take its readers on a guided tour of the world of science fiction that throws a mirror to the present, tantalises with possibilities of utopias and entertains with robots and descriptions of space travel*

FRONTPAGE



09
Reserved for plundering
Karnataka repeatedly refuses to declare its forests in Western Ghats inviolate

INTERVIEW



45
Appachi Indian
Mani Chinnaswamy on his contract farming model called Appachi that gives farmers the right to negotiate

SPECIAL REPORTS



21

Mother Dairy under pressure

Pioneer of retail marketing in India faces competition from new aggressive chains



23

Ami is dying

The river in Uttar Pradesh has been choked by industrial effluents for 20 years. Government is indifferent

20-PAGE DTE SUPPLEMENT
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59–78

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3 **EDITOR'S PAGE**
6 **LETTERS**

NEWS
12 Coal grading system meets global standards
14 Centre revokes clearance to Nirma's cement plant
16 National AIDS agency buys low cost, toxic drug in bulk

SPECIAL REPORTS
18 Maharashtra foresters' relocation plan that works
20 How fire safe are hospitals in India

SCIENCE & TECHNOLOGY
48 Smartphones with health monitoring apps catch on
50 Cure for mass radiation exposure
51 Wax beads can tap solar energy, heat water
52 Fungal pigments can keep heart ailments, cancer at bay

TWENTY YEAR SPECIAL
54 Reflections of 1992 in 2011

COLUMN
55 Why latest climate talks skirted adaptation technology
56 **MEDIA**
58 **LAST WORD**

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REWIND
2011
Events that defined the past year

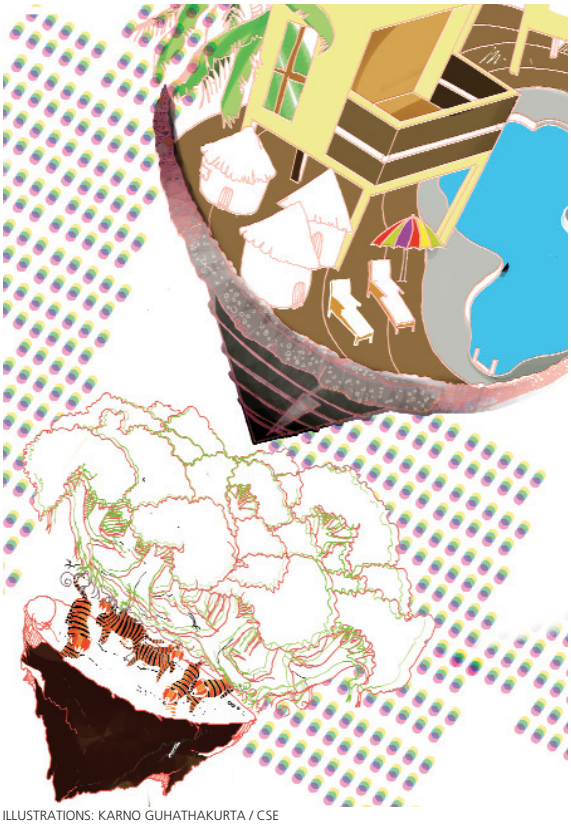
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94 suicides in a month, Andhra Pradesh farmers in distress

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IT IS NOT A ZOO



ILLUSTRATIONS: KARNO GUHATHAKURTA / CSE

Apropos of the article, "Don't just cash in on tigers" (December 1-15, 2011), "eco-tourism" is restricted to brochures, books, and talks by wildlife resorts. One should understand that anything done in the name of tourism is not always right.

In many tiger reserves forest department officials cut trees to improve the chances of tiger spotting near water holes, frequently visited by tourists. In drier seasons water is made available only in those areas which fall along safari routes. On many occasions I was surprised to see heavy machinery being employed inside pristine forest to dig artificial waterholes along safari routes. The purpose is only to facilitate sightings.

A national park or a sanctuary is not like a children's park that one can manage by putting a few swings and slides and flower beds. Whatever tinkering is needed should be based on scientific knowledge and fuelled by the desire to conserve wildlife and not project them as zoo animals.

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NATURALLY, DEBT RIDDEN

This refers to the editorial "Count the natural debt, too" (December 1-15, 2011). Should one go back in time and undo the industrial innovations? To be rational, the universe has inner-contradictions. Marxian dialectics, Malthusian premonition of unchecked population canceling itself out and Darwinian natural selection accord with the Hindu belief that the universe has no beginning or end. Evolution and involution are two sides to the same coin as are force and matter. The rise of Hiroshima and Nagasaki shows that despite the negative effects of science, industrialisation and the mounting natural debt, man can find a way to survive.

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VAIBHAV RAGHUNANDAN / CSE

HIGH AND LOW NOTES

I agree with the implied argument in the write-up "Staying legal, staying reasonable" (November 1-15, 2011) that communities and their traditions should be taken into confidence while designing any conservation programme. However, the analogy between music copyrights and firewood collection is not right. A composition is an intellectual property, notes and sounds are not. One can only copyright a musical composition, not the sounds because sounds are common property. The same applies to firewood. Natural wealth cannot be copyrighted or claimed to be one's own unless it is a creation. The communities have been living in those forests for millenia. It is their home, it is their right to collect wood from those forests. Any law that disregards these rights is fundamentally flawed. We need win-win solutions for as large a group as possible.

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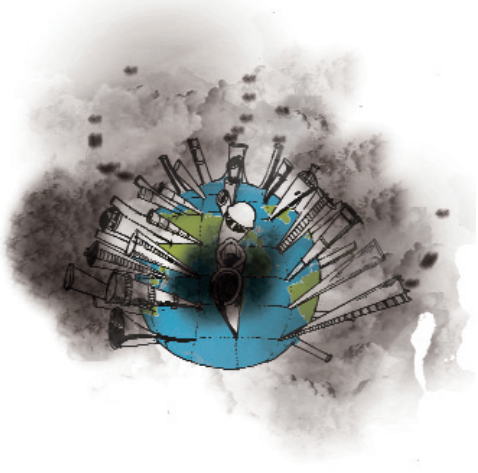
SITTING, WAITING, WISHING

This refers to the editorial, "Equity: the next frontier in climate talks" (December 16-31, 2011). If nothing else, the Durban meet did not end like the previous conferences on climate change where people flew to exotic cities and sat in airconditioned halls trying to reach a consensus.

As rightly mentioned in the write-up, the global climate change issue has arisen because of the historical emissions. The North has always denied its share of responsibility for greenhouse gases and will continue to do so.

Today, the concept of equity has gained more ground than it did two decades ago. The climate watchdog now needs to ensure that the collaborative agreement is environmentally just and at pace with development.

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HOW DO YOU DRY CLOTHES?

This refers to the editorial, "How to rewrite the Durban script" (November 1-15, 2011). In most developing nations clothes are sundried. This saves a lot of energy which is otherwise used up by modern washing machines. While calculating the carbon footprint of these nations the reduction of CO_2 generation through such eco-friendly measures must also be accounted for.



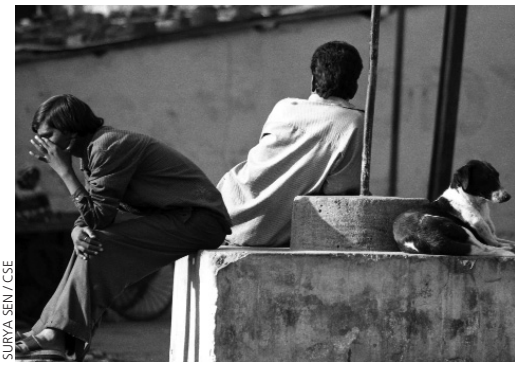
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WHAT AN IDEA

This refers to "Mobile tester for crop diseases" (December 1-15, 2011). Recently, it was reported that a mobile application has been developed that uses Global Positioning System (GPS) to trace the location of other cell phones. Such an application can be used in case of stolen cell phones.

On the same lines, an application can be developed to know where bombs have been planted. I suggest a device with electronic waves that can smell RDX and other materials used in bombs.

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SURYA SEN / CSE

SHOO AWAY

All living creatures have a right to live ("An urge to act", November 16-30, 2011). But stray animals should be treated differently. Their right to live should not affect citizens. The authorities have failed to control the population of stray dogs despite their half-hearted attempt at the "catch-neuter-vaccinate-release" operation. Bengaluru has more than 0.3 million stray dogs. These dogs are a nuisance to the public. A few citizens feed them out of sympathy but they do not want to adopt them.

We need permanent actions such as catching the stray dogs with minimal force, vaccinating and neutering them and then keeping them in permanent shelters outside city and town limits. Funds needed for catching and maintaining the stray animals could be generated through donations and by levying a small cess on property owners. This would be a small price to pay for bringing down incidents of rabies and attacks on citizens, and for ushering in peace and quiet at night.

Having stray dogs roaming all over the city is an indication how backward we are in matters of civic sense and cleanliness.

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DIESEL *V* PETROL

This refers to the editorial "Diesel: when bad policy makes for toxic hell" (November 16-30, 2011). The government should decontrol the prices of diesel, petrol, liquefied petroleum gas (LPG) and compressed natural gas (CNG), and reduce the tax levied on them. The vast tracts of dry land in India and the land used for tobacco cultivation should be used to grow biofuel

plants like jatropha and pongamia. The authorities should work towards producing more electricity, so that farms and factories do not have to use highly polluting diesel or kerosene gensets. Lastly, diesel driven SUVs and other personal transport should be taxed heavily.

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✉ The rise in sale of diesel cars is due to low running cost of the car because of subsidised fuels. The government cannot sell diesel vehicles at dual rate because of distribution problem. Some steps that can be taken are: one, the subsidy on diesel should be revoked. Farmers should be given a fixed amount of money as per their farm area. If farmers have an electricity pump, they can be debarred from the subsidy. Sale of diesel cars will be reduced once there is no substantial difference between petrol and diesel prices. Two, eco-friendly cars should be promoted in a better way. Subsidy on electric cars should be enhanced and people using them should be presented as environmentally aware. There should be no parking fees for electric cars. My college, IIT-Delhi, has no motor-driven vehicle policy for its students. Such policies should be introduced in other educational institutes as well.

PRAVIN MUTIYAR
IIT Delhi

✉ Diesel subsidy should be removed. Car manufacturers should be licensed to produce only battery or battery-hybrid cars. The authorities should permit the conversion of existing buses and cars to the battery system like in the case of CNG.

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ERRATUM

A quote in the article, "Trade barred", on *p20* (December 1-15, 2011) reads: "In fact, protectionism is a big leap for India from being just a back-end processing industry to becoming a high-tech manufacturer and have its own knowledge base." It is incorrect. It should be: "India is trying to take a big leap by moving away from being just a back-end processing solar industry to becoming a high-tech manufacturer with its own knowledge base." We regret the error.

Down To Earth welcomes letters, responses and other contributions from readers. Send to Sunita Narain, Editor, *Down To Earth*, 41, Tughlakabad Institutional Area, New Delhi - 110 062. Email: editor@downtoearth.org.in

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Reserved for exploitation?

Karnataka repeatedly refuses to declare its forests in Western Ghats inviolate

KUMAR SAMBHAV SHRIVASTAVA *Sakleshpur*

After refusing a World Heritage Site tag by UNESCO for its pristine Western Ghats early this year, the Karnataka government has recently shelved a proposal to upgrade the conservation status of 12 reserve forests in the mountain range. Conservationists allege the government is keeping the Western Ghats out of the inviolate zone because such a move does not suit its political and commercial interests.

The proposal was part of the forest department's long-term plan to connect all national parks and wildlife sanctuaries in the state, scattered over 650,000 hectares, by adding some 200,000 ha forest patches in between or adjacent to them. One of the biggest projects was expanding Pushpagiri wildlife sanctuary in the Western Ghats by merging 12 adjacent reserve forests to it. The state wildlife board forwarded the plan to the state government for approval of the National Board for Wildlife (NBWL) in October. The government did send it to NBWL, but after removing Pushpagiri expansion plan.

The proposal upset Union corporate affairs minister Veerappa Moily. On October 7, unaware of the deletion by the state government, he wrote to Union environment minister Jayanthi Natarajan to reconsider the Pushpagiri expansion plan. Moily, who is from Dakshina Kannada district, said in his letter (copy of which is with *Down To Earth*) that the residents of Shiradi, Uppinangady and Subramanya villages in the district feared losing their land once the reserve forests are converted into sanctuary. The environment ministry forwarded the letter to the state forest department seeking a detailed report on the issue.

The forest department says its proposal includes only the reserve forests where the rights of people have been settled and does not include villages or agriculture land. "Some vested interest groups want to sabotage the proposal," said B K Singh, principal chief conservator of forests (wildlife) of Karnataka, in his letter to the ministry in November.



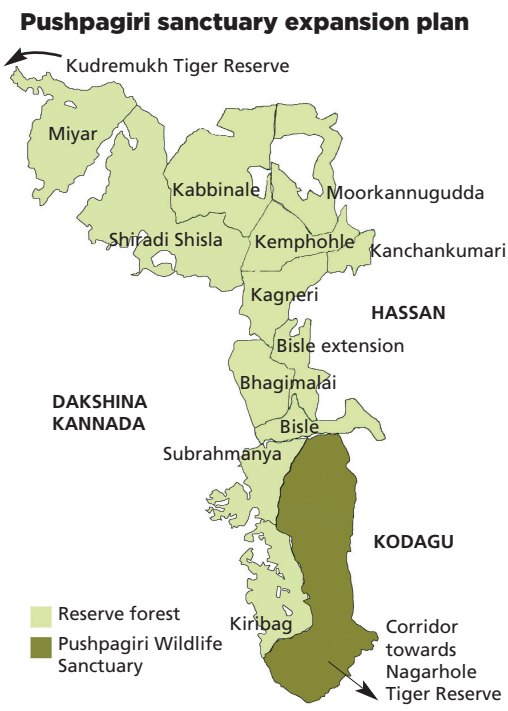
PHOTOGRAPHS: KUMAR SAMBHAV SHRIVASTAVA

Mauthi Gen's mega hydel project: on paper are shown two mini hydel projects

Spread over 10,000 ha, Pushpagiri sanctuary has a good number of tigers, elephants and rare lion-tailed macaques and sloth bears. It is declared as an Important Bird Area. By merging the reserve forests to it, the forest department aims to make it contiguous with other protected areas in the Western Ghats. Pushpagiri lies at the junction of the southern and norther ranges of Western Ghats. Towards the south, wildlife migration corridors extend from Pushpagiri to far away Wayanad Tiger Reserve in Kerala via Nagarhole and Bandipur tiger reserves. In the north, the 12 contiguous reserve forests act as vital corridors, connecting Kudremukh and two other tiger reserves in the state. With 288 to 333 tigers, Karnataka boasts



Bisley reserve forest near Pushpagiri has rare sloth bears, lion-tailed macaques



Source: Karnataka state forest department

of the highest tiger population in the country. The expansion plan says upgrading the status of these reserve forests will help reduce man-animal conflicts in the region as more funds will be available to erect barriers like electric fence.

But once a forest is declared sanctuary no non-forestry activity can be carried out in it without the permission of the Centre and the Supreme Court. Allegations do the rounds that this would have been a threat to the hydel power, mining, timber and tourism lobbies operating in the area.

Vested interests

The 12 reserve forests have the headwaters of several tributaries of the river Nethravathi. This makes them attractive for mini run-of-the-river hydel projects. The state renewable energy development agency has permitted 15 mini-hydel projects in these forests. Three are operational, while a project by Maruthi Gen Ltd, a Bengaluru-based power company, is under construction. The rest could not start work on their projects as the high court in April ordered a temporary halt on new mini hydel projects in the Western Ghats.

The court order was in response to a public-interest petition by the Western Ghats Environment Forum. The conservation group says though considered environment-friendly, a large number of projects in a particular area will affect the river flow and lead to fragmentation of forests due to setting up of roads, power lines for transmission and labour colonies, affecting biodiversity. So far the state has permitted 137 mini hydel projects across Western Ghats; 27 are on the Nethravathi and its tributaries.

Mini hydel projects are highly lucrative as they get subsidies from state and Central governments under renewable energy development schemes and can also avail benefits under the clean development mechanism of the United Nations Framework Convention on Climate Change. Since such projects are usually of capacity below 25 MW and do not require more than 5 ha, the company does not need to apply for environmental clearance and can obtain forest clearance from the regional office of the Union environment ministry.

Sanjay Gubbi, a conservation biologist who has worked extensively in the area, says the mini hydel project lobby is strong enough to politically influence the state's decision. This is evident from the way Maruthi managed to get permission for its mega hydel project, projecting it as two mini hydel projects. When forest range officer of the area discovered the fact, she lodged an FIR on October 17. The FIR says the company carried out illegal constructions, dug the hills to reduce the height, dumped debris in the forest and along the banks of the river Hongadall, restricting its flow and endangering the flora and fauna. It illegally carried out explosions in the forest, causing landslides at many places. Construction on the project was stopped after the FIR was filed. However, when *Down To Earth* visited the site on December 3, a meeting was going on between forest officials and representatives of the company. A company employee in-charge of construction said they have got informal permission and would resume work from the next day.

People benefiting from such projects are instigating people in surrounding villages to oppose the expansion of the sanctuary, says Bhuvanesh of non-profit Pushpagiri Wildlife Foundation. The forests have rich gem stone reserves, he adds. More than 10 ha in and around Kiribag and Bisley reserve forests are under illegal gem stone mining. People from nearby villages who are involved in the mining say they mine 15 to 20 kg of gem stones per acre (0.4 ha) every day. They get paid ₹450 to ₹1,500 for a kg of gem stones, which are then sent to jewellery manufacturers in Gujarat and Maharashtra. Besides, once the forests become sanctuaries people will not be able to harvest timber legally or illegally, Bhuvanesh adds.

A source in the forest department says, the villages around the reserve forests are a strong bastion of the state's BJP government. Elected representatives from these areas are spreading the information that people may lose their land to the sanctuary expansion. They are also misguiding the chief minister that the development of their regions would be hindred because of the expansion. The chief minister perhaps stalled the proposal to handle the delicate political situation in the state, he adds. ■

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- A supportive yet challenging **culture of enquiry and discovery**.

Applications are invited from **working professionals, teachers and fresh graduates** for admission to the Masters Programmes 2012 – 2014.

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Develops outstanding professionals for fulfilling careers in Education, including as administrators, curriculum designers, entrepreneurs, technology experts, policy specialists, researchers etc. Students will have the opportunity to focus on specific areas such as Early Childhood Education, School Leadership and Management etc. in the second year. Alternatively, students can pursue a balanced general programme as well.

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Builds high calibre professionals for leadership in the social sector, with abilities in inter-related development domains, ranging from Governance & Health to Ecology. Career opportunities would be across these domains, including in the field, in operations, in analysis and policy roles.

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Develops highly competent teacher educators. Serves the critical need of the Indian education system, to have a large number of dedicated, high ability professionals in the teacher education system.

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Financial assistance through educational loans will be available for all students to cover full or part tuition and accommodation expenses. In addition, scholarships may be provided for eligible students, based on an assessment of needs.

Working professionals may be eligible for additional financial support schemes. Student support systems include academic tutorials, language, communication skills and counselling. Student accommodation provided as required.

PLACEMENT ASSISTANCE

Placement support will be provided to avail of career opportunities in government, industry, NGOs & multi-lateral agencies. Suitable students will be considered for employment at Azim Premji Foundation on successfully completing the course.

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Address: Pixel Park, B Block, PESSE Campus, Electronics City, Hosur Road(Beside NICE Road), Bangalore 560100
Toll Free No: 1800 266 2001 **Email:** admissions@apu.edu.in **Website:** www.azimpremjiuniversity.edu.in

****Final approval from NCTE is awaited.***

Coal prices set to change

New grading system will be a setback for the power sector

ANUPAM CHAKRAVARTTY

THE system of grading coal in India will change from January 1 so that it complies with the global standards. The switch, announced by the Union Ministry of Coal, will hit the power sector hard.

Till now, the value of coal was calculated on the basis of its ash and moisture content. The best coal has the lowest ash and moisture content. This is called Useful Heating Value (UHV). The new calculation, called Gross Calorific Value (GCV), will also include the chemical composition of coal, says Kalyan Sen, former director of the Central Fuel Research Institute, who was a member of the team that had adopted UHV in the 1960s.

The switch to GCV will set much higher standards for calculating the energy content of coal as it will take into account the content of highly combustible elements like carbon, hydrogen, oxygen, nitrogen and sulphur. "This will change coal pricing. Higher grades will fetch better prices and vice-versa," says N C Shah, chairperson of Coal India Limited (CIL), a state-owned mining company, largest in the world. Even the lowest grade is placed in the bandwidth of 840 kcal, fetching a high price.

The power sector, which consumes 75 per cent of domestic coal, has been making huge gains by purchasing coal graded under UHV. Indian coal has high ash content and most of it falls between Grade E and Grade G. Under the UHV structure, coal is graded into seven groups (see 'Coal grades').

Government provided handsome rebates on high ash coal because it wanted power companies to purchase Indian coal. The boilers used to burn high ash coal consumed a lot of energy.

"Modern pulverised boilers can burn high ash coal with almost 99 per cent efficiency. Therefore, the rebate needs to be reconsidered," says Sen. CIL officials say calorific value, not ash content, should decide the pricing of coal.

At present, the average price of coal is 30 to 60 per cent lower than the international price, says Shah. Sudden shift to the globally accepted GCV will severely hit the power sector. We are, therefore, adopting it in phases, he adds.

The power sector argues that companies which depend solely on domestic coal will be hit hard. "With decreased mining, supply of coal is also dwindling. Increase in prices will make it difficult to maintain costs. The rebate should continue," says a National Thermal Power Corporation official in New Delhi.

Delayed too long

India is the only major coal producer which does not follow GCV. Power sector has opposed the switch for years.

The 1997 Ash Content Notification of the Ministry of Environment and Forests required use of coal with ash content not exceeding 34 per cent. This was to be adopted by June 2002. In August 2001, a parliamentary standing committee on energy recommended that quality of coal can be improved by standardising it. But each time, the power sector opposed it.

To ensure availability of better quality coal through reduction of ash content, Pratik Prakashbapu Patil, Minister of State for Coal, recently announced setting up of 20 more washeries.

At present, CIL operates 17 washeries—11 for coking coal and the rest for non-coking coal. Their combined annual washing capacity is 39.40 million tonnes. The ministry's plan will increase the washing capacity by 111 million tonnes. ■



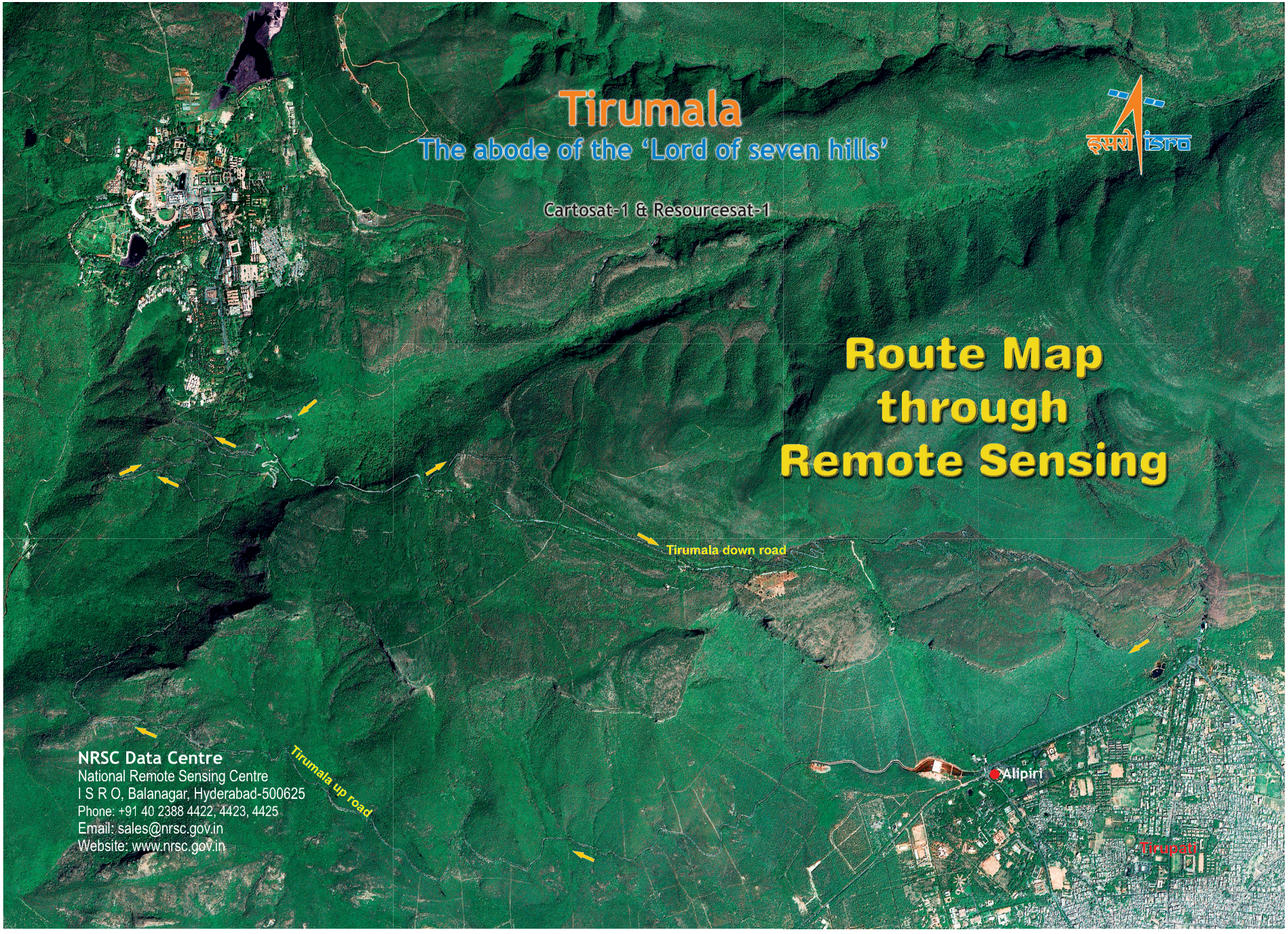
SUGANDH JUNEJA / CSE

Coal grades

Increase in energy value of coal after calculations switch to Gross Calorific Value

Grade (non-coking coal)	UHV (Universal Heating Value) in kilo calorie per kg	GCV (Gross Calorific Value) in kcal per kg at 5% moisture level
A	Exceeding 6,200	Exceeding 6,454
B	Exceeding 5,600 but not exceeding 6,200	Exceeding 6,049 but not exceeding 6,454
C	Exceeding 4,940 but not exceeding 5,600	Exceeding 5,597 but not exceeding 6,049
D	Exceeding 4,200 but not exceeding 4,940	Exceeding 5,089 but not Exceeding 5,597
E	Exceeding 3,360 but not exceeding 4,200	Exceeding 4,324 but not exceeding 5,089
F	Exceeding 2,400 but not exceeding 3,360	Exceeding 3,865 but not exceeding 4,324
G	Exceeding 1,300 but not exceeding 2,400	Exceeding 3,113 but not exceeding 3,865

UHV based on highest value of Indian coal (8,900 kcal) minus 138 kcal rebate given for its ash content
GCV calculates combustible elements present in coal's composition besides its ash content and moisture


Tirumala
The abode of the 'Lord of seven hills'
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इसरो ISRO
Route Map through Remote Sensing
Tirumala down road
Tirumala up road
Alipiri
Tirupati
NRSC Data Centre
National Remote Sensing Centre
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Phone: +91 40 2388 4422, 4423, 4425
Email: sales@nrsc.gov.in
Website: www.nrsc.gov.in

Nirma loses wetland

Environment ministry revokes clearance to its cement plant

SUGANDH JUNEJA

THE union environment ministry has revoked the clearance it had granted to the detergent giant Nirma to construct a cement plant in Gujarat. The 1.91-million-tonnes-per-annum plant is under construction in Mahuva block of Bhavnagar district.

The ministry's expert appraisal committee had recommended the revocation, saying the clearance was granted based on undisclosed and incorrect information. The plant is located on a wetland, and not wasteland as claimed by the Gujarat government as well as Nirma in its environmental impact assessment report submitted to the ministry.

In its order dated December 1, the ministry has also asked Nirma to maintain status quo at the project site. Construction work has been halted since March 2011, when the ministry issued a stop-work order after its expert committee chaired by C K Varshney found that the project is on a wetland.

In May, another expert committee of the ministry, headed by C R Babu, former pro-vice-chancellor of Delhi University, had submitted a report. It recommended relocating the plant outside the wetland and its catchment area. Based on the report, the ministry issued a notice, asking Nirma to explain within two weeks why the clearance granted to its plant should not be revoked.

In September, the apex court gave Nirma three months time to respond to the show-cause notice of the ministry. It has been hearing the case since May 2010 when Mahuva residents brought the matter to the court's notice (see 'Detergent co's infatuation with wetland'). The ministry states that even though Nirma was given time to file its response to the show-cause notice, the company failed to do so. In a letter dated November 23, Nirma requested another 10 weeks time to file its reply to the show cause, which the ministry considered "unjustified" and a "breach of the order of the Supreme Court". The ministry then revoked the environmental clearance of the plant based on the reports of the expert committees and the public hearings given to the company. The Supreme Court has upheld the ministry's decision. However, it disposed of the petition on December 9 after Dushyant Dave, counsel for Nirma, sought to challenge the revocation order at the National Green Tribunal. NGT was established in 2010 for expeditious disposal of environment-related cases. According to Shilpa Chohan, a Supreme Court lawyer, cases under Section 5 of the Environmental Protection Act, which regulates closure, prohibition or regulation of any industry, operation or process, can appeal to NGT even while the case is sub-judice.

The ministry's order has failed to pacify Mahuva residents. "The order is essentially incomplete and the question of status quo does not arise," says Harish Salve, counsel for petitioner Khimjibhai Lakhabai Baraiya, a Mahuva resident. "The ministry cancelled the clearance but did not give directions on what should happen to the built-up structure at the site," he adds.

Salve has appealed that the ministry should ask Nirma to remove the structure and return the land to the state. Kanubhai Kalasaria, the BJP MLA who led the protest against the plant, is disappointed with the case now moving to NGT. "We had thought the Supreme Court is the apex body of law". He hopes that given the kind of in-depth analysis done on the matter under the court, NGT will have little option but to comply with the ministry's decision. ■


Nirma whitewash

Detergent Co's infatuation with wetland

SEPTEMBER 2008
Mahuva residents oppose cement plant on their waterbody at a public hearing

DECEMBER 2008
Environment ministry grants clearance on basis of rapid environmental impact assessment report, which describes the project site as wasteland

MARCH 2009
People's front moves Gujarat High Court

AUGUST 2009
Based on a high powered committee report, a ministerial subcommittee recommends allowing the project, directs Nirma to return 54 ha of acquired land, increase reservoir's capacity to offset water loss. High court accepts decision

MARCH 2010
High court stays construction after petitioners submit satellite images of wetland. But allows it within a month, asking Nirma to surrender additional 46 ha

MAY 2010
Petitioners move Supreme Court

JANUARY 2011
SC asks ministry to respond. It seeks time and sets up an expert committee under C K Varshney to inspect the site

MARCH 2011
Based on Varshney report, ministry issues stop work order. Nima moves the high court, which turns down its appeal against ministry's order. Following SC's order, ministry forms another expert committee under C R Babu

MAY 2011
C R Babu committee report submits its report recommending relocation of the plant as it is on wetland. Ministry issues show-cause notice to Nirma

SEPTEMBER 2011
SC asks Nirma to prove that the project site is a wasteland; gives 3 months to respond to ministry's show-cause notice

DECEMBER 2011
Ministry scraps environmental clearance granted to the cement plant. SC dismisses the petition after Nirma submits that it will appeal against ministry's order in the National Green Tribunal

Abstract submission deadline:
14th January, 2012
(Revised)

Acceptance notification:
31st January, 2012
(Revised)

Submissions should be sent to deblina@cseindia.org

Selected abstracts will receive a slot for presentation or for the poster session.

Limited funding is available for travel and local expenses for suitable candidates.

For further details www.cseindia.org/node/3248

National Seminar on Decentralised Wastewater Management Practices: Options and Challenges

CALL FOR ABSTRACTS

Centre for Science and Environment (CSE), New Delhi is organizing a National Seminar on 'Decentralised Wastewater Management Practices: Options and Challenges' in February 2012 (Revised).

The aim of the seminar is to act as a forum to discuss and share experiences regarding the existing and upcoming decentralised sewage treatment concepts and technologies. The focus will be to document natural system based technologies-onsite and offsite (wastewater treatment in flowing drains, rivers, lakes, tanks etc.)

Abstracts are invited from water experts at national level (including academicians, scientists, engineers, practitioners, researchers, consultants and managers) to present case studies on sustainable wastewater management practices – onsite & offsite.

Submissions should include full title of the paper, initials and surname of author(s), current institutional affiliation(s) with complete postal address, telephone/fax numbers and email Id of all the authors. Abstract should be maximum of 250 words.

A national seminar on lake conservation

The broad objective of the workshop is to set up a network of researchers, NGOs, legal advocates and regulators from India involved in the conservation of urban lakes. The workshop will identify the issues, challenges and options related to the conservation of the lake. The network will influence policy debates in rapidly urbanizing cities and will push participatory and locale-specific policies for conserving the country's urban lakes.

CHURNING STILL WATER

CALL FOR ABSTRACTS

Centre for Science and Environment (CSE), New Delhi is organising a National Conference on Lake Conservation to be held in the last week of January, 2012.

We invite abstracts from researchers, NGOs, faculties, law practitioners, in the areas relevant to lake conservation (and or threats). There will also be panel discussions involving invited speakers related to lakes.

Submissions should include title, author, affiliation (s), contact details and an abstract of not more than 250 words. Submissions should be sent to *sushmita@cseindia.org* by January 15, 2012.

Limited funding is available for travel and local expenses for suitable candidates.

AIDS agency orders cheap drug

Stavudine disfigures, affects peripheral nervous system permanently

ANKUR PALIWAL

THE national aids Control Organisation in November procured in bulk anti-HIV drug stavudine, which is being phased out worldwide. NACO officials unofficially cite funds crunch for depending on the low-cost drug. Stavudine requires less monitoring of patients, they say. NACO provides free treatment to HIV/AIDS patients in the country.

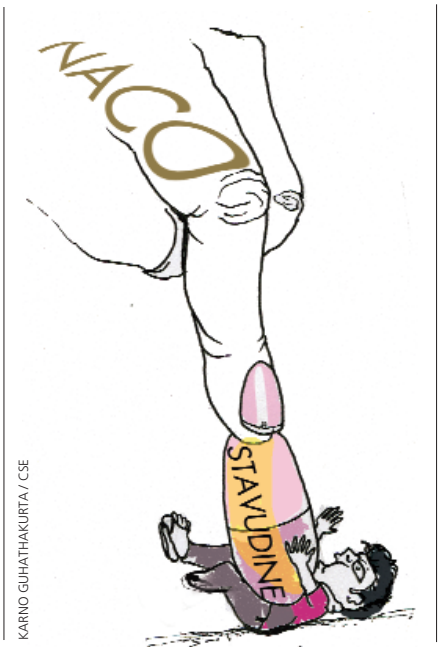
In 2010, the WHO had revised its HIV/AIDS treatment protocol and recommended countries to phase out stavudine as the preferred first-line therapy due to its long-term, irreversible side-effects. The drug causes lipodystrophy, or irregular distribution of fat in the body, resulting in sunken cheeks and buffalo humps at the back and neck. It also damages peripheral nerves, causing numbness and burning pain in hands and feet. WHO had urged countries to move to less toxic alternatives such as zidovudine, tenofovir and abacavir. In line with its recommendations, Kenya, South Africa and a few other countries announced shifting from stavudine to tenofovir over the next five years. Developed countries, including EU nations and the US, have long been using stavudine as the last opted drug.

India's HIV/AIDS treatment protocol remains unchanged. The technical resource group of the Union health ministry held a meeting soon after the release of WHO recommendations. It acknowledged the side-effects of stavudine but reached no consensus on phasing it out. Minutes of the meeting show that some members had argued that if all patients on stavudine are shifted to tenofovir, the expenses will nearly double.

As per NACO's protocol, zidovudine should be given as the first preferred drug. If the patient developes complications like anaemia, stavudine is the option. Tenofovir is the last resort.

But in practice stavudine is always the first choice of doctors, says Loon Gangte of non-profit Delhi Network of Positive People. "In several instances, doctors change the treatment regime to zidovudine or tenofovir only after pressure from patient support groups," says Shivangi Rai, legal officer with Lawyers Collective. The lawyers group is fighting a public-interest litigation in the Supreme Court to make stavudine the last option in NACO's treatment protocol.

Doctors say they prefer stavudine and zidovudine because they are bound by the treatment protocol. A member of NACO's technical resource group, on requesting not to be named, says: "We prefer stavudine as it is well tolerated and requires less monitoring. Besides, only five to seven per cent patients suffer from lipdystrophy and peripheral neuropathy." Despite repeated queries, NACO refused to divulge the number of patients on stavudine.



KARNO GUHATHAKURTA / CSE

Side-effects caused by stavudine mostly goes unreported because NACO does not have a programme to keep vigil on the health complications, says Leena Menghaney, campaign coordinator (India), Medecins Sans Frontieres, an international non-profit that works on access to essential medicines.

Public health activists say it is not just about giving the right drug, but giving the quality of life. With stavudine-induced disfigurement, patients face a double stigma. Anuradha of NAZ Foundation that works with HIV-positive children, adds: "Our children feel alienated in school due to their appearance. It lowers their self-esteem." Of 16 HIV-positive children at NAZ who get treatment, 14 are on stavudine; eight have developed lipodystrophy.

When anti-HIV programme took off in India in 2004, stavudine was the only option. But now other safer and equally effective options are available, says Menghnany. But doctors often keep shuffling patients between stavudine and zidovudine, even though the patient develops side-effects to both. Patients with frequent regimen changes suffer from virological resistance and increased mortality. It is important to choose the safest treatment regime, she says, adding, tenofovir is the safest available option for adult patients. Studies show though tenofovir can cause renal complications, its risk of side-effects is six times less than that of stavudine.

But tenofovir was not even listed in the tender NACO procured in November.

Rai argues with both global and domestic aid, NACO has no dearth of funding. Bulk order brings down the cost. Studies show tenofovir is cost-effective; treatment cost to reduce further health complications is higher for other drugs (see table). It has additional advantage, says Menghaney. One needs to take just a pill of tenofovir a day, which improves compliance with the treatment regime. ■

How cost-effective

Drug	*Cost per person/yr	**Drug and incremental cost	**Life gained (in months)
Stavudine	₹2,952	₹2,56,680	115.5
Zidovudine	₹5,700	₹2,63,120	115.8
Tenofovir	₹20,000	₹2,56,680	125.8

*Source: *NACO; **Clinical Infectious Diseases, February 1, 2010 (US $1=₹46)*

(A)



(B)



(C)



Litter Bins

(D)



With Flap Lid

(E)



Bucket

(F)



Wheeled Waste Bins

(G)





(H)

Hand Cart

(I)



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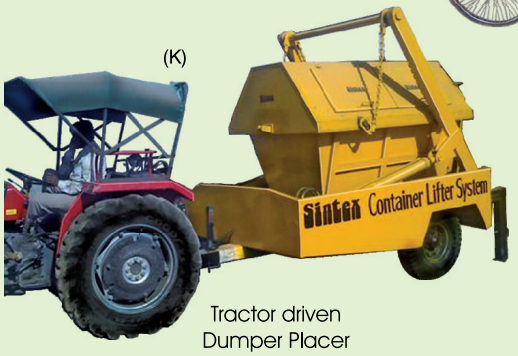
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(J)

Door to Door
Collection Vehicle



(K)



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(L)



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Bidhan-SIL-15/11

HAPPILY UPROOTED

A well-calculated compensation plan eases relocation pain of forest dwellers from the core area of Melghat Tiger Reserve

ASHWIN AGHOR *Melghat, Maharashtra*

It's not the kind of relocation story that one usually hears. Early last year three villages were uprooted from their traditional land in the core area of the Melghat Tiger Reserve to make way for free movement of the big cat. They did not protest, and walked away with their belongings and herds of cattle. Eight months since, they are comfortably settled and prospering.

Residents from other villages in the tiger reserve now want to be relocated and have approached the Maharashtra forest department. Officials say people are eager to relocate because of the revised rehabilitation package and a novel formula developed by the forest department to disburse the compensation.

The core area of this tiger reserve in Amravati district has 30 villages. This is not the first time the forest department has made an effort to relocate villages from the core area, as required under the Wildlife Protection Act. It had initiated the programme twice before: first in 2000-01 and then in 2003-04. It managed to vacate only five. The programme got stalled due to reluctance of people.

"The compensation then was just ₹1 lakh per family. It was too meagre to motivate people to give up their land and forest resources," says S M Sarjuse, a range forest officer in the tiger reserve.

There was another option: the government would rehabilitate people at a location of their choice. Landless people would receive one hectare per family and the rest be compensated on house-for-house and land-for-land basis. The forest officials had used this option for relocating two villages from Tadoba-Andhari Tiger Reserve in Chandrapur district in 2007. Each family was given a house and a little more than two ha as part of rehabilitation package. But they could not grow crops in the absence of irrigation facility. Within two years, most had returned to the forest, saying they were well-off depending on bamboo and forest produce (see 'Relocation by half measures', *Down To Earth*, August 1-15, 2009).

So in 2008, when the Centre raised the compensation amount to ₹10 lakh per family, following the recommendation of the National Tiger Conservation Authority, forest officials seized the opportunity. "We prepared the proposal for relocation of Amona, Nagartas and Barukheda villages in Wan wildlife sanctuary and sent it to the Ministry of Environment and Forests," says G D Deshmukh, range forest officer of Barukheda range. The relocation process could not be initiated until January 2011 due to administrative hurdles and funds crunch. But once the money was sanctioned, 381 people from these villages were relocated within four months, he adds.

Winning formula: ₹2 lakh put in savings account, ₹8 lakh in FD for future needs

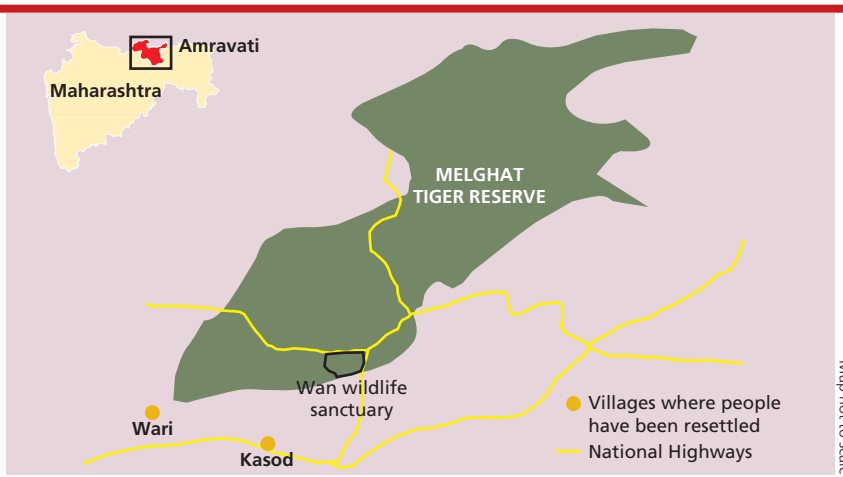
"This is first of its kind relocation in the country where an entire village has been shifted out of forest in one go," says Praveensingh Pardeshi, Principal Secretary (Forest), Maharashtra.

The success lies in the formula, which the forest and administrative offi-



Using compensation money, people dug wells and are growing crops


ASHWIN AGHOR / CSE



Map not to scale

cials worked out with village heads to ensure assured income to people at regular intervals. They helped the residents open savings account and transferred the compensation amount to them under three plans. ₹2 lakh was deposited in the savings account so that the residents could use the amount to pay for the cost of shifting and constructing new house. Rest of the money was put in fixed deposits (FD): ₹3 lakh for nine months to facilitate purchase of farm land or meet other needs in near future and ₹5 lakh for six years. The interest on FD would accrue in the savings account.

Residents of Amona were resettled in Kasod village in Akola, while people from Barukheda and Nagartas were resettled in Wari village. The irrigation department offered its abandoned colony in Wari, built during the construction of Wan dam. People eagerly bought the houses at ₹60,000 to ₹80,000, says Deshmukh. "This is for the first time that the irrigation department has given its land for relocation of people in the state," Pardeshi says.

The revenue department helped them get land, but asked them to pay for it and construct houses on their own. "We were careful not to repeat the mistake committed while rehabilitating people from Tadoba-Andhari Tiger Reserve," says D G Goswami, assistant conservator of forest, Akot Wildlife Division. Using the money they have dug wells and installed borewells, and are growing crops in abundance.

Life is different now

In place of a thatched hut in Amona, Mungilal Patel Kasdekar is now the owner of a three-storey building in Kasod in Akot tehsil. He lives with the families of his three sons and had received ₹40 lakh as combined rehabilitation package. With the money, he purchased a hectare of farm land and one tractor, which he rents out. Together, his family earns ₹20,000 a month. This is above the interest amount they get on the ₹20 lakh in their FD accounts.

His neighbours Ramvilas Kasdekar and Kalya Pandu Patil have bought second-hand SUVs, which they have rented out for passenger service from Kasod and nearby villages to the tehsil headquarters. "I never thought I would own a four-wheeler," says Ramvilas, who proudly flaunts his cellular phone, motor bike and the satellite TV connection. "While living in the forest we barely had the electricity supply. Very few had ration cards. Every day we would walk 10 km to Kasod or other villages, for all our needs. It was almost impossible to go to a health centre. Now, the health centre, schools and markets are all within the distance of a few kilometres," he says. The only problem is, says Ublal Baluja Kasdekar, then police *patil* (village guard) of Amona, "we do not know where to graze our cattle herds".

Residents of the host village are also happy with the influx. Though the region is fertile, land used to lie fallow due to labour shortage. Kasod residents are now leasing out their land to Amona families or hiring them as farm labour.

The successful rehabilitation of Amona, Barukheda and Nagartas has prompted at least six other villages in the tiger reserve to appeal for relocation. The forest officials are preparing a relocation plan for them, says G H Chavan, forest guard at Amona. With the villages and their 3,000 herds of cattle removed from the area, tiger, leopard, hyena and sloth bear have started returning to the area, says Chavan, who had never spotted a large carnivore in the area during his posting for over a decade. ■

WHERE'S THE FIRE ALARM?

Most hospitals in India fail the fire safety test, yet they take no corrective step



REUTERS

AMRI Hospital staff watches rescue operations after the fire in Kolkata

SONAL MATHARU

Close to a hundred people died in a major fire that engulfed the Advanced Medical Research Institute (AMRI) Hospital in Kolkata on December 9. Majority of them were patients, in so critical a condition that they could not even move their limbs. They helplessly saw smoke enter their cabins as they suffocated to death. Those administered sedatives died in sleep. The cause of fire is still not known. What's known is that despite warnings, the hospital had not taken steps.

On September 5, the Kolkata fire department had inspected AMRI Hospital and pointed out the loopholes. The hospital merely promised to take corrective steps within 90 days. The tragedy occurred just before the deadline was to expire.

The fire at AMRI Hospital is not a one-off case. In 2001, at least 25 mentally ill patients were charred to death in a hospital at Erwadi in Tamil Nadu. Chained to their beds, they could not have escaped. In fact, AMRI Hospital too had witnessed a minor fire on its ground floor in 2008. Despite the grievous losses, the Centre could not act because fire safety is a state subject. And clearly, making hospitals fire-safe is not a priority with the state. Delhi is a case in point.

The Delhi Fire Service (DFS) has declared 27 blocks in the city's different hospitals—16 run by government and 11 by private firms—unsafe. As per rules, DFS can seal a building that does not have a no-objection certificate (NOC) issued by it. But none has been sealed. Manoj Sharma, spokesperson of DFS, argues that most buildings are in the process of procuring NOCs.

Between April 1, 2006, and March 31, 2011, Delhi hospitals witnessed as many as 106 fires. A possible reason could be that over 500 hospitals countrywide are awaiting accreditation from the Quality Council of India (QCI). The body accredits buildings for their quality service under the National Accreditation Board for Hospitals and Healthcare Providers certification.

"But 50 per cent of the hospitals, for sure, will not have at least one of the four crucial licences required," says Giridhar Gyani, director of QCI. The crucial licences are—building permit, NOC from chief fire officer, NOC for biomedical waste management from the pollution control board, and Atomic Energy Regulatory Board's approval to run radioactive machines.

QCI grants accreditation only if a building meets 72 legal requirements. For fire safety, it checks four main points—mechanism for early detection and abatement of fire, a safe exit plan, a staff trained to tackle emergencies, and mock drills twice a year.

Gyani says hospitals can easily cheat. For instance, there is no way to check whether mock drills have been conducted twice a year, he says.

According to the National Building Code, 2005, hospitals are classified as institutional buildings, and therefore require equipment like extinguishers, hose reels and automatic sprinkler system. At all times, the area around a hospital building must be kept clear for easy access of fire tenders. The entry gate should be at least 5.5 metres wide, lanes around the hospital six metres wide and the turnings nine metres wide. The staircases should be two metres wide and the corridors the width of 2.4 metres. The hospital building should be no more than 30 metres high to make evacuation of patients easy. All hospitals must have a ramp.

M Mariappan, associate professor at the Centre for Hospital Management at Tata Institute of Social Sciences, Mumbai, says, "Accidents occur due to negligence." But the alarm bells simply don't ring in the administrative circles. ■

Delhi's unsafe hospitals

- Trauma centre, RML Hospital
- Extension cardio neurology centre, AIIMS
- ESIC Hospital, Rohini
- Civil Hospital, Rajpur Road
- St Stephen's hospital, Tis Hazari
- Leprosy Mission Hospital
- Sunder Lal Jain Charitable Hospital, Ashok Vihar
- Brahm Shakti Hospital & Research Centre, Budhh Vihar
- RG stone Urology & Leproscopy Hospital, Rajouri Garden

SAFAL SHOWS THE WAY

Mother Dairy's retail model helps farmers but is under pressure from chains

LATHA JISHNU and JYOTIKA SOOD

FARM & CRISIS REFORMS

Call it the Safal model. For close to 25 years, a large chunk of households in the National Capital Region have had access to fresh fruits and vegetables at affordable prices—at rates much lower than what the local vegetable and fruits market or the handcart vendor would charge. This was made possible by standing the concept of buying on its head. Instead of the farmer coming all the way to markets where the middleman would fleece him and where he had to pay steep taxes, the market went to his doorstep. As a result, customers could get the fresh products daily, making the farm-to-fork concept a reality long before retail chains began doing so in the metros. It is the Safal model that these chains also employ.

The inspiration was milk. A decade and more after Mother Dairy, a fully owned subsidiary of the National Dairy Development Board (NDDB), had established itself as a leading vendor of milk purchased mostly through cooperatives of farmers, it turned its attention to fresh produce and edible oils. As a state-owned undertaking, NDDB's basic mandate in all such endeavours is to provide a market for farmers through the cooperative framework and to help them get the right price for their produce. It cannot at the same time afford losses, says Pradipta Sahoo, horticulture business head at Mother Dairy Fruit & Vegetable Pvt Ltd (MDFV), which owns the Safal brand.

In the case of edible oils, sold under the Dhara brand, there is the larger issue of reducing dependence on imports. Sales, though, are just over ₹350 crore in





Farmers at a crop planning meeting with Mother Dairy officials at one of the extension service stations in Haryana. (Top) Carrots being washed at the company's central distribution facility in Delhi that can process 200,000 tonnes of fresh fruits and vegetables in a year



SABYASACHI / CSE

Safal has the largest retail network for fruits and vegetables in NCR

a market that is valued at ₹75,000 crore—and this 22 years after it launched its first branded cooking oil.

Safal, on the other hand, has fared much better. Turnover is now ₹550 crore and has been growing steadily at around 10 per cent annually, with the brand becoming a household name in NCR. Its 400-plus outlets provide vegetables that are 5-15 per cent cheaper than the market rate, apart from bigger discounts on items that are in oversupply. This has helped to build up consumer loyalty for MDFV, which sells about 350 tonnes of fruits and vegetables daily. Its strong point, however, is the backend of its operations, which in this case means the farmer. It works at the village level through its area stations which have agriculture graduates on call for farmers.

The cultivator is the focus not merely because of Mother Dairy's social mandate but also to enhance marketability. "We not only pay the *mandi* (wholesale market) rate prevailing at Azadpur (Asia's largest fresh produce market located in north-west Delhi), but also provide agriculture extension services to the farmer," points out Sahoo. This includes crop planning, advice on what kind of seed and fertiliser to use and tips on good agriculture practices which from a consumer point of view are critical. Explains Sahoo: "One of the serious drawbacks with fresh produce is the heavy use of pesticide. We tell farmers how to use it and when. In *mandi*s you will find produce that has been sprayed just before being harvested. This is not the case with Safal vegetables and fruits."

Over time as trust developed, Mother Dairy has been able to put together over 200 farmers associations with a membership of 8,000 farmers

Mother Dairy's relation with farmers is at times rocky. Loyalty was at a discount when big names in domestic retail debuted in Delhi

straddling 14 states. But the relationship is sometimes rocky. Since there is no written contract, farmers are not bound to sell their crop to MDFV. Quite often loyalty was at a discount when the big names in domestic retail, such as Reliance Fresh, Spencer's and More made their debut in Delhi five to six years ago. With their deep pockets they were able to buy out stocks of popular vegetables from farmers at higher rates while still keeping the prices low for consumers. Farmers are still switching sides.

Old-time associates of MDFV, however, say they would prefer to stay with Safal as long as the price is reasonable. Vinod Jhajharia from Abohar in Punjab has been selling vegetables to MDFV for the past decade. "I started by supplying bottle gourd to the company and then switched to kinnow (a hybrid citrus fruit) because the profits were higher. Company officials have helped me improve quality and given me an assured market," he told *Down To Earth*.

The compelling reason for Jhajharia, as for other farmers, is that he gets the Azadpur rate without the aggravation of going to the *mandi*, haggling with the *adhtiyas* or commission agents and paying fees, taxes and bribes. "That can be a painful and time-consuming affair," he says. There are other horror stories. Jhajharia says he once fell prey to an *adhtiya* who took away his produce worth ₹80,000 and never paid him.

The other reason is assured payment, adds Surinder Juneja who heads the Abohar Safal Farmers Association. The association, formed five years ago, covers farmers of around 150 villages. Their average farm size is two to three hectares. Most of them grow kinnow for which Abohar is famous. They also supply carrots and radish to MDFV.

"A farmer has a harrowing time when he goes to the *mandi*. In Punjab we have to pay 4 per cent market fee, and 5.5 per cent VAT apart from commissions to the *adhtiya*. We save ourselves all this bother and make a profit even after Safal cuts transport cost from the final price," explains Juneja. The taxes and fees are levied under the Agriculture Produce Market Committees Act and it varies in each state. Although the Centre has been calling for its reform and has put up a model Act for states to implement, few states have done so. As a result, if a farmer from Jammu and Kashmir wants to sell his produce in Delhi, he would have to pay taxes and octroi to each of the states he passes through. For Juneja, the comfort MDFV offers is that it is a public sector company and works through the cooperative model. "We have established a good working relationship over the years," says Juneja, "because of our faith in this model". But he confesses that association members do sell to other buyers, including retail chains, because Safal's operations are limited and cannot absorb all that they grow.

Clearly, MDFV needs to gear up for competition. Its growth over the past decade has shown that it is not as nimble as it should be. Given the aggressive plans being drawn up by domestic retail chains, not to mention the likely approval of foreign direct investment in retail, Safal could soon find itself under pressure. Sahoo, who was formerly with Reliance Retail, is aware of the challenges. "Retail chains price fresh produce low primarily to increase the footfalls. For them, this is not a priority segment and they use profits from other goods to subsidise fresh produce."

MDFV cannot do that. But it believes "competitors cannot steal the trust Mother Dairy has built up in 25 years." Whether it can withstand the harsh economics of the marketplace remains to be seen. ■

Cry of a river

A little known river in UP is struggling for survival. Untreated effluent, delayed action to blame



BHARAT LAL SETH / CSE

BHARAT LAL SETH *Gorakhpur*

Indra Pal Singh fondly recalls drinking sweet water of the river Ami as a child. Elders of the village where Pal Singh grew up say the river gets it name from *aam* (mango) or *amrit* (nectar). Today, Pal Singh, pradhan of Adilapar village in Uttar Pradesh's Gorakhpur district, says the 136 km river has become a nuisance. A drain that carries untreated industrial effluent from the Gorakhpur Industrial Development Area (GIDA) has reduced it to a filthy water body. Residents of more than 100 habitations downstream of the drain often complain of colds, mystery fevers, nausea and high blood pressure. They find it hard to breathe at night as the stench from the drain rises with the increase in the volume of the wastewater. The residents say the effluent level rises by half a metre at sunset.

Built on the lines of NOIDA in the late 1980s, GIDA was set up by the then chief minister Veer Bahadur Singh. It comprises 158 units, including paper mills and textile manufacturers, which discharge some 45 million litres of untreated effluent into the drain every day. GIDA was formed with the commitment that a common effluent treatment plant (CETP) will be set up by 1989 but it has not happened. A committee was constituted in 2009 to look into the matter; it has met just once. Officials insist that work on the facility is in progress.

Untreated municipal waste from two nearby towns is also discharged into the river. It is said that the towns' sewage is harming the river's health. "The towns account for seven million litres of sewage each day and this pollution load is within the assimilating capacity of the Ami," says Govind Pandey, professor at Madan Mohan engineering college in Gorakhpur, blaming industry for the river's health.

A campaign is born

Before GIDA was set up, thousands of people living in the 522 sq km catchment area of the river, mostly fishermen and farmers, were reaping the benefits of the Ami. Rice is the major crop of the region, while wheat and barley are also sown. But due to the pollution the productivity has reduced by a third. Freshwater fish like boi and rohu, which once used to be bountiful, are no longer found. The negligence on the part of the authorities has affected the residents. "Several thousand fishermen are now either doing wage labour in urban areas or selling liquor. Some have even resorted to crime," says Pal Singh.

The residents started observing changes in the river water quality in the early 1990s. A pradhan of a village downstream organised a meet on World Environment Day in 1994, and the movement to save the Ami kicked off.

"I told the residents that GIDA was discharging untreated sewage into the Ami and it did not have a CETP," says Pandey. In 1994, Pandey asked the CEO of GIDA, his senior from college, to conduct an environment impact assessment in the area and chalk out an environmental management plan. "He agreed. But due to lack of funds the plan did

not materialise. It has been more than 15 years," says Pandey.

Pandey gave impetus to the movement in 2009 when he called all those living on the banks to symbolically throw a fistful of alum, a coagulant, and bleaching powder into the river on *Maker Sakranti*, an annual Hindu festival, in January. The event made the front page of local dailies.

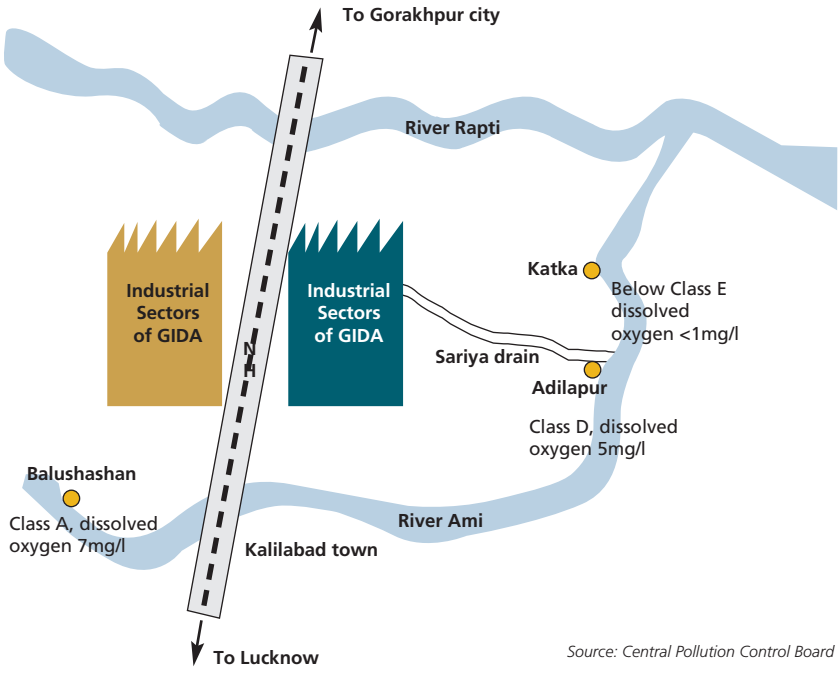
Vishwa Vijay Singh, former student union leader of a Gorakhpur college, was appointed to take the campaign forward. "Vijay Singh has been very active in organising rallies. He even undertook a *padyatra* for almost the entire course of the river," says Pandey. When Congress general secretary Digvijay Singh visited Gorakhpur in 2010, Vijay requested him for help. The then environment minister Jairam Ramesh, when apprised of the matter, sent a letter to Chief Minister Mayawati and directed the Central Pollution Control Board (CPCB) to probe the matter in April 2011.

Impressed by his work on their first meeting in July 2011, All India Congress Committee general secretary Rahul Gandhi picked Vijay Singh as the party candidate to fight the polls from Sahjanwa constituency in Gorakhpur.

An incident involving officials of the Uttar Pradesh State Pollution Control Board (UPPCB) and the residents also grabbed headlines. The people are aware that the industries are not complying with the conditions mentioned in the no-objection certificate. So in April when three UPPCB officers were testing the river water, the residents blackened officers' faces and made them wear *saris* and paraded them through the villages. They were let off only when the district magistrate intervened.

UPPCB says shutting down units is not the permanent solution. It issued a show-cause notice to the units. The units continued to operate.

Water quality at various points of river Ami



Source: Central Pollution Control Board

At ground zero

In April 2011, a three-member CPCB team was deputed to monitor the quality of the river and the drain. Six polluting industries were to be inspected.

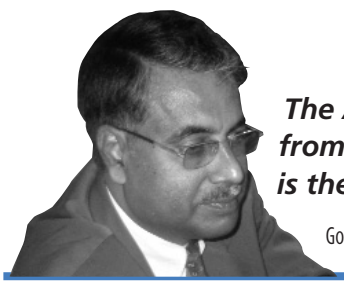
CPCB conducted the first test of the river water near a village that lies near a point where no mixing of effluents takes place. According to CPCB's report, the water at the point is of the best water quality classification (Class A). The coliform count, however, indicates some sewage discharge. The next sample was tested before the effluent-carrying drain falls in the river. It was found to be unsuitable for bathing (Class D) as industries near the towns were discharging untreated waste. CPCB also tested at a point downstream of the drain. The water quality at that point is below even the worst classification (Class E), according to the report submitted to the environment ministry in June 2011 (see infographic: 'Water quality at various points of river Ami').

The quality of the drain was, however, found to be within the pollution parameters. The catch is: during sampling the major polluting industries were not operating. "We told CPCB not to inform the industries about the inspection," says Vijay Singh. But while inspection was on, the units conveniently suspended their operations for some time, he adds. One plant was shut due to maintenance, another for want of electrical connection, two reported labour problems and two other cited lack of raw material. Yet, CPCB found some discharge, suggesting that work at a paper mill was halted recently. CPCB found this effluent to be well above the permissible limits. The board ordered a unit to dismantle its 1,400-metre-long illegal underground drain. The unit is yet to follow the direction.

CPCB has recommended GIDA to set up adequate treatment facilities and towns to install separate sewage treatment plants.

Gorakhpur mayor Anju Choudrey says the river today is more a problem than an asset. "The development authority gives permission without checking whether the industry has followed the rules," she adds.

In the first quarter of the new year, Jayanthi Natarajan, the present environment minister, is expected to visit the area. All hopes are pinned on her. ■



The Ami receives untreated sewage from two towns, which it assimilates. It is the industry that is polluting the river

Govind Pandey, professor, Madan Mohan Engineering College, Gorakhpur

SCIENCE MEETS FICTION

26
THE ANIMAL CALLED SCIENCE FICTION
T V VENKATESWARAN

28
THE ORIGINS
ARVIND MISHRA & HARISH GOYAL

29
ALIENS *v* BABUS
DEBJANI SENGUPTA

32
FROM CACHE
VINAYAK RAZDAN

34
AND SO IT GOES
ANIRUDDHA SENGUPTA

36
SHADOWS OF MODERNITY
YOHAN J JOHN

39
INFINITE SPHERE
DILIP RAOTE

41
THE MISSING
ANIL MENON



VAIBHAV RAGHUNANDAN / CSE



T V VENKATESWARAN

THE ANIMAL CALLED SCIENCE FICTION

Walk into a well-stocked bookstore. You are likely to find a section marked 'science fiction', stacked with brightly coloured covers illustrated with intricate spaceships floating in the vast space with weird looking alien, or men and women clad in bizarre apparels in futuristic cities. Flip through it, the tropes are quite recognisable: travel to other planets, encounters with extraterrestrial life forms, utopian social speculation, futuristic extrapolation or even travel back/future in time.

What is this animal called science fiction? Is it romance? Yes, it can be—even an intense romance between a woman and a machine (*Bicentennial Man*). Is it horror; drama; humour; action; soap opera (*Star Wars*)? Each piece of science fiction could be potentially identified with one of these genres. However, what sets sci-fi apart from other literature is a narrative centred on the sense of wonder. The sense of wonder might be engendered by the natural, such as the rings of Saturn or horizon of the black hole, or by the technological, such as a space station or a rocket ship.

At the heart of this genre is construction of a world other than our own, another planet (or even another universe) or a future world in which conditions have changed—alien invasion, Martian colonies, a permanent cure for the ageing process. The "what if?" in science fiction enables readers to focus on the human ramifications of the story and allows science fiction to become a powerful instrument of speculation and social critique. In science fiction, 'the idea' is the hero.

Scholars like Darko Suvin locate the emergence of sci-fi in the West to the intellectual impact of the Copernican revolution. By challenging the authority of scripture, Copernicus challenged the authority of the Church, the prime axis of political power in his times. Potential dissolution of the social and political arrangement, that was hitherto seen as permanent and god given, opened new avenues to imagine future social arrangements, radically different from the present. It is in this context that we should read Thomas More's *Utopia* (1516). The protagonist of this utopian science fiction, reports visiting a distant island, where society is ordered in immeasurably better ways than in the Europe of his times.

In spite of science fiction being "fantastic", it is not pure fantasy. While the mythical and fairy tales are set in "once-upon-a-time far away, beyond seven seas and seven mountains", sci-fi is futuristic fiction. This is not to say that all sci-fi novels must be set in the future, but to state that



VAIBHAV RAGHUNANDAN / CSE

the genre is counterfactual literature: not things as they actually are, but as they might be, whether in the future, in an alternative past or present, or in a parallel dimension.

The genre draws from the post-Galilean modern science, a clear break from the magical apprehension of the cosmos to a newer materialist, non-magical discourse. Suddenly, the cosmos was vast, new and unimagined objects (like the moons of Jupiter) were discovered and further new ways of thinking about time was possible. No longer was the trope of magic essential to bring about awe; science (and increasingly technological potential) was enough to create wonderment and spectacle. If fantasy relied upon the magical to generate a counterfactual, true science fiction is expected to do so only with prospective/plausible potential of science and technology. That is why Jules Verne scorned at H G Wells (*The first man in the moon,* 1901) for using purely magical anti-gravity material cavorite to lift his rocket to moon.

Two dominant narratives have come to stay in sci-fi; hard (didactic) and speculative (fantastic). The former, exemplified by Verne's narratives, sought to teach science through fiction. The later, exemplified by H G Wells, developed fiction through science. Further, if Verne transported his readers to exotic locations, centre of Earth, moon, North Pole and distant planets, Wells took the reader on a journey through time.

Sci-fi literatures of the 19th century mirrored the aspirations and fears of the middle classes. Take Albert Robida's *The Twentieth Century*. The protagonist of this 1883 novel, a young woman, is exploring the Paris of 1952, looking for a suitable career. The utopian Paris in the imagination of the author was teeming with aircabs that transported people, and each home contained a telephotoscope to broadcast the latest news and entertainment, and where the government is swept out of office every 10 years in a planned decennial revolution. The novel speculated not only on technology, mass transport and communication, but also on questions of feminist issues (women's career) and forms of government (elected democracy).

In contrast, Mary Shelley's *Frankenstein* (1818), is a mark of the fears of the elite unable to reconcile themselves with the rapid changes in the social fabric in the wake of emergence of capitalism. Having moved the source of terror from the supernatural to the scientific and rejected the naïve belief in the scientist as hero and in technology as inherently good, the novel is a romantic rejection of technological progress. The archetype, the mad scientist who, in his hubris-filled pursuit of knowledge and power, betrays basic human values, became a defining plot for future.

Science fiction, in particular, imagines change in terms of the whole human species, and these changes are often the result of scientific discoveries and inventions that are applied by human beings to their own social evolution. Small wonder socialists of one hue or other like Edward Bellamy, William Morris, H G Wells and Jack London were sci-fi writers. All these early to mid 20th century authors believed scientific and utopian romance was allied with the social reform of amoral laissez-faire capitalism.



Jules Verne scorned at H G Wells' *The first Man in the Moon* (*1901*) for using purely magical anti-gravity material cavorite to lift his rocket to moon

Science fiction of the 1960s and '70s was impelled more by what Italo Calvino called "a utopian charge", a powerful, unformed desire to rid the world of poverty, racism, sexual repression and exploitation, than naïve scientific romance. Soviet writer Ivan Yefremov's acclaimed sci-fi novel *Andromeda* (1957), which broached virtually every issue relevant to socialist concerns, from science to the arts to ethics, and engaged Western science fiction in a well-informed subtle polemical dialogue, is noteworthy.

This is not to say all works of contemporary science fiction were to take a socialist standpoint. Critics have pointed out that in recent times pulp sci-fi, especially from the US, has been a major inspiration for the development of super-weapons of mass destruction. Sci-Fi films like *Independence Day* and *Armageddon* have been deconstructed to reveal the insidious ideological force of an apparently harmless form of entertainment. Scholars point out that these films attempt to rationalise nuclear weapons at a time when mass movements for abolition of nuclear weapons in the world are growing in strength. The role of American pulp sci-fi in denying global warming is well known.

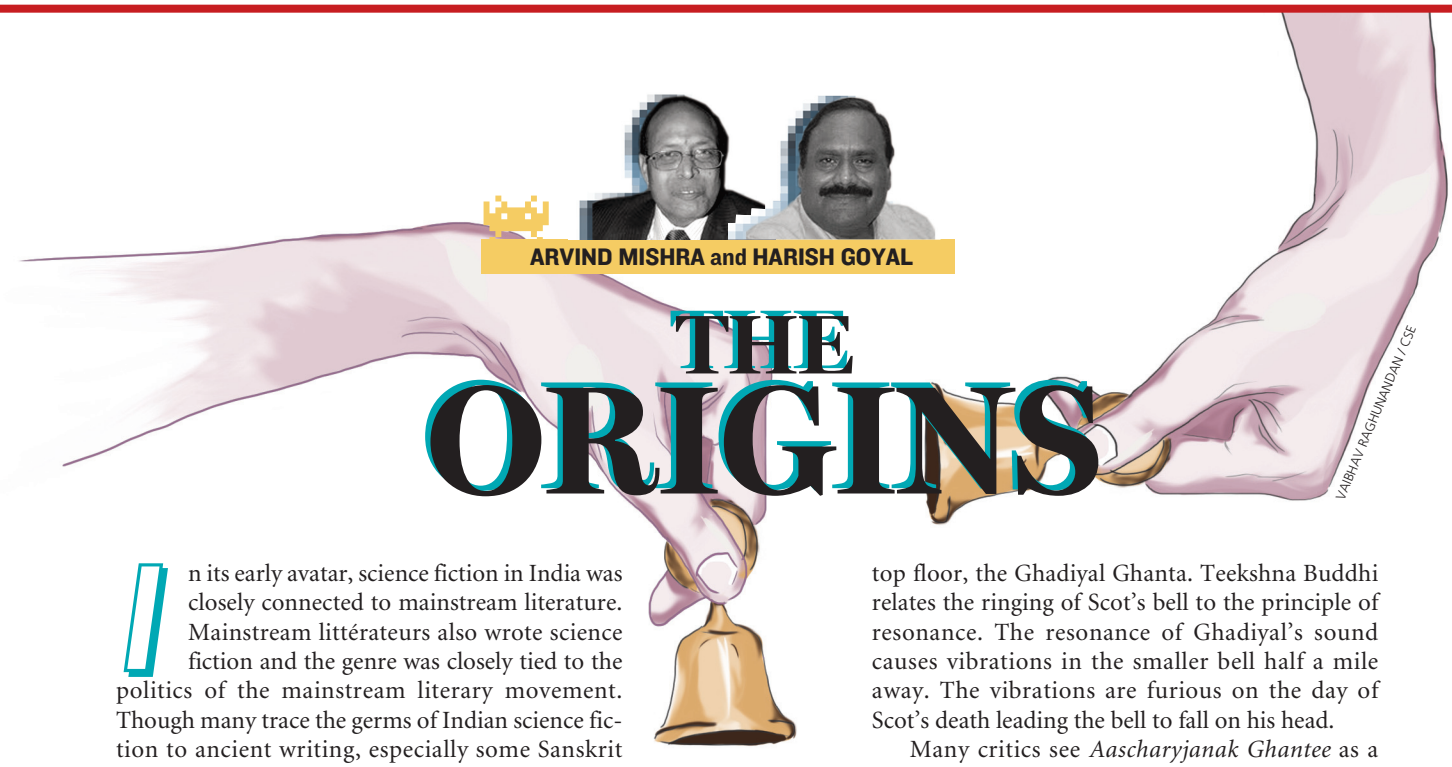
In its time Don Quixote's duel with the windmill may have been seen as hilarious, but after August 1945, technology is anything but naively good. Naturally, man-machine relationship has engaged the imagination of sci-fi. The naive view of technology—of machine relieving man of the drudgery—has given way to suspicion and mistrust of technology. When an ultra-modern new generation computer is asked the question "whether there is God", the machine replies "yes" and strikes dead a man who is about to turn off the machine in Fredric Brown's *Answer* (1954).

Recent sci-fi questions conformism, creeping bureaucracy and commodification. It highlights the cause of environmentalism, cautions against xenophobia and advocates tolerance and multi-culturalism. It critiques capitalism's expanding sphere of influence and its often sinister relationship with technology *(Avatar)*. However, unlike earlier times, these works rarely pose solid political questions or offer alternatives to global capitalism.

We seem to know what we do not wish, but it appears we are not yet able to articulate what we desire.

Films like *Armageddon* try to justify nuclear weapons at a time when protests against them are strong

T V Venkateswaran is a scientist with Vigyan Prasar, New Delhi



ARVIND MISHRA and HARISH GOYAL

THE ORIGINS

VAIBHAV RAGHUNANDAN / CSE

In its early avatar, science fiction in India was closely connected to mainstream literature. Mainstream littérateurs also wrote science fiction and the genre was closely tied to the politics of the mainstream literary movement. Though many trace the germs of Indian science fiction to ancient writing, especially some Sanskrit scriptures, it's safe to describe Ambika Datt Vyas's *Aascharya Vrittant* (A Strange Tale) as the first modern work of Hindi science fiction.

Vyas was a mainstream writer and *Aascharya Vrittant* was serialised in *Piyush Pravah*, a Hindi literary magazine, between 1884 and 1888. This landmark of early Hindi literature was inspired by Jules Verne's *Voyages Extraordinaires*. It was certainly futuristic for many Hindi readers: it narrates the adventures of Gopinath as he undertakes a journey underneath the earth.

Voyages Extraordinaires continued to influence Hindi writers in the coming decades. In 1900, *Saraswati*, another popular literary magazine published Babu Keshav Prasad Singh's *Chandrlok ki Yatra* (A Journey to Moon)—around 60 years before the first humans landed on moon and more than a hundred a years before India's Chandrayan began exploring Earth's satellite.

Saraswati continued to give space to stories inspired by science. But not all of them were futuristic. In 1908, the literary magazine published *Aascharyjanak Ghantee* (A Call Bell Wonder) in 1908 written by Satyadev Parivrajak. The murder mystery was inspired by the principle of resonance described by Galileo. Scot, the story's main protagonist, often hears a mysterious sound. Investigations trace the sound to a bell which rings without any external force applied to it. The mystery complicates with the arrival of a Japanese visitor, Oku Matsumi, who wants to purchase the bell at any cost. But Scot refuses to part with it. One day he is found dead. Detective Augustus, also called Teekshna Buddhi, is asked to investigate the bell owner's death. Augustus finds blood stains on the bell. He visits Deewankhana, a large building half-a-mile from Scott's house. He finds a big bell on its top floor, the Ghadiyal Ghanta. Teekshna Buddhi relates the ringing of Scot's bell to the principle of resonance. The resonance of Ghadiyal's sound causes vibrations in the smaller bell half a mile away. The vibrations are furious on the day of Scot's death leading the bell to fall on his head.

In a story published in 1924, the protagonist wakes up in the 22nd century to find crops genetically modified

Many critics see *Aascharyjanak Ghantee* as a story that popularised a scientific phenomenon. Futuristic fiction in Hindi came into its own with the publication of Rahul Sankritayan's *Baisvin Sadi* in 1924. The story is a description of a society set in 2124. Technological improvements are the harbinger of political and social reforms. The story begins with its protagonist Vishwabandhu falling asleep in 1924. He wakes up 200 years later in a completely changed world. The world is governed by a single entity: the world government. In this world, Vishwabandhu finds the president an Indian, Shri Datt, the prime minister a Japanese, Ohiro, the education minister is a Russian, Molon, and the health minister an American, David. People speak a single language. There is no police force. Vishwabandhu thinks scientific progress has reached its zenith. Agriculture is driven by biotechnology. Farmers introduce desired traits in crops genetically.

During Sankritayan's time, no one had thought of genetically engineered or genetically modified foods. Vishwbandhu finds villages earmarked for the production of any selected single crop: a village with apples, another with oranges and fields of one type of supercrop stretched miles long. He finds the supercrop of apple in one area and the supercrop of orange in another. Animals are found only in zoos and people communicate with a device akin to the modern Internet. There is also a radio phone, like the modern video phone.

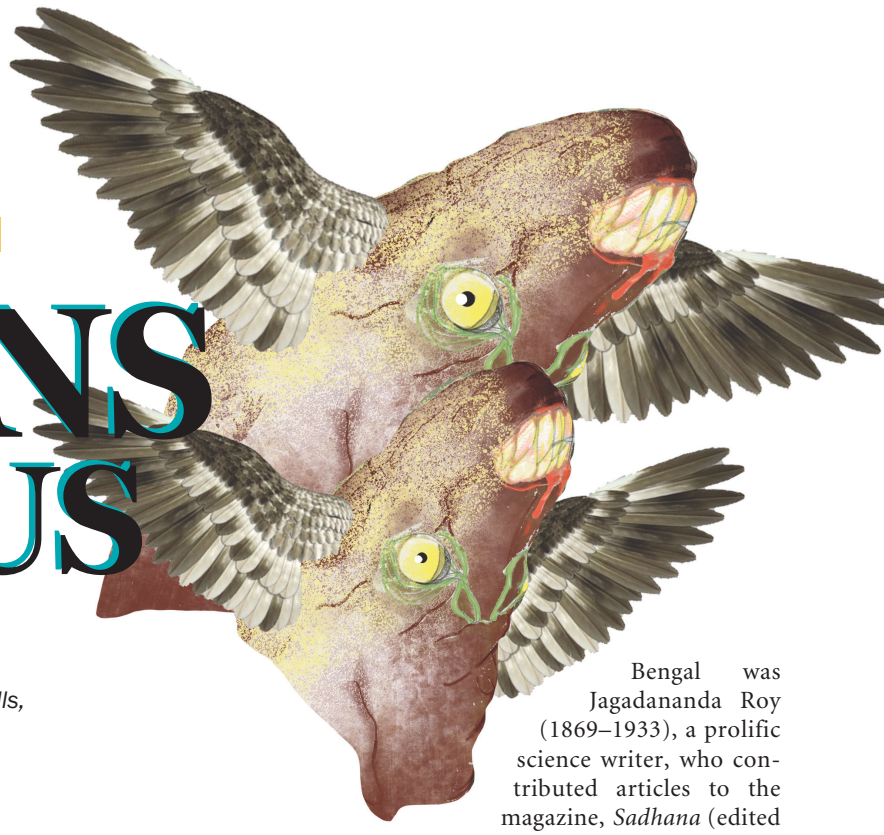
During the 1930s, Yamunadatt Vaishnav Ashok inculcated 'Indianness' in his stories through careful introduction of local locations, familiar protagonists and plot development.

Arvind Mishra is co-author of** Science Fiction in India **and Harish Goyal writes science fiction in Hindi



DEBJANI SENGUPTA

ALIENS v BABUS



Flour mills, jute mills, cloth and brick mills,
Machines that dig out water and make landfills,
Elephantine machines make roads a day,
Pranam *at the feet of machines,*
Town and country are now twins.

Kolkata Barnan by Rupchand Pakshi

Science was increasingly gaining popularity among the educated elite in Bengal in the last quarter of the 19th century. This was because of a rapid mechanisation of English businesses by the 1880s that led to a growing desire among the colonised Bengali to master the alien technologies and sciences, largely perceived to be a remedy against superstitions and ignorance. It was also a way in which colonial modernity could be understood and mastered. The growth of Calcutta as an economic and political centre in the heyday of the East India Company is implicitly connected to the advent of industrialisation in that period, and its impact on colonial Bengal's cultural, social and political life. The interface between science, technology and culture would soon be reflected in literature.

The first science fiction written in Bengal was in the last decades of the nineteenth century when the effects of the Industrial Revolution were beginning to be felt in Bengal's social and cultural life. Hemlal Dutta's *Rahashya* (The Mystery) was published in two installments in 1882 in the pictorial *Bigyan Darpan*. The story revolved around the protagonist Nagendra's visit to a friend's house, a mansion completely automated and mechanised. Automatic doorbell, burglar alarms and mechanical clothes brushes were some of the innovations described in the story in a tone of gawky wonder.

An early practitioner of science fiction in Bengal was Jagadananda Roy (1869–1933), a prolific science writer, who contributed articles to the magazine, *Sadhana* (edited by Rabindranath Tagore), and whose books included *Ghrohonokhotro* (Planets and Stars, 1915) and *Pokamakor* (Bugs and Insects, 1919). His science fiction novel *Shukra Bhraman* ('Travels to Venus', written in the 1890s) described an interstellar journey and visit to another planet. Sukumar Ray (1887-1923), probably inspired by Arthur Conan Doyle's *The Lost World*, wrote *Heshoram Hushiyarer Diary* (The Diary Of Heshoram Hushiar) in 1922. Like Jagadananda, Sukumar Ray also wrote on scientific and technological subjects explaining natural phenomena or new technology to young readers in the pages of *Sandesh*, a magazine first published in 1913 by his father Upendrakishore Ray Chaudhuri, a notable member of the Brahmo Samaj and a writer himself.

Heshoram Hushiyarer Diary **in early 20th century was unique in its critique of colonial science**

In its eccentric and hilarious narrative *Heshoram* was a spoof on the science fiction genre because the writer poked fun at the propensity of Western science to classify and name things, and that too in longwinded Latin. The brief story suggested that the names were given arbitrarily to objects and the name of a thing was somehow intrinsically connected to its nature. So the first creature that explorer Heshoram met in the course of his journey through the Bandakush Mountains was a 'gomratharium' (*gomra* in Bengali means someone of irritable temperament), a creature that sported a long woebegone face and a cross expression. This tour de force certainly subverted the generic characteristics of a sci-fi and although just an extract, *Heshoram Hushiyarer Diary* was unique in its scathing critique of colonial science.

Premendra Mitra (1904-1988) was one of Bengal's most famous practitioners of science fiction. Mitra's stories are still read avidly in Bengal. His memorable character Ghanashyam Das (Ghanada in short), first appeared in a story called *Mosha* ('Mosquito' 1945), in which a mad scientist created a new strain of mosquito to wipe out the world. Ghanada's timely appearance and an even timelier slap saved mankind from this virulent breed. Ghanada, a lanky bachelor famous for his tall stories and his even taller brand of courage and curiosity, was a personification of Mitra's humanistic ideology and moral universe. Without greed and scrupulously honest, Ghanada strove to rescue mankind from the apocalyptic failures of science. In collections of stories like *Ghanadar Galpo* (Stories of Ghanada) and *Abar Ghanada* (Ghanada Again) that Mitra wrote through the '50s and '60s we saw this quintessential Bengali travelling to space in search of Black Hole or diving under the seas to discover the mysterious origin of the universe to fortify our engagement with the world.



In Premendra Mitra's sci-fi stories, a Bengali travelled to space in search of Black Hole or dived under seas to discover the mysterious origin of the universe

Leela Majumdar (1908–2007), a niece of Upendrakishore, was probably the first woman in Bangla to venture into sci-fi. Her science fiction fantasies were peopled by extraordinary humans, plants, animals and ghosts. Through her presentations of the bereft, the strange and the underdog, she not only managed to stretch the borders of middle-class domesticity, but also presented an inclusive vision of the universe where strange things could be accepted with ease and nonchalance. Most characters of her stories had a marginal place in society. They were small people, sometimes literally so, as many of her heroes were children: naughty children, poor children, or children who were the despair of parents. The marginality of her characters was a social marginality rather than an intellectual/imaginative one: her heroes might be poor or unimportant but they were forever curious about the world and unafraid to explore its possibilities.

Although hugely popular and often bestsellers, her writings expressed a certain world-view that critiqued Western Enlightenment-driven notions of science prevalent in the Bengali public sphere. Almost all her science fiction stories used science in a double bind—science was a "narrative of progress", a sign of modernity, and also a signifier of a space in which a critique of modernity could be articulated because it accommodated the marginalised. Majumdar's sci-fi stories like *Shortcut* and *Shiri* (The Stairs) suggested that science could be good, because science empowered us with knowledge and compassion, and could be a source of freedom. A true scientist was always a true humanist. And likewise, the marginalised and the downtrodden could be freed by science because only science was capable of removing poverty and injustice.

The humanistic and altruistic aspects of science could also be seen in the stories of Satyajit Ray, son



ILLUSTRATIONS: KARNO GUHATHAKURTA / CSE



of Sukumar Ray, who carried on the family tradition of science fiction writing and created *Professor Shonku* in 1961. The first science fiction featuring this eccentric hero was written for the magazine, *Sandesh*, and was called *Byomjatrir Diary* (The Diary of a Space Traveler). In all, 38 complete and two incomplete diaries (the last one came out in 1992) narrated the fantastic world of Shonku's adventures, inventions and travels. As a fictional character, Professor Shonku was tremendously real: courageous yet forgetful, inquisitive yet self-controlled. His wit and humor made him very human and his inventions were impressive: Anhihiline, Miracural, Omniscope, Snuffgun, Mangorange, Camerapid, Linguagraph. Some were drugs, some gadgets and some machines but all with human purposes and uses. None were allowed to reign over or be more powerful than the human mind that invented them. Some of Shonku's machines even took on human characteristics and were transformed from mere inventions to beloved companions with human names. The first diary started by describing Shonku's efforts to build a space rocket. The first one that he built came down on his neighbour Abinashbabu's radish patch. Abinashbabu had no sympathy for Shonku; science and scientists made him yawn. He often urged Shonku to set off his invention on Diwali so that the neighborhood children could be suitably entertained.

Shonku's world was a real, human world. In his preparations for the space journey he decided to take his cat Newton with him. He had invented a fish-pill so Newton would not starve in space. Two other of Shonku's companions would be his loyal servant Prahlad and robot Bidhusekhar. The first entry on the latter is worth a longer look.

"For the last few days I can hear Bidhusekhar making a 'ga,ga' noise. This is strange in itself because he is not supposed to utter a sound. He is a machine, he must do whatever he is told, the only sound he is supposed to make is the clang of metals when he moves…. I know he has no ability to think nor does he possess any intelligence. But now I can see a difference in him." That his robot had unimaginable human characteristics became evident when Shonku made Prahlad try out his spacesuit. "Today I called Prahlad to the laboratory to try out his suit and his helmet. It was a sight. Prahlad was in splits. To say the truth, even I felt like laughing. Just at this moment I heard a metallic guffaw and turned to see Bidhusekhar sitting in his chair swaying and making a new sound. There can only be one meaning to that clatter. Bidhusekhar was also sniggering at Prahlad."

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VINAYAK RAZDAN

FROM CACHE

"And the prospect of the Encyclopedia Galactica itself—what a monumental project! Imagine the reaction when the public learns that the Galactic Library is involved with such an undertaking designed to highlight the splendor of our civilization—our glorious history, our brilliant achievements, our magnificent cultures. And to think that I, Chief Librarian Tryma Acarnio, is responsible for making sure that this great Project gets its start."

Acarnio gazed intently into the crystal sphere, lost in reverie.

~ Isaac Asimov's Forward, The Foundation (1993)



Asimov was a prolific writer. Wikipedia entry against his name will tell you that the man wrote or edited more than 500 books and composed an estimated 90,000 letters and postcards. If words imply information, surely his writings must offer a server worth of information. And somewhere in those words are his many visions of humanity's future.

Ironically, for someone who anticipated some of our information systems in his writings, Asimov died a victim of lack of information in 1992. Back in the 1980s, if information about HIV was easily and readily available, he may not have contracted the virus from blood transfusion during a bypass operation in 1983.

In one of Asimov's futures, creation of Encyclopedia Galactica seems like a conceited exercise driven by ego. In reality, we humans ended up creating an all-encompassing encyclopaedia of everything, the Internet, inadvertently, out of our ability and need to crunch big numbers, need to handle data, need to process and create information, and a need to dispense it. Given similar needs, Asimov in a way did conceive something akin to the Internet in his famous story *The Last Question.*

In this story, one of his most curious literary creations, Multivac, evolves alongside man as they together try to find an answer to the question: can entropy be reversed? Surprisingly, as time passes, Multivac shrinks in size even as its computation power increases exponentially. It goes down to "personal" size and then to a two-inch cube that is connected through "hyperspace with the great Galactic AC that served all mankind". Asimov conceived this story in around 1955, just when Alan Turing was talking along similar lines based on his work with computing machines. Moore's Law, that clearly relates computational power and integrated circuit size, was formulated only in the 1970s.

Multivac appears in a number of other Asimov stories too and it almost always appears like an oracle. Or rather an oracle that does not beat around the bush and answers directly. You ask a question, you get an answer. Unlike the de-centralised structure of most of the Internet today, Asimov almost always thought of Multivac as a centralised entity that may be controlled, most often by the government.

In 2002, a survey carried out by the Nobel Institute on 100 of the world's best authors from 54

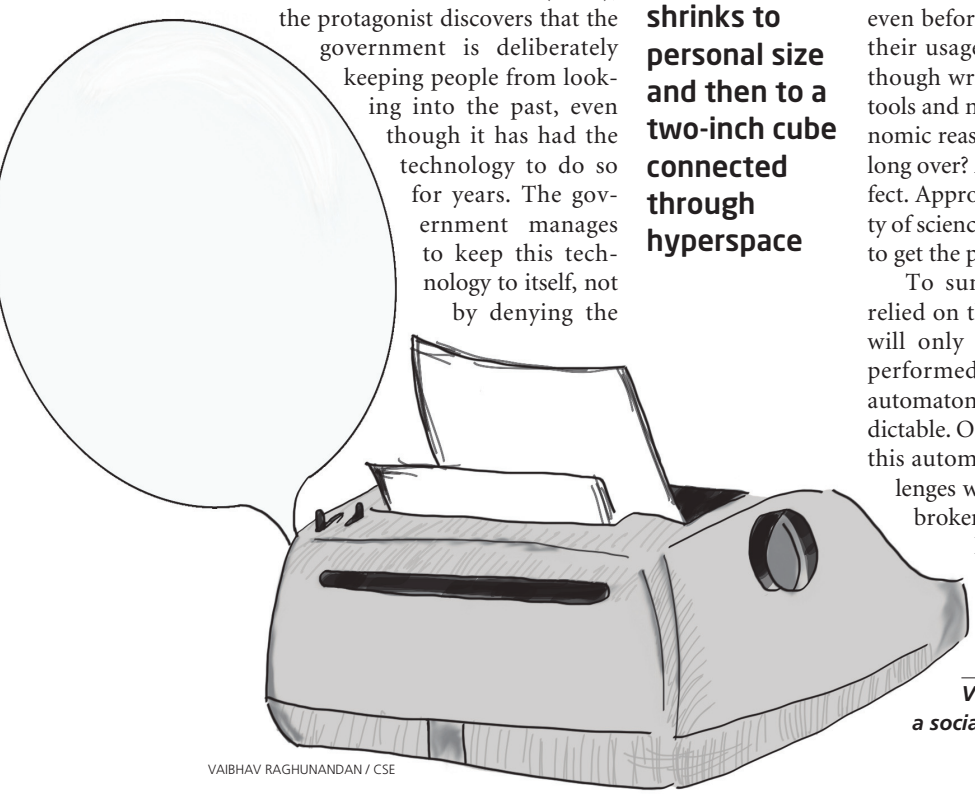
countries led to *Don Quixote* being declared the best book of all time. Newspapers trumpeted the news. But how does one arrive at the "best book of all time"? A year later, Salman Rushdie, one of the writers who took part in the survey, claimed the writers who took part in the survey were asked to list, in no particular order, 10 of their favourite books, then this list was fed into a computer. In the end, the computer declared *Don Quixote* to be the greatest and most meaningful book of all time. Only decades ago, the fact that a machine was deciding matters of art may have raised some eyebrows and maybe given rise to some interesting critique of the methodology. But not a whisper was heard.

Compare this to the plot of Asimov's 1955 story *Franchise* and the debut of Multivac. The story is about the US election in 2008. The election was a simple affair. Computer selected a man, a representative of the electorate, and asked him a few questions. Based on this one man's answers, a President was elected. With all that computational power at hand, it probably was not hard for Asimov to guess which route humanity will take. At the start of this story, the protagonist is weary of the computer-driven election process but by the time the process is over, and after he has exercised his vote, he feels: "In this imperfect world, the sovereign citizens of the first and greatest Electronic Democracy had, through Norman Muller (through him!) exercised once again its free, untrammeled franchise."

Wasn't fate of past empires, too, sealed by the decisions of a select few? Marx would probably agree, even as he would ask Asimov to explore the idea a bit more.

In Asimov's *The Dead Past* (1956), the protagonist discovers that the government is deliberately keeping people from looking into the past, even though it has had the technology to do so for years. The government manages to keep this technology to itself, not by denying the existence of such technology but by building a bureaucracy around it, and by effectively managing the information about it. It publishes bogus journal articles about ancient history that would excite no special interest from the general public. It hides the time-viewing machine right under the nose of the people by telling them that the viewer is working, always busy seeing the dead past of some ancient period. The protagonists manage to get past the government blockade and even build a portable time-viewer. However, in an anti-climax, they realise that the government was not wrong: once the time-viewer is out for public consumption, most people will only be interested in the mundane and the illicit. They realise that the government was only trying to protect the world and that their action of unravelling the truth has unbalanced the world and pushed it towards an uncertain future.

Multivac shrinks to personal size and then to a two-inch cube connected through hyperspace



VAIBHAV RAGHUNANDAN / CSE

Invert this story, twist it a bit and you can see a prophecy about Wiki-Leaks and questions it opened up. Information may or may not be liberation but control of information is certainly power. Were not libraries burnt during the crusades for power?

A good science fiction writer may or may not be right about his vision, but like a good fortune-teller he will certainly read your past, your fears and worries, and then he will conjure an appropriate future, one that is almost always identifiable. We did read about these cool gizmos connected to hyperspace, but who would have written that people would be hooked on these pad-thingies? Who would have written that mobile devices would cause men to have bad dreams about the health of their testes? Who would have written that these devices and their support towers would proliferate even before any proper health study was done on their usage? Who would have claimed that even though writers of future will have better research tools and more time at hand, yet purely out of economic reasons, the age of prolific writers would be long over? A fortune-teller does not need to be perfect. Approximations are enough. That is the beauty of science fiction writing, the best of it only needs to get the past right.

To summon visions of future, Asimov too relied on the past. It is almost like Asimov's man will only perform actions that he has already performed in the past. His man is almost an automaton. The inputs and outputs are always predictable. Only the plot, the simulation within which this automaton runs, offers various kinds of challenges with its simple twists and turns. It is past broken down into a simple edible recipe with a lot of dressing of delicious jargon. And sometimes with this dish, comes a fortune cookie, a message, a piece of information about the future.

Vinayak Razdan works with a start-up as a social games developer/designer



ANIRUDDHA SENGUPTA

AND SO IT GOES



A couple of weeks ago, I got a call from a man who identified himself as Kaushik Das Gupta, the Features Editor of *Down To Earth* magazine. He told me about this science-fiction-themed issue and asked me if I would write a piece for it. I agreed. Thinking about science fiction and its links to environmental issues, I decided to do a piece on one of my favourite authors, Kurt Vonnegut, and the lateral way he had of looking at the earth, humanity and the problems each creates for the other. But as I began writing the article, a strange thing happened. I was interrupted—by the computer! Suddenly, words started appearing on my screen which I wasn't putting there. What it turned out to be ... okay, the best way to let you, the reader, know what it was is to let you read the piece as it emerged, with all the interruptions. So here it goes ...

Evolution paints not just in broad strokes. Even what an individual turns out to be is in many ways an evolutionary process. Where you are born and where you live, who your parents and ancestors were, what decisions they took, all of this plays a strong role in who you end up being.

Kurt Vonnegut's great-grandfather Clemens was a Freethinker in Germany in the early 19th century, a member of a group that rejected organised religion for a secular, scientific outlook on life. Given this ancestral proclivity, it is kind of inevitable that Vonnegut would turn out to be a humanist and a radical.

From his earliest writing, he focussed on the perils of modern-day development, especially the Western model of industrial development. His first published novel, *Player Piano*, was set in a dim and dystopian future not unlike that of Aldous Huxley's *Brave New World*, where technology had left humans reduced, ironically, to the status of automatons. Unlike Huxley, though, Vonnegut took a more pessimistic view of mankind's response, with little hope of deliverance remaining at the end of the story, which felt odd, given that the book itself felt lighter and less oppressive than Huxley's. As Granville Hicks wrote in a review of the book in the *New York Times*, "*Player Piano* is … a less serious (book) than *Brave New World*, but what Mr. Vonnegut lacks in fervor he more than makes up in fun. ... Whether he is a trustworthy prophet or not, Mr. Vonnegut is a sharp-eyed satirist."

Vonnegut recognised the complex relationship between corporation, war, and the exploitation of people and resources

The element of fun is what keeps Vonnegut's dark view of the future of our planet from becoming oppressive. Later in life, one journalist wrote of him: "Vonnegut adds humor, a wild black humor, while most sci-fi is serious to the point of boredom. … Vonnegut seems pre-occupied with genuine human questions, about war, peace, technology, human happiness. He is even bitterly anti-machine, anti-technology, anti-science."

Along with a strong humanism, these are all properties that show up in many of his main characters. They are true of Paul Proteus, the out-of-synch-with-society protagonist of *Player Piano*. They could well describe the millionaire Eliot Rosewater whom people are out to show as insane in *God Bless You, Mr Rosewater*. And they are true of the recurring autobiographical character, Kilgore Trout, whose first appearance is in that book.

Trout, who is described as having great ideas, but being a terrible writer, was orig

o

Hey!

Huh? What the hell?

You writing about me?

Who ... what ... are you?

I'm Kilgore Trout.

What do you mean, you're Kilgore Trout?

Damn, if I had a dime for the number of times I have had to do this ... I am the disembodied consciousness of Kilgore Trout. After my creator died in 2007, I was reduced to some form of digital super-consciousness, caught in what I can only imagine is a cyberspatial chrono-synclastic infundibulum. I don't really know—He

might have been able to explain it. All I could figure out is that if someone uses my name on a computer or refers to me in some way online, I materialise there.

But that's not what a chrono-synclastic infundibulum does, according to Vonnegut.

Oh, what did He know? I'm the one who's been through it all. He just wrote about me.

Are you saying that you actually wrote some of the stories he mentions in his books? But how could you—you're just a character?

Just because I'm fictional doesn't mean my ideas aren't real. Come on, even a child knows that.

Yeah, sorry. I really love your little stories, especially the ideas behind them. They seem so simple but have so much to say. Like the one about the money tree with 20-dollar bills for leaves that attracts people to it so they will kill each other around the tree's base and become its fertiliser.

That? That wasn

Hello? Mr Trout? Kilgore? You there?
That was the strangest thing! It was unbelievable, but the evidence is right there on my screen. Whatever it was, it seems to have stopped all of a sudden, so I don't see what I can do but get back to writing my article.

What began as a detached dystopian view of the world in *Player Piano* became darker and gloomier as time passed. The inaction on the part of the world's leaders on critical environmental issues was something Vonnegut wrote about both in his fiction as well as in columns and essays. In one article, he wrote, "Some of the loudest, most proudly ignorant guessing in the world is going on in Washington today. Our leaders are sick of all the solid information that has been dumped on humanity by research and scholarship and investigative reporting."

He left no room for doubt on what he felt the cause of the planet's malaise was. In another article in a magazine called *In These Times*, he wrote, "Our close cousins the gorillas and orangutans and chimps and gibbons have gotten along just fine all this time while eating raw vegetable matter, whereas we not only prepare hot meals, but have now all but destroyed this once salubrious planet as a life-support system in fewer than 200 years, mainly by making thermodynamic whoopee with fossil fuels."

In his stories, Vonnegut also recognised the complex inter-relationship between corporatisation, war and the exploitation of people and resources. He satirised this nasty web in a Kilgore Trout story called *The Gutless Wonder*, in wh

o

Hey!

Wow! Are you back?

Oh, it's you.



Here's what I think the truth is: we are all addicts of fossil fuels in a state of denial, about to face cold turkey

—Kurt Vonnegut, Cold Turkey

Yes. By the way, what is that mark that appears before you do?

It's an asshole opening and closing.

Oh, I get it. From that drawing Vonnegut did in *Breakfast of Champions.*

Not Him—that was me, too. What are you doing, anyway? How come I keep popping up here?

I'm writing a piece on Vonnegut for a magazine on environmental matters.

Yeah, that was one of his pet peeves. Always complaining that the planet was going to the dogs.

You don't think it is?

No. I know it is. I've been to the future, and there's nothing there. But I shouldn't be telling you that.

Nothing? Really?

Forget I said anything. What brought me back here?

I was writing about your story *The Gutless Wonder.*

Oh yeah, the one about the mass murderer.

Well, he was just a pilot who dropped bombs because his country was at war.

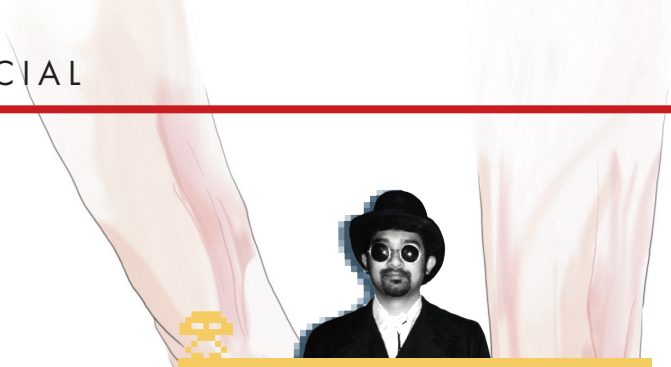
Yeah, and killed thousand, perhaps millions. That's what a mass murderer does. Just because he doesn't look into the eyes of the people he's killing doesn't change that.

I loved the irony of the story. This guy who kills people by the townful is shunned by society not because of his deeds but because he has bad breath. Such a powerful commentary on contemporary values.

It's all about the advertising, boy. Television is truth. Reality shows are the new reality. And if your TV tells you that bad breath gets you shunned, then bad breath does indeed get you shunned. Don't matter what you did or di

Damn! He's gone again! Time to wind this up, anyway. I'll end with what a little alien in one of Trout's stories says about a global epidemic: "After the Rape of Nanking, the Holocaust and the gratuitous atomic bombing of Nagasaki, not to mention humankind's poisoning of the air, the waters and the topsoil, your planet's immune system is trying to get rid of you." And Vonnegut's own comment about this from an article titled 'Last Words for a Century' that he wrote in *Playboy* in 1999: "Yes, and the planet will soon run out of petroleum in any case—so our great-grandchildren will inherit an enormous junkyard." So it goes.

Aniruddha Sengupta is a writer constantly struggling with all manners of temptation presented by his chosen home, Goa



YOHAN J JOHN

SHADOWS OF MODERNITY

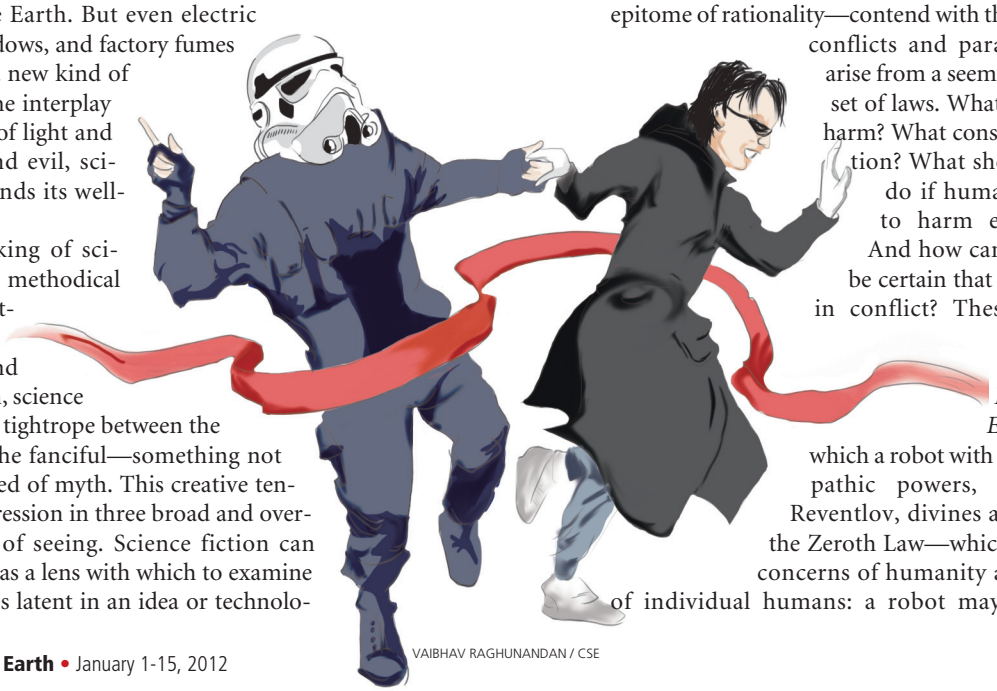
There was a time when the human ability to conjure visions from beyond the domain of everyday experience expressed itself only in tales of the supernatural—in myth, legend and fairy story. Humans once lived in a shadowy world populated by spirits, gods, demons, angels, and phantasmagorical beasts. Magic and mystery were the key forces in nature. Our myths gazed into the past—often to a Golden Age that came to a tragic end, perhaps because of human wickedness or divine capriciousness. Our myths helped to fend off the ever-present darkness on the margins of settled life.

But one day a new light arrived in the village, and the forest, with all its irrational terrors, was cleared to make way for the factory. We were told that magic and mystery would soon be replaced by reason and certainty. Wild nature would be tamed. When we moved from the village to the city, the glories and dangers we imagined no longer belonged to the past, but to a future in which humankind might one day illuminate all the dark corners of the Earth. But even electric light casts shadows, and factory fumes shroud us in a new kind of darkness. In the interplay of new forms of light and dark, good and evil, science fiction finds its wellspring.

In the yoking of science—with its methodical mastery of matter—to the freedom and flight of fiction, science fiction walks a tightrope between the possible and the fanciful—something not usually expected of myth. This creative tension finds expression in three broad and overlapping ways of seeing. Science fiction can manifest itself as a lens with which to examine the possibilities latent in an idea or technology, a funhouse mirror with which to reflect society or history, or a kaleidoscope with which to experience a sensory immersion in an alien realm.

Isaac Asimov's body of work is exemplary of the first, and some might say purest, form of science fiction—a lens that brings into focus the fuzzy implications of science and technology. Here, the science really is central, and individual human characters often seem no more than vehicles for the unfolding conceptual drama.

In the Robot series, Asimov explores the moral and ethical consequences of the Three Laws of Robotics. (1) A robot may not injure a human being or, through inaction, allow a human being to come to harm. (2) A robot must obey the orders given to it by human beings, except where such orders would conflict with the First Law. (3) A robot must protect its own existence as long as such protection does not conflict with the First or Second Laws. Asimov's robots—portrayed as the epitome of rationality—contend with the inevitable conflicts and paradoxes that arise from a seemingly simple set of laws. What constitutes harm? What constitutes inaction? What should robots do if humans attempt to harm each other? And how can the robots be certain that the laws are in conflict? These conflicts culminate in the novel *Robots and Empire*, in which a robot with unique telepathic powers, R Giskard Reventlov, divines a new law—the Zeroth Law—which places the concerns of humanity above those of individual humans: a robot may not harm

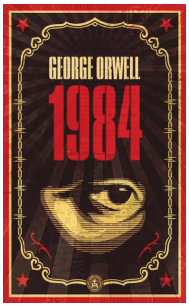


VAIBHAV RAGHUNANDAN / CSE

humanity, or, by inaction, allow humanity to come to harm. The Zeroth Law is not programmed into Giskard—it simply emerges in him—but in trying to rationally decide whether it will be good for humanity or not he ends up destroying his positronic brain. In this fatally consuming struggle we can see echoes of the tortured life of the mathematical genius Kurt Godel. Godel may have been driven mad by his logical proof that logic itself must either be inconsistent or incomplete. The robot Giskard, before he dies, passes on the Zeroth law—and his telepathic powers of persuasion—to another robot, R Daneel Olivaw, who is entrusted with the task of being caretaker of humanity as it pushes beyond Earth to colonize the galaxy.

In Asimov's Foundation series, human society has long since spanned the galaxy, and we follow the legacy of a mathematician, Hari Seldon, who has developed the laws of psychohistory—a combination of history, sociology and statistics used to make predictions about large groups of people. Seldon's laws predicted that the Galactic Empire would collapse, leading to a period of barbarism lasting 30,000 years. Horrified, Seldon sets up two Foundations that are to strategically intervene in the events of the galaxy, reducing the period of barbarism to "just" 1,000 years. The last book in the series, *Foundation and Earth*, even links the story with the Robot series, making explicit the connections between the aims of psychohistory and the Zeroth Law of Robotics. In taking a view of future history that stretches into the tens of thousands of years, Asimov's lens focuses not on any particular technology, but on scientific rationality itself. Can humans and their technologies (robots) be used to take care of an abstraction—humanity? And who or what gets sacrificed for the "greater common good"?

Looking outward through a lens typically does not lend itself to much in the way of introspection. For this purpose we have mirrors. The 20th Century's great genre-crossing works of dystopianism—*Brave New World* and *1984*—stand as canonical examples of the mirror style of science fiction. In Aldous Huxley's *Brave New World,* the state religion is Fordism, inspired by Henry Ford's assembly line—a system based on mass production, a rigid chemically controlled caste system, and consumption of disposable consumer goods. Any desires that cannot be met in these ways can be assuaged with the wonder-drug soma. But those who dare to be dissatisfied with their lot in life are cast into exile. In George Orwell's *1984*, a police state perpetually at war is controlled by an omnipotent Party watched over by the deified and omnipresent leader, Big Brother. It is a nightmarish world of constant surveillance, torture, paranoia, servility, and betrayal. Orwell apprehended our fears will ruin us. Huxley feared that our desire will ruin us. During the Cold War, the world seemed to be presented with two opposed visions—the cruel totalitarianism represented by the Soviet Union, or the vampiric seduction represented by Western consumerist capitalism. The logical conclusion of one would give us Big Brother, and that of the other would be Fordism. Like Old Testament prophets of doom, Huxley and Orwell are inviting us to look within ourselves to root out the seeds of such awful destinies. In the US, we seem to be witnessing the merging of these two means of control. The increasingly militarized police force beats back the protesters and dissidents—those for whom freedom means more than mass-produced hamburgers and shiny electronic toys.



George Orwell apprehended our fears will ruin us and Aldox Huxley apprehended our desires will ruin us. During the Cold War the world seemed to be represented by these two opposed visions

But light need not only be used for practical purposes. Most science fiction, it must be said, does not take itself so seriously as to focus too sharply on any single moral, political or technological idea. Rather than haranguing us with portentous warnings about our present or our future, the kaleidoscopic aesthetic presents a dazzling hodge-podge. Many people enjoy science fiction for no better reason than its grand canvas of spaceships, androids, aliens, ray guns, and intrepid humans dashing about the planet or the universe on an adventure of limited pedagogical value. A lesson might conceivably be derived from a movie like *Predator* or *Alien* but it seems as if the point of such movies is the sheer visceral thrill engendered in the watching. *Even 2001: A Space Odyssey*, with its dark implications for malevolent artificial intelligence, is more an audiovisual adventure than a conceptual exploration: how else can we explain the power of the psychedelic dreamscape with which the film ends? This kind of interpretation seems especially true of a movie like *The Fifth Element*, a giddy ride through a future that seems contrived purely for sensory stimulation. Even the quasi-mystical overtones in the plot appear kitschy and ironic. If we refrain from intellectualising our experience of science fiction, we can appreciate the effervescence and inventiveness of an art form that isn't necessarily about anything.

Some works of science fiction, however, cannot be said to fit neatly into any of the above categories. They are transcendental, in that they encompass all of the categories, creating an emergent whole that confounds easy pigeonholing. The film, *The Matrix*, is emblematic of this form. It uses the hacker aesthetic of the Internet Age as a springboard from which to launch into a stylised war between humans and rogue machines—machines that were once designed to serve humans, but later enslaved them in an illusory virtual world: the matrix. But the Matrix is also a mystical story of self-discovery and personal liberation, taking on an emancipatory logic found in many religions. Neo's liberation from his womb-like prison is the first step on the road to discovering that he is the One—a man prophesied to end the war and transform the

matrix itself. In this he is like the Buddha, attaining Nirvana and spreading his revolutionary message throughout the world. He is also a Messianic figure, dying and then being reborn for the salvation of the enslaved. But even this does not fully capture the multiplicity of messages latent in *The Matrix*. If emancipation means unplugging from a comfortable world and awakening to a real world of war and desolation, then *The Matrix* can also be read as a cry for left-wing revolution in the modern post-industrial world: unplug from the matrix of consumption, and rise up against those who see us merely as a source of fuel. Whether the filmmakers intended any or all of these interpretations is irrelevant. For a generation of young people, *The Matrix* was a rite of passage: for those who chose that path, it was an initiation into a world that could be read as a matrix of symbols.

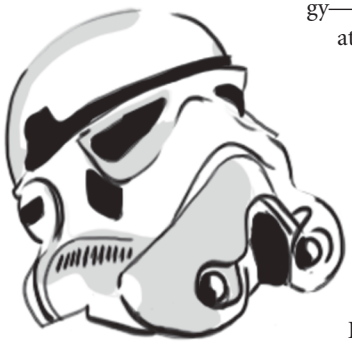
Symbolism also plays a role in the epic television series *Battlestar Galactica*, but that role is far more murky. The overarching plot bears a vague resemblance to the biblical exodus, in which the Israelites wandered through the wilderness in search of the Promised Land. There are also references to Greek mythology—there are important characters with names like Hera and Athena. Humanity has been all but exterminated by the Cylons—a race of renegade robots created long before by humans. The remnant of the destroyed Twelve Colonies of humanity—named after the 12 signs of the zodiac—band together as a flotilla searching for a new homeland. In their quest for a home planet they turn to ancient prophesies about a 13th colony, Earth. While the symbolic mysteries unfold and baffle, the series also presents us with less ethereal—but no less engaging—debates on the nature of democracy and justice, on the role of the armed forces during crisis, and on racial profiling and discrimination. The central plot element that injects an unprecedented vitality to these debates is the discovery that the human population has been infiltrated by a group of Cylons indistinguishable from humans.



Unlike the kind of science fiction in which the enemy is readily identifiable, the humans in *Battlestar Galactica* are also at least partly at war with themselves. The resonance with the era of "with us or against us", Homeland Security and terrorist sleeper cells is undeniable, and yet *Battlestar Galactica* does not lend itself to easy moral, political, philosophical or religious lessons. What you glean from the series depends to a great extent on which characters you choose to focus on, or which symbols you attempt to decipher, and in this complexity its closest equivalent is perhaps the *Mahabharata*.

Most sci-fi does not take itself so seriously as to focus too sharply on any single moral, political or technological idea

The quintessential example of transcendental, mystical science fiction is the original Star Wars trilogy—the series that ushered in a golden era of popular science fiction filmmaking in the 1980s. From the outset it appears to go against standard science fiction protocol. It is not set in a future Planet Earth, but "A long time ago in a galaxy far, far away". It features grand battles between good and evil, but it resists any identification of these conflicts with contemporary political questions. And though it has all the riotous jazziness of pastiche—part Western, part Japanese samurai story, part World War II campaign against Nazi SS officers—it has an emotional core that goes beyond cinematic thrill-seeking while simultaneously satisfying that urge. *Star Wars* occupies a special place in the history of popular science fiction: it's a blockbuster that paints a mythic story on a galactic canvas. It is no surprise that Joseph Campbell—the preeminent scholar of world mythology—was a major influence on its creator, George Lucas.



At times, it may seem that in mythologically tinged science fiction, we have all but forgotten the word "science". Recalling a key scene from the first film (*Episode IV*), will help us restore the link. Luke Skywalker, trying to target a vulnerability in the Death Star, hears the voice of Obi-Wan Kenobe, telling him to use the Force, rather than the computer targeting system. In doing so, Luke succeeds where others who used their computers failed—using the Force allows him to destroy the Death Star. One can't help but interpret this climax as a momentary turning away from all that is technological and robotic. The forces of evil with their martial technologies are captained by Darth Vader—"more machine now than man"—while the forces of good are lead by a scruffy band of rebels and an old man espousing a "sad devotion to that ancient religion". Even someone fully embedded in the world of technology—sitting in its very cockpit—has a choice regarding whether or not to fully submit to the machine.

In showing us what our lenses, mirrors and kaleidoscopes are capable of, science fiction invites us to wonder what we humans are capable of, if only we are brave enough "to boldly go where no man has gone before".

Yohan J John is post-doctoral research associate at Boston University's Neural System Lab



DILIP RAOTE

INFINITE SPHERE

Science in the West is a consequence of the revolt against the bullying of the Christian Church. The Church said God created everything in a week and anyone who questions this is a sinner who must be punished severely. This provoked the thinking types, who wondered how it all happened, when did it begin, why so many life forms were created, is Earth the centre of the universe, why does the apple fall? These mind games were originally undercover activities, but they produced geniuses like Kepler, Copernicus, Galileo, Newton and many more. Science became a respectable pursuit as the power of the Church declined.

But the conflict did not end. There are now many fundamentalist sects whose minds are trapped in Old Testament times. There are also the compromisers who say that religion is very scientific. And there are the scientist sects which ridicule religion and claim that God is a delusion and everything is the result of only evolution. The "God Delusion" evolutionists are as noisy and aggressive as creationists. An Indian scientist who does his morning prayer ritual and then goes to his laboratory will be seen as weird by these Western sects.

As science and technology progressed and the positive and negative consequences spread globally, questions began to be asked. What next? What will be the immediate and distant future? How will science and technology affect human relationships? What will be the consequences of the pollution of the atmosphere and water? How will viruses adapt and evolve to fight medical advances?

This wonder about the future has produced science fiction that extrapolates sci-tech developments to a possible future, on Earth and in space. Science fantasy goes beyond sci-tech extrapolations. But science and technology are accelerating so fast that science fiction and fantasy become obsolete within a few years. Science fiction of even the 1980s did not anticipate mobile phones and SMS lingo, laptops, ipad and icloud, Facebook, consumerism and the organised dumbing down by the media, and deformed babies caused by air and water pollution.

Science fiction is about action. There is no speculation about quiet, solitary figures like writers and artists

The only science fiction that seems to be heading for reality is that of *The Time Machine* by H G Wells, *Brave New World* by Aldous Huxley and *1984* by George Orwell. The world is already in Wellsian time when *Homo sapiens* are divided into a majority of stupid Eloi and the minority Morlocks who feed on the Eloi and keep them entertained.

Science fiction, like crime thrillers, is about action. So there is no futuristic speculation about quiet, solitary figures such as writers or artists and how or what they would create, and how literary and artistic language will change. Could an Indian 100 years ago have made sense of this current language of a slum teenager: "*Tera kya* problem *hai? Kayku* tension *leta hai?* Enjoy, *yaar! Kuchh trouble hoga na, to apunko* SMS *kar,* ya missed call *de! Apun sab* fixing *karega!*" Certainly not. So, what will teenage language be 50 years from now? How will writers churn out stories, plays or poems when pen, paper and keyboards have disappeared? Will classics of the past be written by scholarly computers into contemporary languages?

There is no sci-fi about trees, flowers, fruits. But it cannot be ruled out. Imagine a bedroom full of

genetically modified potted plants swaying and glowing to the rhythm of a mating human couple. Perhaps the plants can be connected to music systems, which convert their swaying into a symphony, raga or rock 'n' roll. We know that trees/plants enjoy music and have extrasensory perception—it was discovered by the genius polymath and sci-fi writer Jagdish Chandra Bose a century ago—and music is now used in grain fields and greenhouses to cheer up the plants and increase their output.

To speculate about artists of the future, when canvases and paints are obsolete, is a little easier. The painter stands before a large electronic screen, runs an electronic brush on the screen and presses colour buttons. When the painting is finished he e-mails it to an art dealer, several art critics and art galleries. In the homes of buyers the painting appears as an image on electronic walls. The painting can be switched on or off, and enlarged or miniaturised. The comments of art critics flash below the painting. The viewer stares at the screen and blinks eyelids fast. A choice of music appears on the screen. The viewer focuses on one and blinks. The music starts. It is impossible to predict the music of the future, but one can play a mind game. Imagine the combination of a Picasso and jazz, *Mona Lisa* and opera star Maria Callas or Kiri Te Kanawa, a Mughal painting and the awesome Begum Akhtar. Sculptures too will be 3D images, or can be converted into solid pieces by nanotechnology. Will these predictions be obsolete by 2025?

What about mythology, a field ridiculed by Western scientists as extravagant fantasy? Science fiction becomes quickly redundant, but mythology has survived for thousands of years and will continue into the distant future. Why?

According to Western beliefs, there was no science in the ancient past. Therefore, there cannot be science fiction. This is ridiculous fundamentalism. Ancient civilisations built awesome pyramids, temples, palaces, fortresses, planned cities with water supply and plumbing. They had agriculture, manufacturing, commerce, trade by land or sea routes, coinage, art, doctors and medicine and surgery, astrologers, transport systems, science of warfare and weapons and armour, kitchenware and the art of cooking which required judging the chemical consequences of food items.

Sci-fi quickly becomes redundant. But mythology has survived for thousands of years

All this could not have been possible without an understanding of maths, physics, chemistry, engineering, biology, botany, astronomy, design and manufacture of complex tools. There were no science journals then where these ideas could be written in "proper" scientific form. The ancients were not interested in theory, but in the down-to-earth application of ideas. The ancients were lateral-thinking practical people.

Mythology has flying humans, invincible armour, mind-controlled weapons, flying machines, spaceships and space warfare, colonies on other planets, submarine cities, talking trees and animals, wormholes through which deities did instant travel over long distances, parallel universes, mass manufacture of babies (100 Kauravas), robots and artificial intelligence, fetus learning (Abhimanyu and Ashtavakra), futurology, telepathy, environmental concerns, and much more. If the ancients didn't have science how did they conceive these ideas, some of which can be implemented now and some are still in the distant future? If modern science fiction writers and sci-tech specialists cannot think more than 20 years ahead, how did the ancients think in terms of thousands of years? It is an awesome mystery that requires serious scientific investigation.

Are mythologies memories of a very distant past which ended with a catastrophe on Earth? Only small groups of humans survived. Deprived of all science and technology, they started the evolutionary process again some 20,000 years ago. But their memories of the glorious ancient past were transmitted from generation to generation until they



VAIBHAV RAGHUNANDAN / CSE

could be written down as what is now called mythology. Ridiculous idea? Where is the archaeological evidence of this past? Well …

Consider another possibility: Earth is invaded by aliens from a distant solar system. They created bio-robots (who later called themselves *Homo sapiens*), stayed around for a while to speed up the evolutionary process, and then departed. Are mythologies records of these aliens?

Now consider this distant future. Earthlings colonise Moon, Mars and the satellites of Jupiter and Saturn. Because of different gravity and environmental conditions, the body structure of humans changes. It is impossible to travel back to Earth conditions. Over decades and centuries the colonisers become shorter or taller, their skin changes, the eyes evolve to cope with radiation. Sexual mating, pregnancy, and baby delivery will be different in the varied gravity conditions. The plants and animals taken there from Earth will also evolve differently.

Then there is a catastrophe on Earth. All life on land is destroyed and Earth is entirely under water, except some mountain tops on which a few survivors have sought shelter. A new evolutionary process begins. Meanwhile, memories of Earth civilisations will become mythologies in space colonies. New deities will be added to the old folklore—Einstein, Gandhi, Rajinikanth, Bruce Lee and many others. Surely, these mythologies too will be ridiculed by scientific sceptics.

According to Western belief, ancient past was devoid of science, and therefore of science fiction. This is fundamentalism

The Big Bang, which started it all, happened nearly 14 billion years ago. The end of the universe, or the Big Crunch, is many billions of years ahead, long after Sun has become a white dwarf. Time will come to an end. Then the whole evolutionary process will begin again with another Big Bang. Imagine the Big Bangs, Big Crunches and evolution going on in an infinite number of parallel universes.

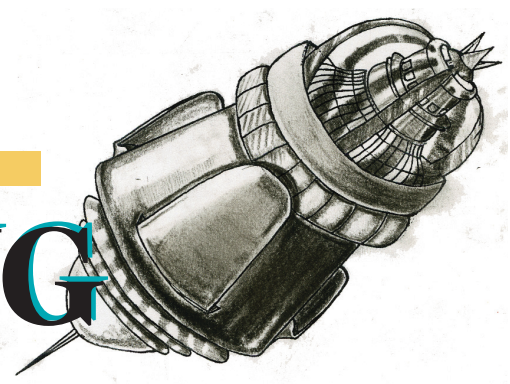
All this brooding brings to mind the last lines of a poem by physics genius Richard Feynman: "I, a universe of atoms,/ An atom in the universe." Could our universe be having similar thoughts about its existence among infinite universes? Only God, or the God Delusion, knows.

Dilip Raote is a journalist and sci-fi buff



ANIL MENON

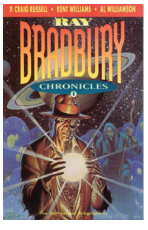
THE MISSING



In 1896, Jagdish Chandra Bose wrote a bilingual science fiction story, *Nirrudeshar Kahini* (The Story of the Missing). The main narrative is in Bangla, but the scientific material is in English. The story is about a man who calms a storm at sea by pouring a bottle of hair oil on the troubled waters.

Hair oil? Yes. In 1891, Hemendramohan Bose, an entrepreneur, created the Kuntalini Puruskar Short-Story Competition. It was open to all, with only one condition. The stories had to refer to his Kuntalini hair oil in some essential way. Bose submitted *Nirrudeshar Kahini*, won the prize, thereby joining an illustrious pantheon of past winners like Sarat Chandra Chattopadhyay, Mankumari Bose and Probhat Kumar Mukhopadhyay.

The story offers another reason for the hair oil. The male narrator explains that due to a protracted illness, he has lost most of his hair, except for a few "islands". Before he embarks on a recuperative sea voyage to Ceylon, his daughter gifts him a bottle of Kuntalini hair oil.

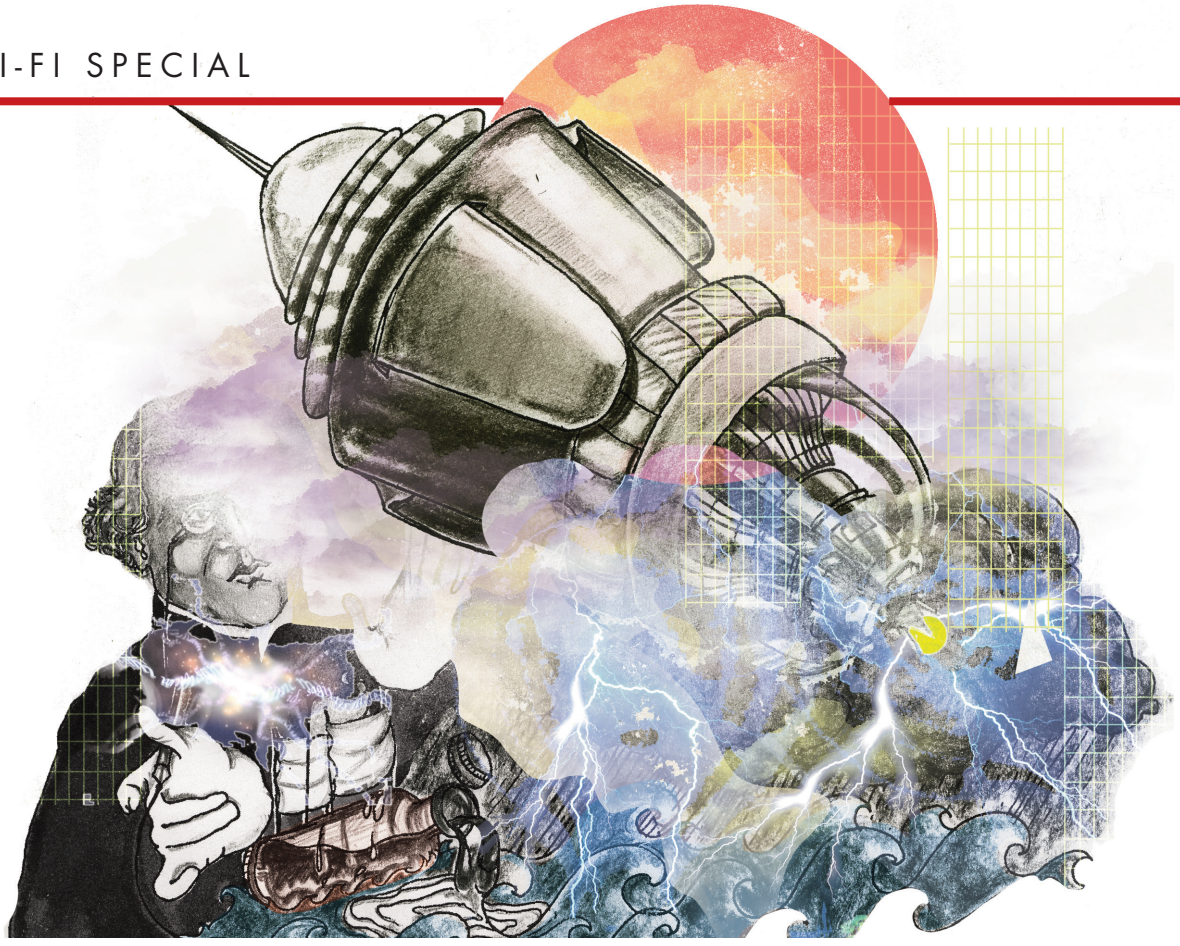


Ray Bradbury's *A Sound of Thunder* (1952) is credited for the first literary use of the chaos theory's butterfly effect, though J C Bose's *Niruddehser Kahini* anticipated the phenomenon 56 years earlier

The oil may or may not have been hair-raising, but Bose's story was a brilliant beginning for *desi* sci-fi. It was tongue-in-cheek and quoted snippets from the *Scientific American*. It anticipated chaos theory's butterfly effect, where tiny changes in initial conditions can have profound global effects. Perhaps Bose was sensitised to the phenomenon from his remarkable work on the measurement of tiny changes in plant growth.

Bose's story had all the elements that would characterise western sci-fi in the 1930-1950s (the so-called golden-age): an idea-centric plot with not much emphasis on characterisation or style, a secular world-view, the suggestion that science could solve almost any problem, and an author with professional expertise in science. These were new things in Bose's time.

Unfortunately, some hundred years later, we



see similar stories. The robots are Asimovian robots, time-travel is Wellsian time-travel and mad scientists are *desi*fied Frankensteins. The problems are technical problems and not social, cultural or emotional ones. Often written by well-meaning scientists and engineers, their social conservatism gets reflected in the stories. Science is assumed to be pan-cultural and objective, independent of establishment values or vested interests.

As in Bose's time, hair-oil entrepreneurs and prize competitions are few and far between. *Desi* sci-fi is published either by the Children's Book Trust, assorted childrens' magazines or the occasional young author anthology. Most of the stories written for children are nauseatingly bland, didactic and bow-tied with a safe moral.

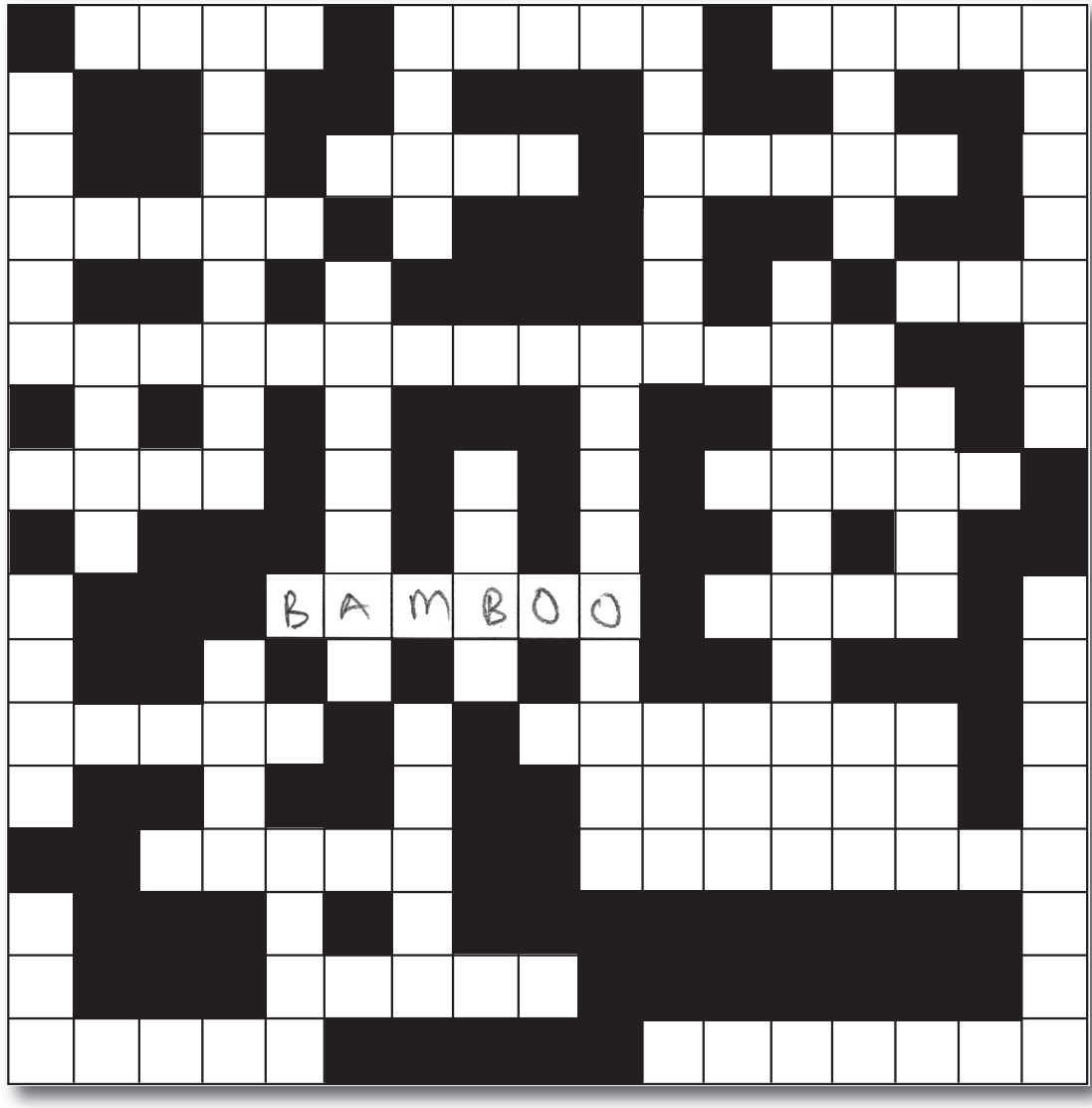
Bose was justly proud of his story, and included a rewritten version in his collection *Abyukta* (1921). The second version is solely in Bangla. The descriptions are more filled out, the pace more leisurely. The name Kuntalini hair oil was changed to Kuntal Keshori. But Bose also unraveled his most significant achievement by giving the hair oil a supernatural origin. He added a back story for the hair oil, involving a balding lion, an English Circus manager, and a *sanyasin* who conjures up the formula in a dream. The reason the hair oil calms the storm has nothing to do with science and everything to do with magic. Perhaps Bose had been gripped by nationalistic fervor. The 1921 version is more about an oriental using native magic to befuddle firang science than about the effect of small actions.

In a later version J C Bose removed the science of the effect of small actions from *Niruddesher Kahini* and replaced it with reasoning drawn from magic

This retrogressive mysticism is also seen in *desi* sci-fi. Vedic crystals, mantras and reborn sages are standard *desi* ropes. We have stories where aliens can be contacted by broadcasting "OM" sound waves because as the Indian scientist explains in the smash-hit *Koi Mil Gaya*, "it is a Hindu religious word containing all the vibrations of the Universe". The future is mostly a matter of discovering the glorious (Hindu) past. The future in these stories is not invented or made, but revealed. Pradip Ghosh's novel *A Long Day's Night* (2002), a fine realist story about an IIT-Kanpur professor's day-long struggles to fix an expensive American spectroscope, offers an example of this strange predilection; at the novel's end, the author uses the professor as a mouthpiece to present a thermodynamic defense of predetermination.

After Bose's great story, we missed an opportunity. But we've begun to regain lost ground. The true inheritors of Bose's 1896 story are works like Amitav Ghosh's *Calcutta Chromosome*, Lokenath Bhattacharya's *The Virgin Fish of Babughat*, Premendra Mitra's short fiction, films like Manish Jha's *Matrubhoomi* and S P Jananathan's Tamil movie *E*. Some of our best speculative stories come from Urdu and can be sampled in the works of authors like Surendra Prakash, Khalida Asghar and Hasan Manzar. There's also a new generation of writers. Perhaps there is, at this very moment, a future Bose scribbling away at what is missing. ■

Anil Menon is a science fiction writer



A group of perennial evergreens in the true grass family Poaceae, subfamily Bambusoideae, tribe Bambuseae.

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'Let farmers decide the price'

Mani Chinnaswamy's contract farming model has prompted IIM graduates to study his Appachi formula. After all, it gives farmers the right to bargain the price of their produce with the buyer. Talking to Jyotika Sood, the entrepreneur shares the hurdles in the implementation of the formula and its potential to change farmers' lives

What makes your formula a novel contract farming model?

Appachi formula differs from conventional contract farming models, especially on the price front. We do not create uncertainty by fixing the price of the produce in advance. Our contract allows farmers to sell their commodity at the prevailing market rate. Though we have the first right to negotiate, farmers are free to auction off the produce in case of a disagreement. We motivate them to form self-help groups to enhance their bargaining power.

Our pricing mechanism usually does not disappoint them as it takes into account the labour put in by the farmer and his family. My company, Appachi Cotton, deals only in cotton because it is a family business, but alongside we encourage our farmers to grow millets, legumes and vegetables, which helps them meet their daily needs and expenses.

Another component of the formula is to ensure that farmers never go short of money and material throughout the cultivation period. The contract assures them easy availability of credit from banks, quality seeds, doorstep delivery of unadulterated fertilisers and pesticides at discounted rates, expert advice and field supervision.

We hear you have stopped facilitating farm credits.

I developed the formula with a vision that everyone who is part of the contract will fulfil their responsibilities. If a farmer takes a loan, he must repay it. It worked well for 10 years. But in 2006, during the assembly elections in Tamil Nadu, some political parties promised waiving off agricultural loans in their manifesto. This led to wilful default by farmers and a bitter end to the idea. To fill the void we started looking for ways to reduce cultivation cost. This made us switch from conventional to organic cotton in 2009. Farmers are always under fear and defensive, applying fertilisers and pesticides indiscriminately, thus increasing cultivation cost. They would sanitise the entire field at the sight of a single insect. There was a need to teach them when to pick up their pesticide guns.

Is organic cotton more profitable than the conventional cotton?

In agriculture, profit can be increased either by increasing the yield or by reducing the cultivation cost. Chemicals and technologies like Bt are pushing up the yield, but they are also increasing the cost of cultivation.

Farmers are organic by default. Through Appachi, we remove middlemen, passing the benefits directly to farmers. An increasing number of farmers are switching from conventional to organic cotton lately. Since the yield reduces during the conversion period, we offer them financial support to keep up their interest in organic cotton. We help them get organic certification.

What are the challenges before organic cotton?

No doubt Bt cotton poses the threat of contamination to organic cotton, but the biggest challenge is seed. All our seed banks have run out of traditional cotton varieties. Hardly any company or agriculture university is coming forward with seeds suitable for organic farming. The government and universities are promoting Bt crops, while people want safe organic crops.

What are the other endeavours of your company?

We have an integrated model for organic cotton farmers and weavers. At present, we have 165 farmers and 50 weavers. We make products like sarees and dress material under the brand name, Ethicus. We put our craftsperson's name and picture on every piece he creates and mention the time it took to weave the fabric. ■

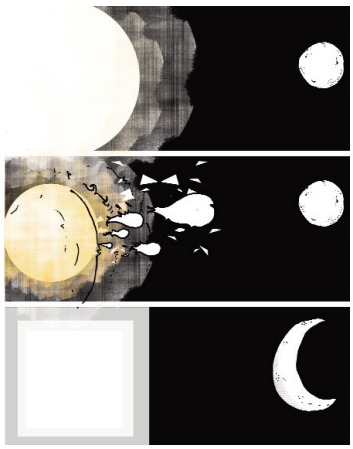


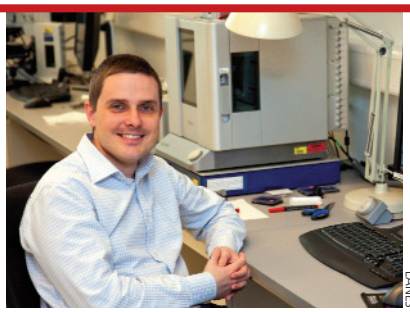
Farmers are organic by default. All that we do is pass the benefits directly to farmers

ASTROPHYSICS

Sun strips moon

Violent solar storms can strip off the moon surface of 100 to 200 tonnes of lunar material. This is equivalent to 10 dump truck loads. These solar storms could also cause atmospheric loss on planets like Mars that are unprotected by a magnetic field. This has been predicted by a first ever study of the effects of solar storms and eruptions of solar plasma, coronal mass ejections (CMEs), using computer stimulations. *Presented at American Geophysical Union meeting, December 5*





LANES

Andras Kis from LANES institute in Switzerland made the new chip

MATERIAL SCIENCES

Better than silicon

Silicon is indispensable for telecommunication but it has disadvantages. Silicon layers start to oxidise at anything less than two nanometres in thickness, making them useless as electronic components. Now scientists have created a microchip from molybdenum disulfide (MoS_2), a relatively abundant, naturally occurring mineral. It can be worked in layers three atoms thick, making it possible to build chips that are three times smaller. The material is stable at this scale. It is also more efficient and can be turned on and off more quickly. *ACS Nano, November 10*

ZOOLOGY

Survival of the incestuous



Inbreeding may be the secret to the bedbug's recurrence. After nearly disappearing in the United States, the blood-sucking pests have made a comeback in recent years, quickly infesting apartment buildings and stubbornly resisting common insecticides. Scientists say a single mated female bedbug starts the infestation. She gives rise to offspring and those offspring mate with each other and with their mother. Close inbreeding in many animals can result in deformities but not in bedbugs.

Presented at American Society of Tropical Medicine and Hygiene conference, December 6

BIOLOGY

The third eye

It may sound bizarre but researchers have created a tadpole that has an eye growing in its gut. It was achieved by genetically manipulating the membrane voltage of cells in the frog embryo. The hypothesis is that for every structure in the body there is a specific membrane voltage range that drives organogenesis. To create the eye the voltage gradient of cells in the chosen area was changed to match that of normal eye cells. This suggests that cells from anywhere in the body can be driven to form an eye. The findings also pave way for a new control mechanism that can be used for regeneration or transplantation of organs.

Development, December 20



MICHAEL LEVIN AND SHERRY AW

Eye in the gut of a tadpole formed by changing the bioelectric voltage in embryo

CHEMISTRY

Slow and steady

It was thought that particles in emulsions reach equilibrium instantly. But it has now been shown that the process may take months or even years. Researchers say the finding will have no affect on any time-tested food formulations. But may have relevance for newer products like nano emulsions, which rely on precise predictions of the particle behaviour. *Nature Materials, December 4*



ALEX PROIMOX

HEALTH SCIENCES

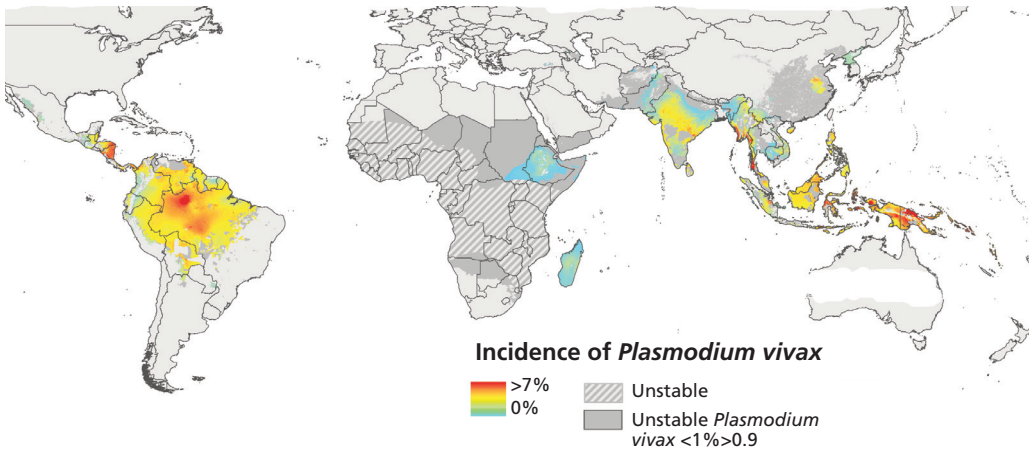
Alzheimer's red hope

A red dye derived from lichens has been used long as the colouring agent in food and fabrics. This dye contains a compound called orcein, and it has now been discovered that it can help fight Alzheimer's disease. The compound is able to reduce the number of small toxic protein aggregates thought to be the cause of neuronal dysfunction and memory loss in Alzheimer's disease. The compound chemically binds with these aggregates, converting them into large, mature structures called plaques, which are non-toxic and benign to neurons.

Nature Chemical Biology, December 2



GILLES SAN MARTIN



MICROBIOLOGY

Impervious malaria

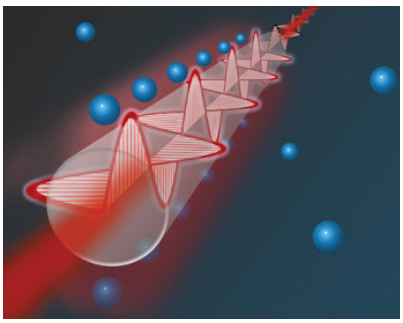
Though significant progress is being made in the fight against malaria, it might just not be enough. A new malaria map, which is the first to identify on a global scale the spread of long-lasting and potentially deadly malaria, shows the disease still has a firm foothold in large swathes of South Asia and parts of Latin America. Among the hot spots for the *Plasmodium vivax* malaria are substantial parts of India, including major urban areas like Mumbai, where malaria was previously uncommon and thought to be a rural disease. Scientists say the map will help understand just how difficult it is going to be to eradicate malaria. *Presented at American Society of Tropical Medicine and Hygiene conference, December 5*

PHYSICS

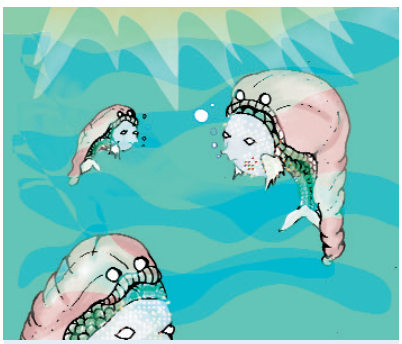
Count atoms the easy way

Fibre cables are irreplaceable for the Internet. Now they can be used in quantum physics labs too. Scientists have developed an ultrasensitive method to study individual atoms. It paves the way to develop detectors that are capable of sensing ultra-trace amounts of materials. In the method, light waves are made to intermingle with fewer numbers of atoms. The waves change with every single atom they cross. By measuring the modifications, the number of atoms and their properties can be ascertained. *Physical Review Letter, December 7*

The light wave changes as it comes in contact with the atoms in the fibre



ILLUSTRATIONS : KARNO GUHATHAKURTA / CSE



CLIMATE SCIENCES

Smarter with warming

Schistocephalus solidus, a parasitic worm that infects fish, has been found to grow much more rapidly at higher temperatures. Moreover, the parasites drive changes in the fish by actively manipulating levels of neurotransmitters in its brain. Thus the fish infected with the worms showed a preference for warmer water. This is the first evidence that global warming affects interactions between parasites and their hosts *Global Change Biology, November 30*

ECOLOGY

Farmland needed

It is not just humans who are dependent on agriculture for their survival, animals need it too. A study has found the natural habitat of a number of species is farmlands and that they are at risk of extinction without them. The researchers cited the white-shouldered Ibis in Cambodia, the sociable lapwing in Kazakhstan, and the liben lark in Ethiopia as those who rely on farmlands. They say these animals greatly benefit from the traditional agricultural practices that promote low ecological impact and conservation should focus on farmland too. *Conservation Letters, December 4*



White-shouldered Ibis

JOSEP DEL HOYO

TECHNOLOGY: *health gizmos*

Tap to know how well you are

Trend of using health-monitoring apps on smartphones catches up in India

DINSA SACHAN

TODAY'S phones are not just for talking or texting messages. Nor the applications (apps) in them for fun. True to their name, the phones of today are smart. They can be your business manager, travel expert and even health adviser.

Take the case of Susan Johnston, a freelance writer in the US. She suffers from chronic insomnia and has been using an app called sleep cycle for months now. "I started treatment using the app even before I met the doctor. Though he did not put much stock in the app it was helpful in showing overall trends in my sleep," she notes. She is not the only one. The market for health apps is expected to hit the $400 million mark by 2016 (up from $120 million in 2010), according to ABI Research, a technology research firm in the US. According to the report by Juniper, a mobile research provider, health apps will have 142 million downloads globally by 2016.

Something for everyone

The available health apps can be divided into three categories. The first type lets people keep a record of their health, like the calorie counting apps. The second are educational apps, which keep one updated with latest information. The third category consists of apps that are used for health monitoring. The apps use standard features of a phone like camera, microphone which are not designed for health monitoring.

These apps have become a part of Anil Saxena's life. The assistant director of invasive cardiology at Fortis Heart Institute in Delhi uses an app called Wards to keep tab on his patients. "It keeps me updated with my patients' progress even when I'm traveling," he says. He uses another app called CardioSource which gives instant access to journals in his speciality. Another app, DrawMD, he swears, has been of tremendous help in explaining heart diseases at the anatomical level. The app provides basic pictures of body organs and their minute parts. Doctors can trace over these pictures using their fingers to explain the intricacies of the body.

Saxena is at the crest of a trend wave that has already hit the developed world. According to a survey by



INSTANT HEART RATE



Developed by : Azumio in the US
Available on: iPhone and Android
Cost : Free

How it works : Put a finger on the camera lens of the smartphone for 10 seconds, and your heart rate will start flashing on the screen in real time. The camera tracks changes in the colour of the skin with every heart beat (surge in capillary blood flow). The principle behind this app is similar to that used in medical pulse oximeter. A pulse oximeter is clipped to finger of the patient and measures oxygen level in one's blood

Expert take: Anil Saxena, assistant director of invasive cardiology at Fortis hospital, Delhi, says, the technology is good and as accurate as the conventional system of measuring pulse

CompTIAsurvey, IT industry association in the US, 38 per cent of physicians in the US are using health apps daily.

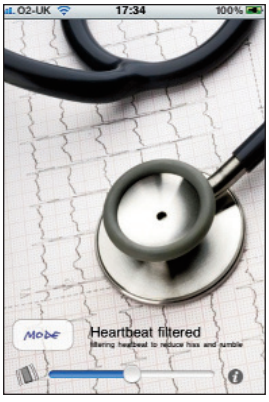
But some medical practitioners are sceptical. An app called Period Tracker that keeps track of the menstruation cycle does not find favour with them. Based on the period dates of the past, the app predicts the next due date. The app also tells a user when she is ovulating and most fertile. Sonia Naik, a gynaecologist in Delhi says, "It can be useful to women who lead a busy life and are trying to conceive, but the menstrual cycle is affected by many factors—emotional, dietary and physical. So reliability of such apps is questionable."

Long way to go

The use of these apps may be debatable, at the same time experts say their use needs to be regulated. Sanjiv Malik, former president of the Indian Medical Association, says, "Who approves these apps and how will we know the information is correct?" It is essential these are approved either by the government or medical bodies before they are rolled out, he adds. The Food and Drug Administration in the US had issued guidelines in July this year for regulating the apps. The guidelines noted that apps have both risks and benefits and if they don't work the way intended, they could jeopardise the patients' health. Bojan Bostjancic, business development officer for Azumio, a software firm, which developed instant heart rate notes that many nurses use it and find it accurate when compared with traditional method. "But we do not position it as a medical device, it is to be used for health and fitness only," he adds. Kanav Kahol, who was part of the team that developed algorithm for the heart app says there is nothing to be worried about. "The future of healthcare lies in technology. Apps have great potential in telemedicine." ■



iSTETHOSCOPE

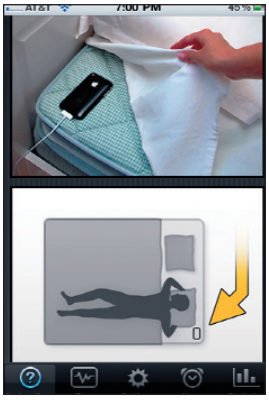


Developed by : Peter Bentley of University College London
Available on : iPhone
Cost : 99 cents

How it works: Hold the phone against the chest. The microphone picks up sounds from the heart. The sound is amplified by an inbuilt amplifier and then transmitted to earphones

Expert take: S B Gogia, Delhi-based plastic surgeon did not like it. He says the sound is too faint, and the microphone is too small to pick up sounds from a large area

SLEEP CYCLE



Developed by : Maciek Drejak Labs in Germany
Available on : iPhone
Cost : 99 cents

How it works: Put the phone next to your pillow. It monitors your sleep patterns based on the movements you make. It shows in graphs your sleep patterns through the night: deep sleep, light sleep or dreaming phase. Depending on the alarm you set, it also wakes you at the most appropriate time period. Suppose you set an alarm at 6:45 am. The app will figure out the best time between 6:15 and 6:45 to wake you

Expert take: Anoop Kohli, neurologist at Indraprastha Apollo Hospital in Delhi, says the data about sleep patterns does not have any medical value. It makes sense only when something like this could be developed to be of help in sleep disorders. Also, it can be less accurate when you are sharing a bed

HEALTH SCIENCES: *radiation amelioration*

Radiation remedy

Antibiotic-protein combo may alleviate radiation sickness



REUTERS

Staff at the Fukushima nuclear power plant scans workers for radiation

DIYA DAS

IN A world leaning towards nuclear energy, one of the greatest fears is of radioactive emergency caused by accident or a terrorist attack. Radiation exposure, or radiation sickness, can affect heart and lung function, and disrupt the nervous system and the digestive tract. White blood cell count falls sharply in irradiated people, reducing their immunity.

Existing therapies for radiation sickness, which include giving antibiotics, must begin within hours of exposure. These cannot be used in case of mass casualties or inadvertent exposure.

Scientists have now developed a therapy that works 24 hours after the exposure. It comprises a fluoroquinolone antibiotic (for instance, ciprofloxacin) and a synthetic version of an infection-fighting protein in humans, BPI (bactericidal/permeability-increasing protein). The protein acts by binding to molecules on the surface of bacterial cells, stopping cell growth and subsequently facilitates cell death by membrane degeneration. Radiation exposure decreases the level of the protein in the blood.

In their study, the team at the Dana Farber Cancer Institute and Children's Hospital in Boston in the US exposed mice to radiation levels of seven grays (exposure from standard X-ray machine is 0.01 gray). This much exposure can kill 95 per cent of untreated mice. A day after the exposure, some mice were given the antibiotic while some were given the antibiotic-protein combo. About 40 per cent of the mice given the antibiotic were still alive after 30 days. The mice that received the combo had a much higher survival rate, to the tune of 80 per cent, and regained their ability to generate new blood cells quicker. Ofer Levy, co-author of the study, says both the antibiotic and protein have been shown to be quite safe in humans."Their combined effectiveness is an indication that they may be equally beneficial in people," Levy adds. The study has been published in *Science Translational Medicine* on November 23.

B S Satish Rao, head of the division of radiobiology and toxicology at Manipal Life Sciences Center of Manipal University, says the double drug-therapy could be effective in case of a mass-casualty situation, like the Fukushima disaster in Japan in March 2011. "Presently, we do not have any such agent which can render effective mitigation against radiation toxicity in post-exposure scenario." The favourable bioavailability and safety profile of the therapy make it more clinically acceptable. An added advantage is, the therapy may ease the suffering of cancer patients undergoing radiotherapy, he adds. ■

MATERIAL SCIENCES: *contamination removal*

Stainless glass

How soot can help surfaces repel both oil and water

DINSA SACHAN

XU DENG, a doctorate student at Max Planck Institute for Polymer Research in Mainz, Germany, experienced a eureka moment while watching a video in which they showed how water could roll off layers of soot coated on paper. His team had been looking for something similar, a magic material that would ward off both water and oil, and pave the way for self-cleaning glass.

This kind of self-purging glass could be used in making goggles, touchscreens, windows and other products. So, eyeglasses would never again need to be cleaned, and dirty windscreens would become a thing of the past.

Until now, scientists have only succeeded in making either oil-resistant (superoleophobic) or water-resistant (superhydrophobic) glass. Max Planck researchers alongwith those from Technical University Darmstadt in Germany have now made a glass that repels both. "Superhydrophobic surfaces lose their self-cleaning properties after sometime because the interstitial spaces get filled with organic debris or dust from the surroundings," says Hans-Jurgen Butt, one of the authors.

The team coated a glass slide with soot by holding it over a candle flame so that soot particles, which measure around 40 nanometres in diameter, formed a sponge-like structure on the glass. But

BEADS THAT CAN HEAT WATER



With fossil reserves fast depleting, new technologies promising more efficient use of renewable energy sources, especially the sun, are flooding the market. Researchers at Sri Venkateswara College of Engineering and Technology in Chittoor, Andhra Pradesh, have devised beads that can store solar energy and be used to heat water. R MEENAKSHI REDDY, the lead author, speaks to ANKUR PALIWAL about his study published in the International Journal of Renewable Energy Technology *on December 2. Edited excerpts:*

Describe your work

We have developed beads containing cheap phase change materials. These Phase Change Materials (PCMs) store energy and release it by changing from solid to liquid and vice-versa. A large number of organic and inorganic PCMs are available in the market. The advantage of the beads is that they have high heat storage capacity in small size.

What are these beads made of?

To make the beads paraffin wax and stearic acid are filled in separate spherical capsules made of high density polyethylene. They are safe, reliable, cheap and non-corrosive. They show little volume changes on melting. The same materials have been used by other researchers in the past and the size of the beads was between 100mm to 25mm. But in our research we have optimised the size to 38 mm because it is difficult to fill paraffin wax and stearic acid in beads with size of 25 mm.

How does the technology work?

The beads are uniformly packed in layers in the form of a bed in an insulated thermal energy storage tank full of water. During daytime, the water gets heated, and it transfers heat to the beads through convection. The beads start melting. The melting point of beads is between 57-61°C and can store heat up to 1,000KJ. When the already available hot water has been utilised, fresh water gets filled in the tank. Because of the temperature difference, the beads begin to solidify and heat water.

How are the beads better than conventional methods?

The limitation with the conventional system is cost and storage of heat only in sensible form. The heat that causes change in temperature of an object is called sensible heat. So, if the capacity of the tank is 50 litres only that much hot water can be utilised. In our set up we store heat in sensible as well as latent form. Heat that causes change in the phase of a substance is called latent heat. So almost double the amount of hot water can be utilised. Once charged the beads can hold heat for 48 hours. The system is cheaper as stearic acid and paraffin wax are available at ₹50 and ₹75 per kg respectively. The beads can be used up to 10 years.

since such a layer is weak and wears off as droplets roll, the team applied an additional coating of silica. "There are two reasons why we chose silica. First, to make the coating mechanically stronger. Second, to be able to coat it afterwards with fluorosilane—fluorinated silicon compound which makes the surface water and oil repellent, like a non-stick frying pan," says Butt. But in surfaces coated with the silicon compound, water and oil mostly roll around in the form of drops, he adds. "In our experiment it is the structure of the coating what makes the glass water and oil repellent," Butt notes. The structure of the layer resembles a sponge-like labyrinth of completely unordered pores, which is made up of tiny spheres. "So the surfaces cannot be wet even by low-viscosity oils," he notes. This is because the liquids that wet even fluorinated surfaces would have to be pressed over these spheres, which measure around 40 nanometres, in order to form a film on the surface. This requires too much energy. At last the glass is baked at 600°C to make the soot transparent. The study was published in the December 1 issue of *Science*.

On the production costs he notes, "The method we employed is expensive. But all steps can be improved to make it cheaper." Reviewing the study James McGuire, professor of physics and engineering physics at Tulane University in the US, says the coating is promising. "It can easily be used to make windows that repel a mixture of water, oil and other molecules and as protective shields for use on oil rigs that suffer blowouts in rough weather." But it needs to be seen how long they will last and whether they have possible toxic effects. ■

Soot forms a sponge-like structure on the surface, repelling both oil and water



SAYANTONI PALCHOUDHURI / CSE



AASHISH BHATNAGAR

HEALTH SCIENCES: *malaria control*

Ayurvedic cure for malaria

Two plants found in tropical India prove useful

KAILASH KOUSHIK

IT HAS been nearly four decades since the first case of drug-resistant malaria was spotted in the world. Since then scientists have been trying hard to develop medicines to counter its menace.

Now a research has shown the potential of two plants—*Tinospora cordifolia* (*guduchi*) and *Cissampelos pareira* (*akanadi*)—commonly used in ayurveda, as an antidote to malaria.

The plants are found in tropical parts of India. *Guduchi* is used to cure ulcers, dysentery, urinary diseases and diabetes. *Akanadi* finds use as a diuretic, anti-inflammatory and digestive medicine.


Cissampelos pareira

To test the efficacy of the plants the team from Department of Bioscience, Himachal Pradesh University divided mice into four groups. They all were inoculated with *Plasmodium berghei*. One group was given the recommended dose of chloroquine, commonly used to cure malaria. The second group was given plain water. The third and the fourth group were administered with extract from *Tinospora* and *Cissampelos* respectively.

The mice were checked for the presence of the parasite in the blood stream. The group which was treated with plant extracts had less than half the parasitaemia than the untreated ones. Thus these plant extracts can effectively be used to treat malaria. The study was published in the November 24 issue of *Current Science*.

Commenting on the study A C Dhariwal, Director of the National Vector Borne Disease Control Programme says, "It is always beneficial if we have alternatives for fighting the disease, and it is even better if the cure is from a source available easily in our country." The government has decided to tackle malarial drug resistance by treating patients with artemisinin-based combination therapy, he adds. Such treatments are now a standard treatment worldwide but are expensive. The starting compound artemisinin is isolated from the plant *Artemisia annua*, a herb described in Chinese traditional medicine. ■

HEALTH SCIENCES: *cholesterol-lowering chemicals*

Fungal friend

Carotenoid in a fungi keeps heart diseases, cancer at bay

BIPLAB DAS

FED up of popping pills to lower your blood cholesterol? There's good news as researchers have found a natural way of controlling it.

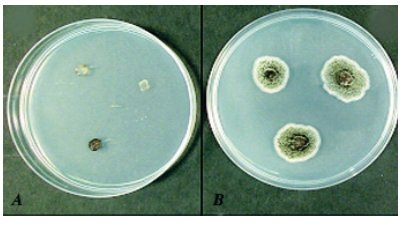
A research team at the Mysore-based Central Food Technological Research Institute (CFTRI) has isolated a carotenoid, a pigment molecule, from a fungus used in food industries.

Carotenoids, also found in carrots and cereals, can lower the levels of cholesterol that triggers cardiovascular diseases. It can also stop the activity of reactive oxygen species (ROS) that damage cells triggering cancer. This led researchers to find carotenoids with similar benefits from bacteria, fungi and yeast and use it for commercial production.

They stumbled upon it while trying to increase the yield of pectinase, an enzyme used in food industries. When they cultured wild strain of the fungus *Aspergillus carbonarius* and exposed it to ultraviolet rays, the fungus produced a mutant strain.

Grown in acidic medium, the strain started to accumulate a yellow pigment alongwith pectinase. Biochemical tests revealed the pigment was a partially saturated carotenoid called Canthaxanthin.

Aspergillus carbonarium *colonisation in different growth conditions*



In a previous study, the researchers had found that Canthaxanthin can kill prostate cancer cells. Thus they derived that the carotenoid can stop the activity of ROS which are linked to cancer.

Subsequently, they conducted studies to find the carotenoid's ability to lower cholesterol and counter the harmful effects of ROS. Mice grown on high fat diet were fed with diets constituting varying concentrations of the carotenoid—50 parts per million (ppm), 100 ppm and 250 ppm. The carotenoid decreased the concentrations of blood and liver cholesterol. In addition, the activity of enzymes, which destroy ROS, increased.

"The study reveals the carotenoid is thermally stable and can help keep ROS-mediated diseases, including cancer, at bay," says lead researcher Vijayalakshmi Govindaswamy of CFTRI. The study was published in the December 2011 issue of *Food and Chemical Toxicology*. ■



Discuss the new Food Law,
everyone should know about it



New Food Law (Food Safety and Standards Act)

- Empowers the consumer to take samples for food testing
- Aims to ensure safety and hygiene throughout the food chain
- Food Operators - manufacturing, storing, selling, distributing food products would require license or registration
- Science based standards to be followed for processed and other foods
- For suggestions, queries, complaints, call our toll free helpline number at 1800 - 11 - 2100 or visit fssai.gov.in

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PRESS REWIND KEY

JANUARY 15, 1993


RETROSPECT '92

THE FUTURE IS NOW

In 1992, the world moved several steps towards globalisation. But little attention was paid to the sharp economic, social and cultural divides. The rich world, troubled by recession, did not show much courage in dealing with them as it, too, began to feel poor.

As the world bade goodbye to 1992, *Down To Earth* looked back at how countries moved closer to globalisation, while overlooking economic, social and cultural divides. Edited excerpts of the January 15, 1993, issue:

● 1992 was the year of environment. More than 100 heads of state and government gathered at Rio to discuss the health of the planet. But the conference refused to look at underlying issues, lack of global democracy at one level and local democracy on the other, that favour exploitative forces. Instead, they dealt with symptoms of the disease and promised a few technocratic and regulatory pills.

● 1992 was also the year of market integration and GATT. Rich governments pushed harder for a powerful GATT to free world trade. The biggest wars, however, were fought within industrialised countries over reduction of subsidies and for free trade in agricultural commodities. Prices of many Third World commodities took a beating.



● In eastern Europe and the former Soviet Union, the move towards markets proved to be hazardous. Markets in industrialised countries did not show signs of health. Uneasy with the idea of free markets, Americans voted Bill Clinton into the White House and made state intervention a respectable word again in Western circles. In Britain, the Conservative government found it hard to let its coal industry be pushed out by global market forces. In the Third World, India faced the problems of structural adjustment.

● By the end of the year, even staunch donors like Sweden, Norway, Finland and the Netherlands planned cutbacks in their aid budgets. The Southern argument in Rio that funds for environment should be added to funds for development produced no results.

● Concentration of wealth brought in its wake migration, which became a political issue in numerous European countries. Migrant workers faced savage racist attacks.

● Biology and earth sciences boomed. Scientists searched for genes for use as disease fighters and producers of industrial products. Diseases such as malaria and diarrhoea remained as strong as ever, joined by a new scourge: AIDS.

● Lifestyles continued to become more westernised. Asia moved steadily towards meat-oriented, Western food habits, creating new demands for grain even as land available for agriculture shrank and millions starved. Indian households were swamped by Western programmes through satellite and cable television.

● The new world order crept in slowly, but without its contours becoming any clearer. Sovereignty took a back seat as environmental concerns for global management came to the fore and human rights became a worldwide issue. But the world was left wondering: Who will decide when intervention is needed and when it is good? Will the UN be used as a pliable world government to maintain law and order and regulate environmental and human rights problems, while donor-dominated Bretton Woods institutions govern the world's economy together with GATT?

Two decades later, poor countries' right to develop has become a bigger inconvenient truth in the climate change debate. Free trade has created more uncertainity, developed countries are in a deeper economic mess, while concentration of wealth has begun to haunt emerging economies like India as well

PATENTLY ABSURD / LATHA JISHNU

WHAT DURBAN DID NOT DISCUSS

IPRs are blocking access to mitigation and adaptation technologies. India offers a way out

Debate on the rights and wrongs of intellectual property rights (IPRs) always gets stuck on a fundamental question. Would there be any incentive to invent and create without the incentive of IPRs such as patents and copyright? The conventional view is that without the reward of IPRs there would be no investment in researching and developing new technology. The counterview is that IPRs create a barrier to access and actually stifle innovation.

It is a deeply divisive issue that has been resonating across the world in the past 15 years in the context of medicines where access on account of their high prices is a paramount concern. Patents, say critics of IPRs, deprive poor countries of badly needed drugs. A similar discord is building up on the role of IPRs in climate change technologies. This would explain why negotiators at the various conference of parties (CoP) to the UN Framework Convention on Climate Change (UNFCC) have preferred to skirt the issue. In Durban, too, there was silence on this subject.



KARNO GUHATHAKURTA / CSE

The silence is dismaying. The development and diffusion of clean technology is a critical component of the strategy to meet climate change challenges, a principle that is articulated in Article 4.5 of UNFCC. This requires developed countries to "take all practicable steps to promote, facilitate and finance, as appropriate, the transfer of, or access to environmentally sound technologies and know-how to other Parties, particularly developing country parties to enable them to implement the provisions of the Convention".

In 2007, the Bali Action Plan, agreed to at the 13th CoP, restated the importance of tech transfer. That plan called for increased action on tech transfer to support action on mitigation and adaptation. In Cancun, there was some movement on the vexed question when CoP 16 decided to establish a Technology Mechanism. However, it left many important questions, such as how the mechanism relates to the financial mechanism to be resolved at Durban. So, too, the matter of how the two components of the mechanism, the technology executive committee and the Climate Technology Centre and Network, will relate to each other. Durban did not do so.

It discussed how to operationalise the Green Climate Fund, some countries have pledged funds, and set up a new mechanism and adaptation committee that will coordinate efforts towards adaptation.

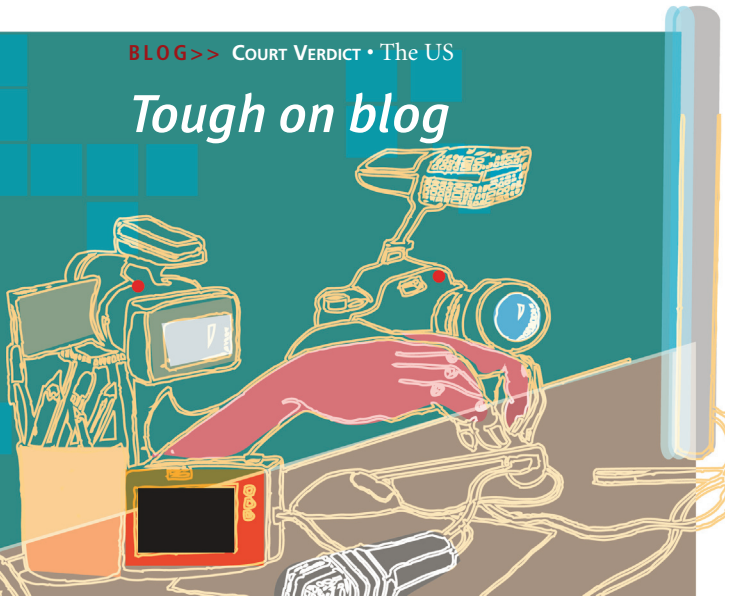
Interestingly, India has submitted a proposal to foster a "constructive" discussion on what it terms the important issue of accelerated access to critical mitigation and adaptation technologies and related IPRs. It is the first country to have taken on this issue, and one can only conjecture why it has done so. Was it the fact that it has been the hub and target of the fight between generic drug producers and innovator pharma firms in the past decade and a half? Perhaps.

Here's how it posits the debate: climate justice in India's view means "a fair, equitable and transparent global regime for technology transfers". But it is careful to strike a reasonable stance. Noting that most of the technologies that would help developing countries achieve a lower carbon growth are out of reach due to IPRs and prohibitive costs, it says "India firmly supports a facilitative IPRs regime that balances rewards for the innovators with the common good of humankind… In the absence of such a facilitative IPRs regime the objective of advancing nationally appropriate mitigation and adaptation actions at the scale and speed warranted by the Convention will not be achievable."

What it suggests is a facilitative IPRs regime that must form the cornerstone of a programme to advance global action on climate change. If the negotiations on the Bali roadmap "remain immature or unbalanced across the two tracks, emerging understandings on a facilitative IPRs must be reflected in the operational provisions of intervening CoP decision texts". In other words, parties should identify another forum and process to address these issues to ensure that they remain on the agenda.

Among the options it suggests are: launching a process under the CoP or AWG-LCA, clearly tasking it with crafting a facilitative IPRs regime relating to critical mitigation and adaptation technologies, and identifying desired inputs, outcome and a time frame to reach it. AWG-LCA stands for Ad Hoc Working Group on Long-term Cooperative Action. It is a subsidiary body under the Bali Plan. It conducts a comprehensive process in order to reach an agreed outcome.

India submitted its paper well in advance of Durban and it was circulated by UNFCC on October 7. There was no discussion. The impasse continues. ■



BLOG>> COURT VERDICT • The US

Tough on blog

A US District Court judge in Portland has drawn a line in the sand between "journalists" and "bloggers". The distinction has cost blogger Crystal Cox US $2.5 million.

Cox, who runs several law-centric blogs, like *industrywhistleblower.com*, *judicialhellhole.com*, and *obsidianfinancesucks.com*, believes the judgement could have serious repercussions. Cox was sued by investment firm Obsidian Finance Group in January for defamation for writing blog posts that were highly critical of the firm and its co-founder Kevin Padrick. Representing herself in court, Cox had argued her writing was a mix of facts, commentary and opinion (like a million other blogs on the web) and moved to have the case dismissed. Cox argued her post was factual because she had a source leaking her information. She refused to divulge her source under the US media shield law. But the judge ruled indemnity applied only to journalists. "Cox did not qualify for shield-law protection ... because she is not employed in an official media establishment," the judgement noted. ■

SNIPPETS NEWS

>> YouTube has launched a school-friendly version of its site. YouTube For Schools promises classrooms access to educational videos without the risk of pupils being "distracted by the latest music video". The Google-owned site has put together playlists according to subject matter and intended age level. The new service allows schools to turn on a network setting that means pupils can access only content from YouTube EDU—the site's section for education videos.

>> Google Inc has abandoned an ambitious project to make renewable energy cheaper than coal. The change in plan is because some investors have groused about rising spending at the world's No.1 Internet search company. It is facing competition in mobile computing and social networking from Apple Inc and Facebook.

LANGUAGE>> BO • Andaman Islands

Bo out

One of the world's earliest languages has gone to grave with the demise of the last member of a 65,000-year-old tribe. Boa Sr, who died in December, aged about 85, was the last native of the Andaman Islands who was fluent in Bo. Named after the tribe, Bo is one of the 10 Great Andamanese languages, thought to date back to the pre-Neolithic period when the earliest humans walked out of Africa.

Anvita Abbi, professor of Linguistics at Jawaharlal Nehru University in Delhi, who knew Boa, said the octogenarian had been losing sight and was unable to speak with anyone in her own language. Boa had no kids and her husband died years ago. Boa told her how she envied the Jarawa and the Sentinelese because they had managed to avoid contact with outsiders, she said. ■



COURTESY: SURVIVAL INTERNATIONAL



ILLUSTRATIONS: KRNO GUHATHAKURTA / CSE

DOCUMENTARY>> POLAR BEAR • The UK

Bear with BBC

BBC's documentary series *Frozen Planet* has got bad press after revelations that some scenes were filmed in a zoo. Footage of a polar bear inside a den with newborn cubs was mixed with scenes shot from the wild in the episode *Winter*. The accompanying voice-over from David Attenborough referred to cubs being born "beneath the snow".

But BBC denied misleading viewers. "The sequence would be impossible to film in the wild," its spokesperson said, adding, "The filming was standard practice for natural history shows".

BBC's rival *The Telegraph* alleged, "The truth about the sequence was not disclosed in the programme. Only viewers who visited the *Frozen Planet* website and stumbled across a video by the producer, Kathryn Jeffs, would have learned that they had been watching bears in captivity." BBC retorted, "The commentary is carefully worded to not mislead the audience." ■



Screen shot of the US' 'virtual' Iran embassy

EMBASSY>> POLITICS • The US/Iran

Bitter enemies, virtual friends

Three decades after it closed its embassy in Iran and cut diplomatic relations with it, the US has launched what it is billing as a "virtual Iranian embassy".

A message by US Secretary of State Hillary Clinton, in English and in Persian, welcomes users to the site. Clinton says she hopes it will provide an opportunity for citizens of the two countries "to communicate openly and without fear." An accompanying text from the State Department explains: "This website is not a formal diplomatic mission, nor does it represent or describe a real US embassy accredited to the Iranian government. But in absence of direct contact, it can work as a bridge between the American and Iranian people." ■

BOOK>> CLIMATE CHANGE • Australia

Brain wash

Barely a day after the conclusion of the Durban meet on climate change, former Australian prime minister John Howard lent his support to a book which argues the theory that human-induced global warming is a scam. The latest from controversial geologist Ian Plimer, the book is billed as "an anti-global warmist manual for the younger reader".

It includes 101 questions in which Plimer says students can challenge their teachers on climate science. The geologist claims worried parents prompted him to write the book. "We want children to have the basics from scientists, and not be fed activism," he claims parents told him. Australian science teachers' body retorted that Plimer "has no understanding of the way science is taught in schools". Its president Margaret Watts said, "Teachers put out all facts and show children how to work through evidence." ■

ADVERTISEMENT>> POLITICS • South Africa/Zimbabwe

Pulling a fast one

A South African fast food chain has withdrawn a TV commercial which lampoons Zimbabwe's President Robert Mugabe as "the last dictator standing". Nando's South Africa said threats from a youth group forced it to axe the video showing a sad Mugabe look-alike dining alone at a table set for Libya's Muammar Gaddafi, Uganda's Idi Amin and other late autocratic rulers. The actor reminisces about happy times with them to the soundtrack of Mary Hopkin's *Those Were the Days*.

"We've noted with concern the political reaction emanating out of Zimbabwe, including perceived threats against management, staff and customers of our outlets," the fast food chain noted in a statement. The video, which reportedly cost up to US $370,000, was broadcast across the continent through satellite channels, and recently went global scoring thousands of hits on YouTube.

"We condemn such adverts because it reduces our president to be someone without values," Jimmy Kunaka, who heads a Mugabe loyalist group Chipangano, told BBC. ■

Mugabe look-alike in the ad withdrawn after protests



ONLINE

http://www.greendiary.com

GREEN LIVING IS EASY



PEOPLE these days have realised the value of re-using and recycling their old and unused items to make something cool, elegant and sophisticated. So, if you are being nagged to throw that old trumpet away, pay no heed. You can use your old, beloved trumpet to add grace and beauty to your house. So claims the website under review, and shows one how to do so: turn the trumpet into a lampshade.

The site has other interesting solutions as well. It showcases gadgets such as off door handle. When on a vacation, off door handle can prove to be a great savior, in case the gas has been left turned on or the lights of your child's room have been left turned on.

Then there are curtains with solar cells embedded in them to produce energy in sunlight and use it in dark for lighting.

RIGHT TO DISSENT / LATHA JISHNU

IMPORTING DISASTER

India's power elite is still seeking US solutions for our problems despite the havoc they have wreaked upon American society

Many decades ago when my generation was in its early teens and was captivated by the Merseyside beat of the Beatles along with bell-bottom pants of that era, disapproving elders told us that we were mindlessly aping the West. As far as I can see, dalliance with the rock music of the Liverpool Fabulous Four did us little harm—either in the appreciation of own music or in our outlook and values, much less in our dress sense. But "aping the West" was a scathing indictment and we preferred not to be accused of such mindlessness.

One of the oddest things about the Indian establishment though is the complete mindlessness with which it has been lapping up practically anything hawked by Western governments, corporations, financial institutions and other snake oil salesmen. And unlike adolescent whims, this kind of aping is far from being harmless; they can have deleterious effects on economies, livelihoods and societies. The wholesale import of policies more suited to developed societies that have gone through their industrial and post-industrial revolutions are hardly the panacea they are made out to be for the disparate problems of a developing country, specially one which carries the burden of the largest number of the wretchedly poor, the unschooled, the diseased and vulnerable people. Nowhere is this determination to import disaster more evident than in agriculture. Farming in the US and India are as different from each other as the atmosphere in Jupiter is to that of Earth. Take some basic facts. The US has less than one per cent of its population claiming farming as their occupation and just about 960,000 persons who say farming is their principal occupation. The average farm size is a whopping 167 hectares (ha) while a large chunk of farms are between 40 ha and 220 ha. When it comes to farming in India, about 550 million people are dependent on agriculture and the vast majority of farm holdings are between 0.8 ha and 2 ha. Most of the farmers are, needless to say, dirt-poor.

It is in such starkly different circumstances that the top officials of the Planning Commission, the farm minister himself and the Prime Minister's Office seek to transplant the US model of industrial farming here. And there's one other detail that should not be overlooked. American farmers receive huge subsidies. Between 1995 and 2010, less than a million farmers were paid $167.3 billion under the direct payment subsidy programme. These subsidies were doled out to grain and commodity farmers as a safety net regardless of their actual production. In the very same period, a total of 256,913 debt-ridden Indian farmers committed suicide.

It is in such a situation that the government has rolled out the red carpet for seed and pesticide multinationals. It is only a matter of time before the retail giants too walk in. As for the World Trade Organization (WTO), the intransigence of the EU and the US to cut its farm subsidies has resulted in a decade-long deadlock in negotiations to conclude a new round. But it matters little to New Delhi's power elite. Inspiration still comes from the West, and, as a corollary, subservience to its demands will also continue.

It is not anyone's case that the West has nothing to offer us. One policy worthy of emulation is its public-funded school system of quality education that covered the entire population. But, interestingly, this is one issue policymakers here have ignored while opting for shortcuts such as the Sarva Shiksha Abhayan, which is on the whole a shabby programme of third-rate schooling. That, however, is another issue.

What is curious is why the establishment, whether it's the political, bureaucratic, academic or scientific establishment, still continues to draw its inspiration from a system that appears to be in tatters. Europe and the US are enveloped in a pall of gloom and seething rage against a theology that has failed the vast majority of people. And nowhere is the anger more widespread than in the US where an extraordinary mix of people across racial and ethnic divides, from laid-off workers, teachers and young and middle-aged professionals to the elderly and perpetually homeless, are living on the streets to seek a more equitable system.



FRANCO FOLINI

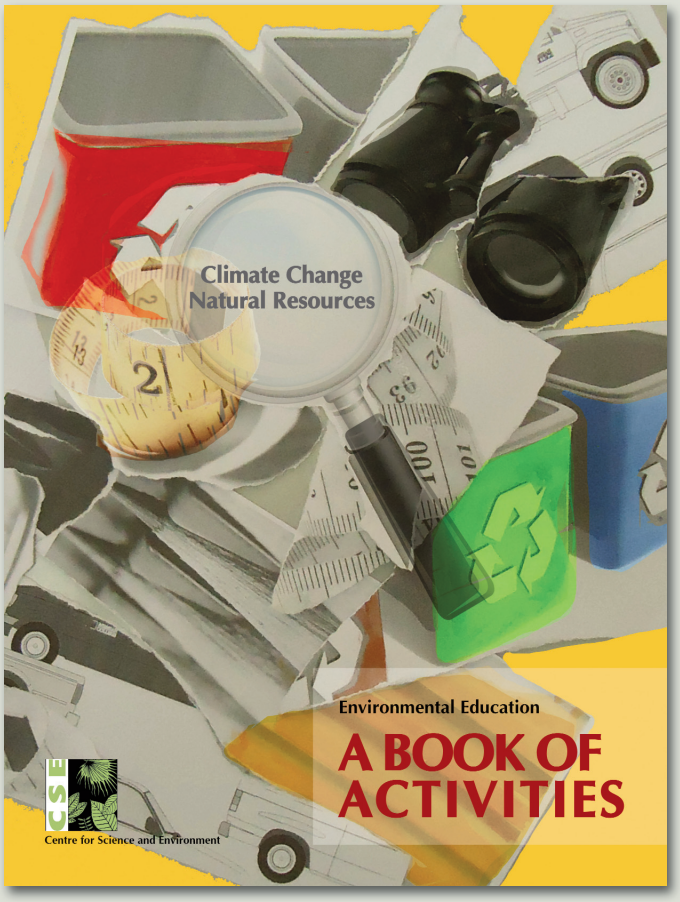
Here are some of the reasons that have fuelled the mass outburst:

- Americans living in poverty: more than 46 million
- Americans without health insurance: close to 50 million
- Americans without jobs or underemployed: between 24 and 26 million
- Homeless Americans: 3.5 million

All this in a country with a population of just 312 million. If nothing, these statistics should serve as a reality check for those who believe the free market economy is the solution. Does it have to be said that India needs to find its own ways of dealing with its many crises? ■

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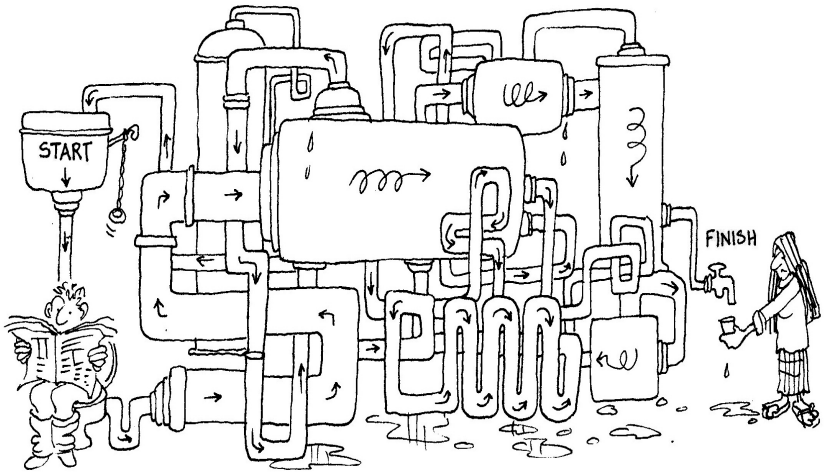
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The fast growing economy, urban population in India along with increasing wastewater generation gives reason for concern and the need for appropriate water management practices. The sewerage network and the centralised treatment plants often fail to address the needs of the communities in terms of collection, treatment and disposal of domestic wastewater. There is a big gap between the amount of sewage generated and the amount being treated in urban centers.

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- Review of the existing treatment practices
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